United States Patent

[11] **3,585,365**

[72] Inventor **Paul J. Kircher**
Mansfield, Ohio

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[73] Assignee **Westinghouse Electric Corportation**
Pittsburgh, Pa.

[54] **SWITCH AND TIMING MECHANISM FOR APPLIANCES**
5 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **219/512**
[51] **Int. Cl.** **H05b 1/02**
[50] **Field of Search** 219/512; 200/38, 35; 337/123, 126, 127, 140, 384, 387, 390, 341; 338/316

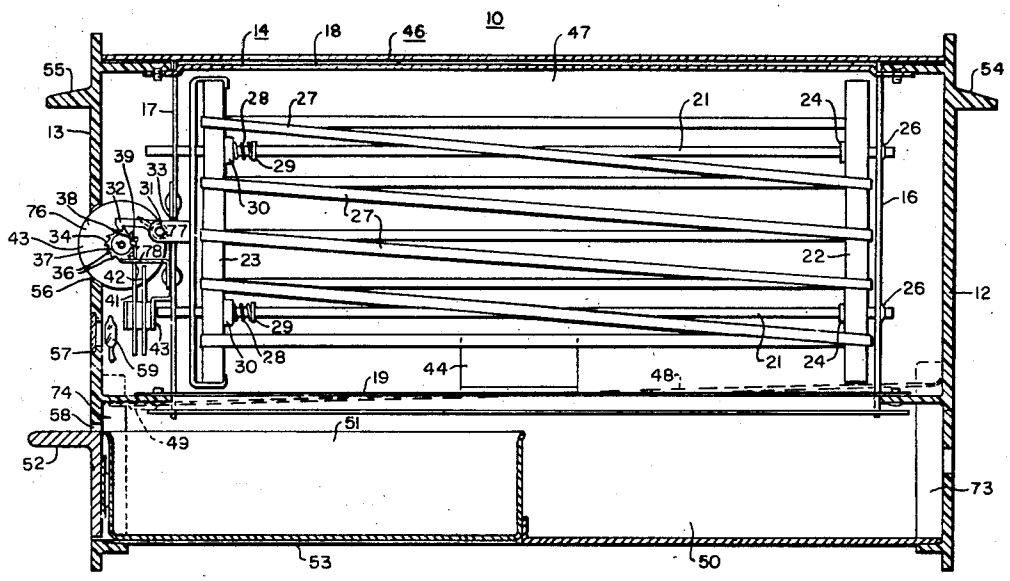
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Primary Examiner—Bernard A. Gilheany
Assistant Examiner—F. E. Bell
Attorneys—F. H. Henson, E. C. Arenz and B. B. Sklar, Jr.

ABSTRACT: An electrical appliance incorporating a heater structure. The appliance which may be a bacon cooker, or the like, is characterized by the provision of a digital timing device which utilizes the expansion and contraction characteristics of the heater structure for actuation thereof. The timing device includes a circuit opening and closing switch which is opened after a predetermined number of heat-up and cool-down cycles of the heater structure. The heat-up, cool-down cycles are accomplished through a temperature responsive, circuit interrupt switch.



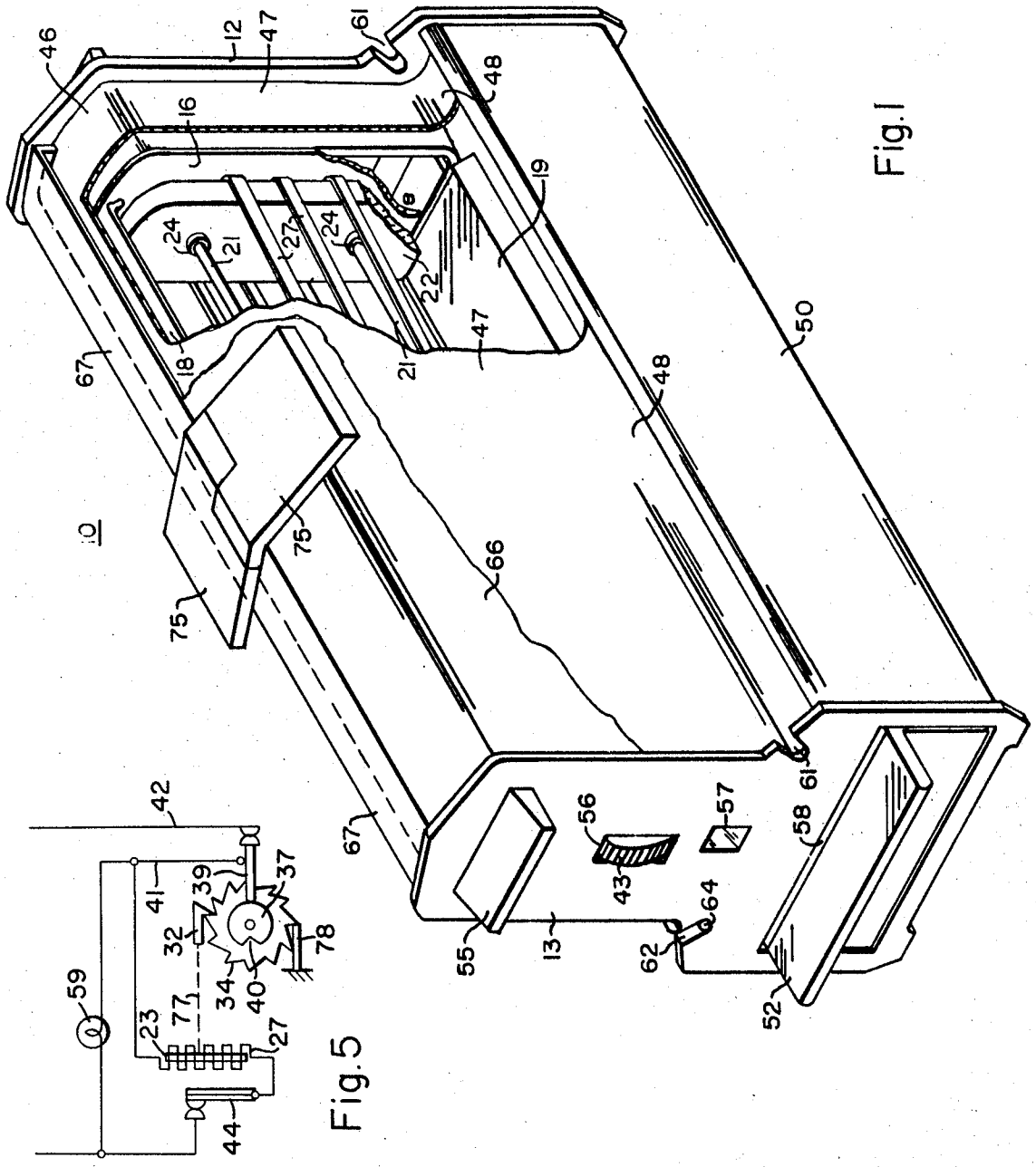

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Fig. 1

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Fig. 5

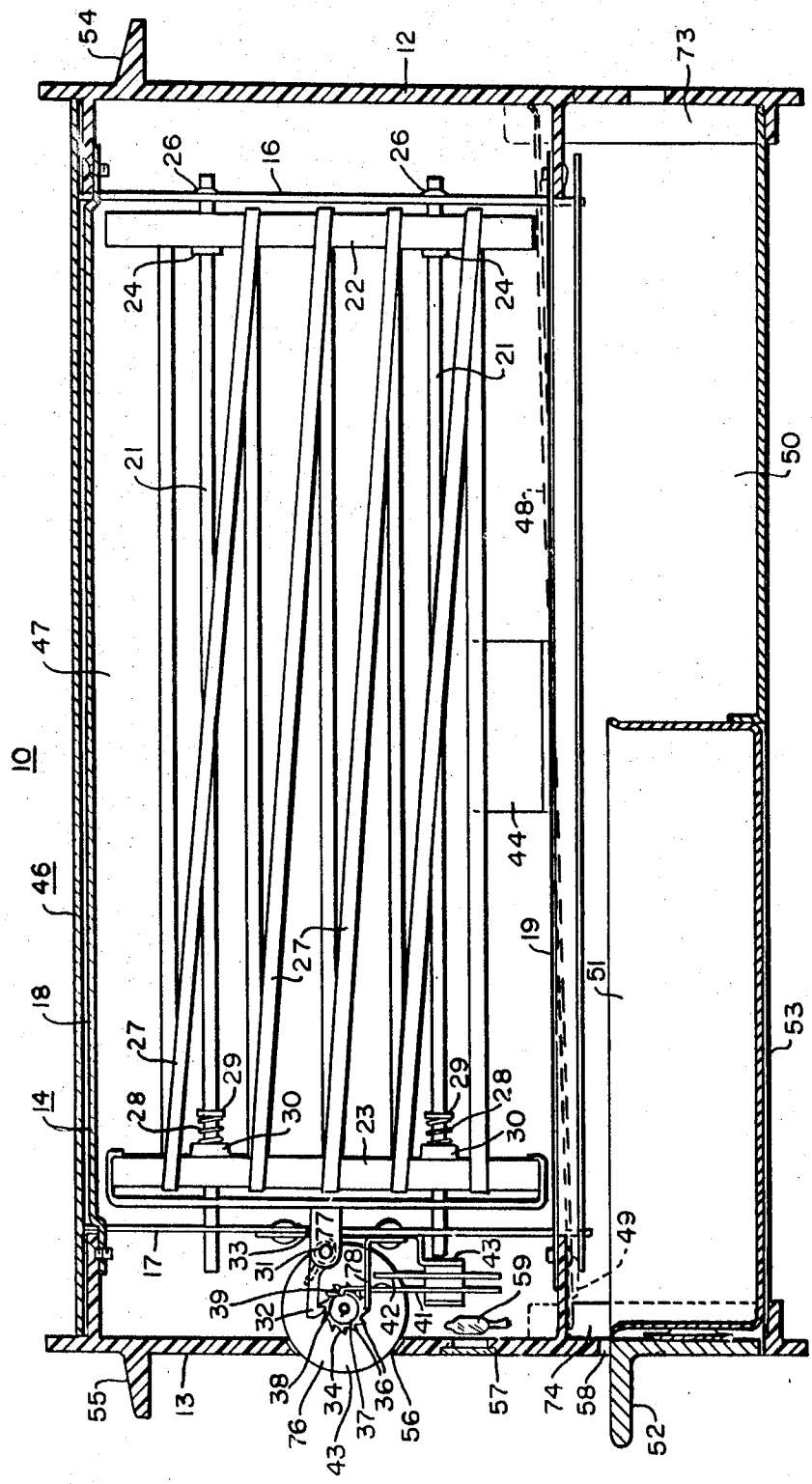

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Fig. 2

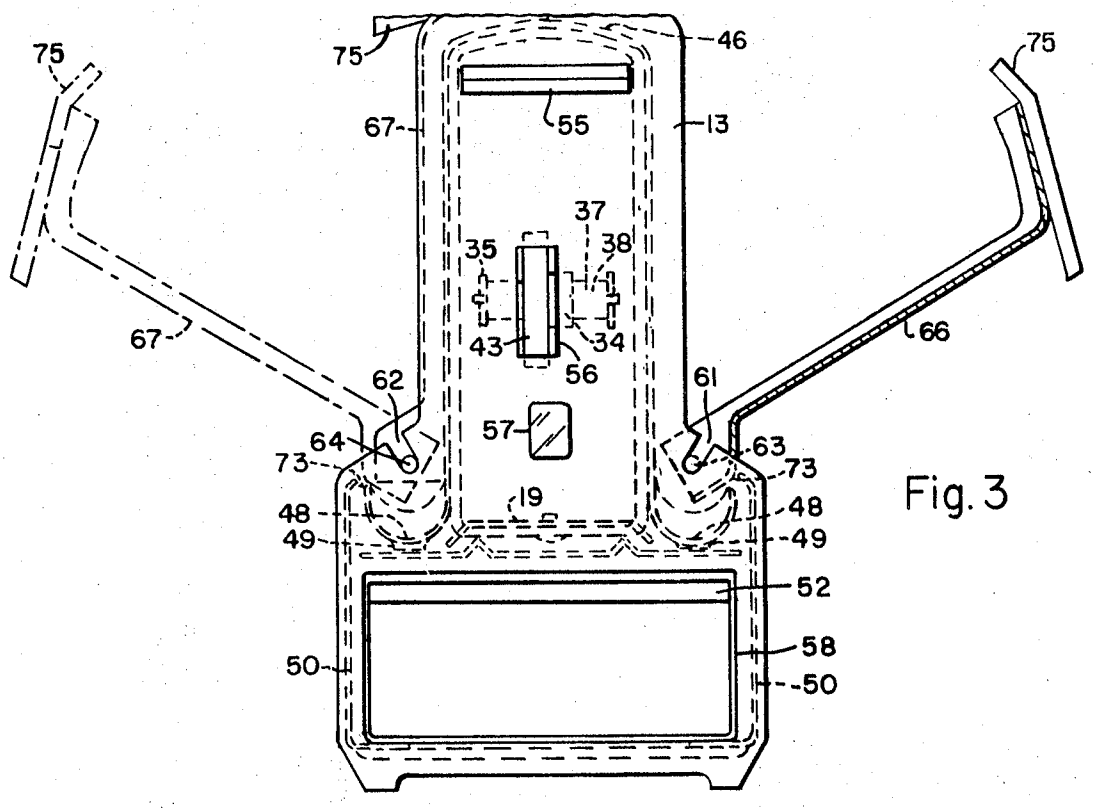

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Fig. 3

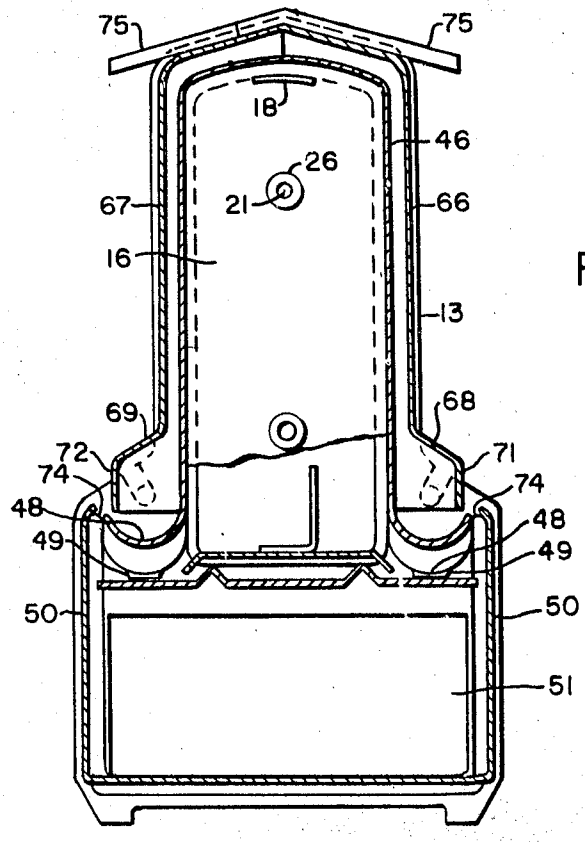

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Fig. 4

SWITCH AND TIMING MECHANISM FOR APPLIANCES

BACKGROUND OF THE INVENTION

This invention relates, in general, to appliances incorporating resistance heating elements therein and, more particularly, to automatic timing mechanism for a cooking appliance such as the bacon cooker disclosed in copending application Ser. No. 815,899 of common assignee.

It is well established that the maximum capacity of domestic type toasters is four slices, and the average capacity of known bacon cookers is approximately one half pound. In contrast to the foregoing, the mealtime requirements of an average family may be on the order of a pound of bacon and between 10 to 12 slices of toast. Quite obviously, such requirements will necessitate reloading of the toaster and bacon cooker, the former, perhaps more frequently than the latter. To this end, it is necessary that a suitable timing device (i.e. one which automatically compensates for the effect of previous loadings and for fluctuations in line voltage) be employed. Timing mechanism of the prior art incorporating automatic compensation of the type herein contemplated are very complex and, consequently, quite costly.

Accordingly, the general object of this invention is to provide in an appliance incorporating a heater, new and improved timing mechanism.

It is a more particular object of this invention to provide a new and improved timing mechanism for an appliance which has automatic compensation for prior heating of the appliance.

Another object of this invention is to provide a new and improved timing mechanism which utilizes a minimum number of parts and which can be fabricated inexpensively in accordance with simple manufacturing techniques.

BRIEF SUMMARY OF THE INVENTION

Briefly, the above-cited objects are accomplished by the provision, by way of example, in a bacon cooker, of a resistance heater which is wrapped around spaced apart insulators, one of which is stationarily mounted in a housing structure and the other of which is movably mounted therein.

The heater structure forms a part of an electrical circuit which includes an on-off switch and a thermomotive member. The thermomotive member is responsive to the ambient temperature in the area of the heater structure and serves to open and close the circuit to the heater structure to effect expansion and contraction thereof, to thereby effect movement of the movable insulator, which is spring biased in the direction of expansion of the heater structure.

The pawl of a ratchet wheel and pawl arrangement is supported by the movable member such that the wheel is rotated one notch each time the heater structure heats up and cools down. A detent on the ratchet wheel for receiving a projection carried by one of a pair of switch arms, effects opening of the switch to terminate operation of the appliance.

Further objects and advantages of the present invention will become apparent in view of the drawings and detailed description forming a part hereof.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a bacon cooker incorporating the invention;

FIG. 2 is a side elevational view, partly in elevation and partly in section, of the device shown in FIG. 1;

FIG. 3 is an end view of the device shown in FIG. 1, but with its covers removed;

FIG. 4 is a view of the opposite end of the device from that shown in FIG. 3; and,

FIG. 5 is a circuit diagram for the appliance including a schematic drawing of the timing mechanism.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, especially FIGS. 1 and 2, reference character 10 designates generally a bacon cooker comprising a housing structure generally indicated at 11.

The housing structure 11 comprises a pair of nonmetallic end caps 12 and 13 attached to a framelike support structure 14. The support structure consists of spaced apart vertically oriented members 16 and 17 and spaced apart and horizontally disposed cross members 18 and 19 (see FIG. 2).

A pair of horizontally disposed rods 21 extending between members 16 and 17 are received in apertures appropriately spaced in the members 16 and 17. Rods 21 also extend through and support vertically extending insulating blocks 22 and 23 generally adjacent the support members 16 and 17. Both rods 21 and at least one of the blocks (in this instance block 22) are stationarily mounted as by a collar member 24 which abuts block 22 and a retaining spring washer 26 which abuts support member 16, whereas the other block 23 is mounted for limited sliding movement on the rods 21. Block 22 is resiliently urged in one direction by a coil spring 28 carried by each rod and in abutting relationship between stationary collars 29 of each rod and hubs 30 of the block member 23.

A ribbon heater structure 27 wrapped around the insulator blocks 22 and 23 provides the heat for the cooking of the bacon, as will be discussed hereinafter. It will be understood that as the heater structure is energized, it expands along the longitudinal axis of the cooker or, as viewed in FIG. 2, horizontally and in the plane of the paper. The coil spring 28 carried by each rod 21 collar 29 of the rod and the block member the 23 moves the block 23 to the left as viewed in FIG. 2 as the heater structure 27 expands.

Such movement of the block 23, as discussed above, also imparts movement to a pawl structure 31 which is carried thereby, such that a fingerlike component 32 moves, generally, along the longitudinal axis of the cooker 10. The free end of the pawl structure 31 extends through an opening 33 in the support member 17 and cooperates with a ratchet wheel 34 rotatably mounted between two arms 35 carried by the support member 17. The fingerlike component 32 rides on and engages, one at a time, ratchet wheel teeth 36, of which there are 12 . The teeth 36 are provided on the circumference of the wheel 34 and while there are presently contemplated 12 such teeth, any number may be employed.

The wheel 34 has a hub 37 which provided with a cam surface 38 on which a follower 39 rides. The follower 39 forms an integral part of a contact carrying arm 41 of a switch 42, mounted by bracket 43 to the support 17. The cam surface maintains the switch contacts closed throughout its circumference except for a notch 40 which permits movement of the follower 39 sufficient to open the switch. The switch 42 is included in a circuit comprising the heater structure 27 and a thermomotive element, in the form of a normally closed bimetal thermostat 44, which senses ambient temperature in the area of the heater structure and opens the circuit at a predetermined maximum temperature.

A substantially U-shaped cooking plate 46 is supported by the end caps 12 and 13 in such a manner that vertical sidewalls 47 thereof, lie adjacent the heater structure 27. The lower edges of the plate 46 are curved as indicated at 48 to provide sloped troughs thereat. The sloped troughs serve to direct the flow of grease toward one end of the plate, where apertures 49 are provided and through which the grease passes. A removable grease container 51 having a handle 52 is supported beneath the apertures 49 by a bottom cover plate 53. A pair of side panels 50 are received in grooves provided in the end caps 12 and 13 and are thereby held in place intermediate the end caps 12 and 13.

The end caps 12 and 13 are both provided with carrying handles 54 and 55 while the latter end cap is provided with apertures 56, 57 and 58 through which respectively, the wheel

34 extends, an indicator bulb 59 shines and through which the grease container 51 is installed. The end caps 12 and 13 each are provided with a pair of recesses 61 and 62 for receiving trunnions 63 and 64 of cover structures 66 and 67.

The cover structures 66 and 67 are contoured as indicated at 68 and 69 to provide 71 and 72 (see FIG. 4) which engage surfaces 73 and 74 of the end caps 12 and 13 to hold the cover structures in an open position for installation of bacon on the cooker plate 46. Each cover structure is provided with one-half of a combination of lock and handle assembly 75 which holds the covers together during cooking. It will be appreciated that the cover members could be readily removed, if desired, when loading the cooker.

OPERATION

To load the cooker 10, the cover structures 66 and 67 are spread apart, as shown in FIG. 3 or completely removed. Bacon is placed on the cooking plate 46 and the covers are closed. Incidentally, the cooking plate may be coated with a nonstick material, for example, polytetrafluoroethylene. Referring now to FIG. 5, the ratchet wheel is integrally connected to and manually rotatable by a knurled wheel 76 which has the numbers 1 to 12 printed on the circumference thereof for convenience in setting the wheel at a desired position depending on how "done" the bacon is to be cooked and correspond to the manual rotation of teeth on the ratchet wheel. The wheel 76 from its off position where the switch 42 is open corresponding to follower 39 in the cam notch, closes the switch whereupon the heater structure 27 becomes energized. As the heater structure 27 expands the springs 28 move the block member 23 and the pawl 31 to the left, as viewed in FIG. 2. As the fingerlike component 32 moves to its extreme left position, it is moved upward, against the bias of a spring 77, by one of the teeth 36 and drops behind the next tooth due to the force of the spring 77. When the predetermined maximum temperature, as determined by the calibration of the thermomotive element 44, has been reached, the circuit to the heater structure is opened and the heater is allowed to cool down, causing it to contact to its initial position the effect of which is to move the block 23 back to the right, and consequently, move the pawl element 31 to the right which causes the wheel 76 to rotate one increment. The bimetal upon sensing the relatively cool ambient temperature would again close, energizing the circuit causing the expansion and subsequent contraction to again repeat. Assuming the wheel 34 was set at six, then the foregoing would take place six times before the cam notch position would correspond with the follower 39 such that the switch 42 would be opened and the operation of the cooker terminated. A locking pawl or detent 78 prevents backward rotation of the wheel 34.

Since numerous changes may be made in the above apparatus and different embodiments may be made without departing from the spirit thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings be interpreted as illustrative and not in a limiting sense.

What I claim is:

1. A cooking appliance including:
a cooking surface;
means for heating said surface;
a temperature responsive switch means adjacent said surface;
on-off switch means for automatically timing the duration of a cooking operation, said temperature responsive switch and said timing switch serially connected to said heater;
means for mounting said heating means generally adjacent said cooking surface and including means movable with said heating means in response to expansion and contraction of said heating means;
said on-off timing switch means including,
first and second resilient contact arms;
cam means rotatively mounted abutting said first arm to control the closing of said first and second contact arms;
ratchet means operatively connected to said cam means to incrementally rotate said cam means; and
pawl means mounted on said movable means to engage said ratchet means and rotate said cam in response to a cycle of expansion and contraction of said heating means whereby the relative initial angular displacement of said cam means with respect to said first arm determines the number of cycles of expansion and contraction required to rotate said cam to a position at which said on-off timing switch is off thereby timing the duration of the cooking cycle.

2. A cooking appliance according to claim 1 wherein said pawl engages said ratchet to advance said cam only on contraction of said heating means.

3. A cooking appliance according to claim 2 wherein said heater is a ribbon resistance heater and said movable means includes opposing insulators supporting said ribbon heater spirally wound thereon, said insulators being biased apart to maintain said heating means tightly wound thereon and permit movement thereof from the contraction and expansion of the heating means.

4. A cooking appliance according to claim 3 wherein one of said insulators is held stationary and the other of said insulators is movably mounted to conform to the movement of said heaters.

5. A cooking appliance according to claim 4 wherein said pawl is attached to said movable insulator.