

Oct. 25, 1966

A. D. ALTEMILLER
COMBINED WAFFLE IRON AND MULTIPLE HEAT
WARMING APPLIANCE AND CONTROL THEREFOR

3,281,577

Filed April 13, 1964

4 Sheets-Sheet 1

Fig- 1

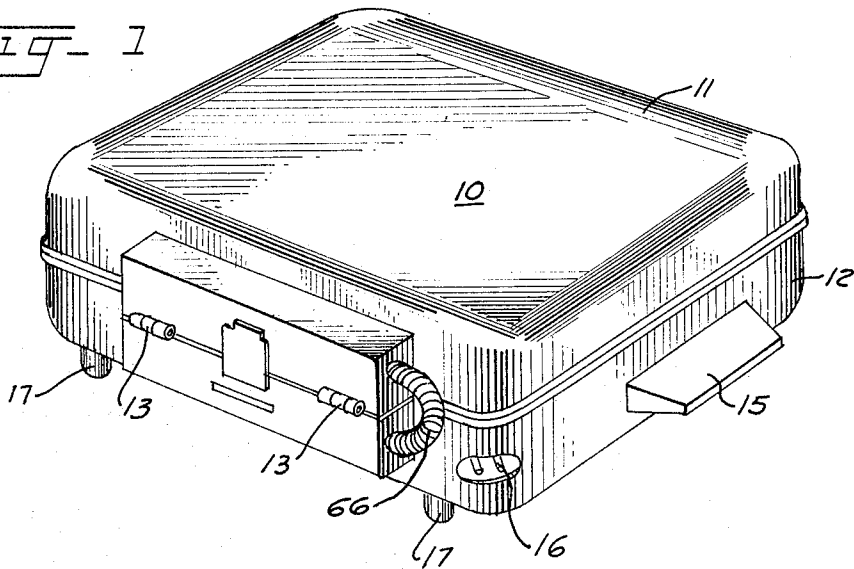


Fig- 2

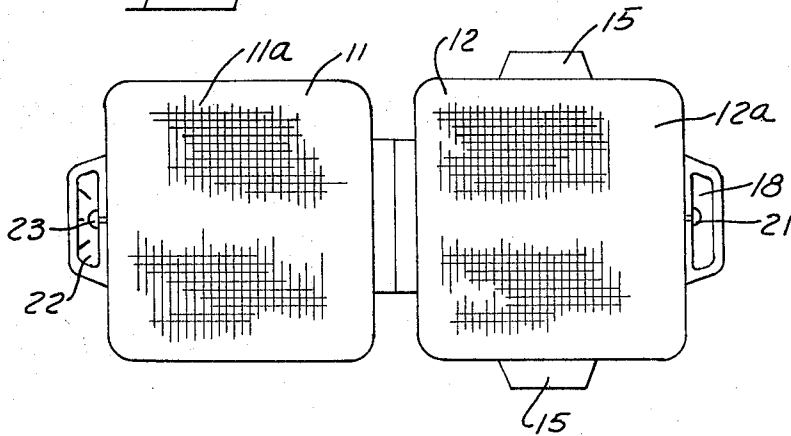
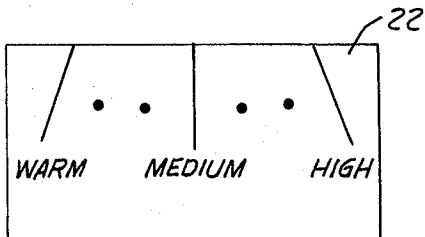


Fig- 3



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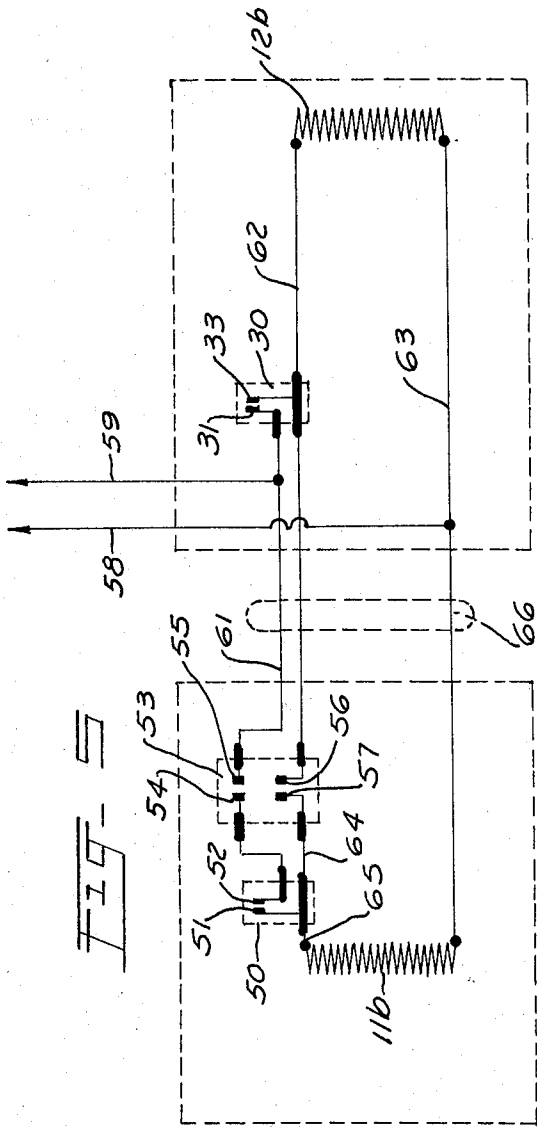
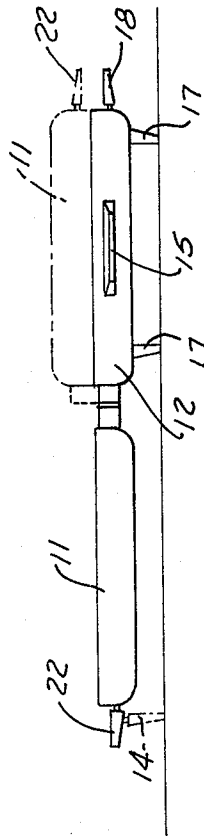


FIG- 4



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FIG. 6

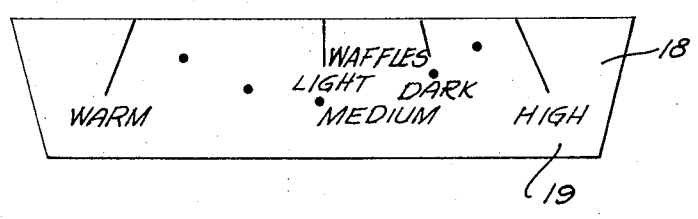


FIG. 7

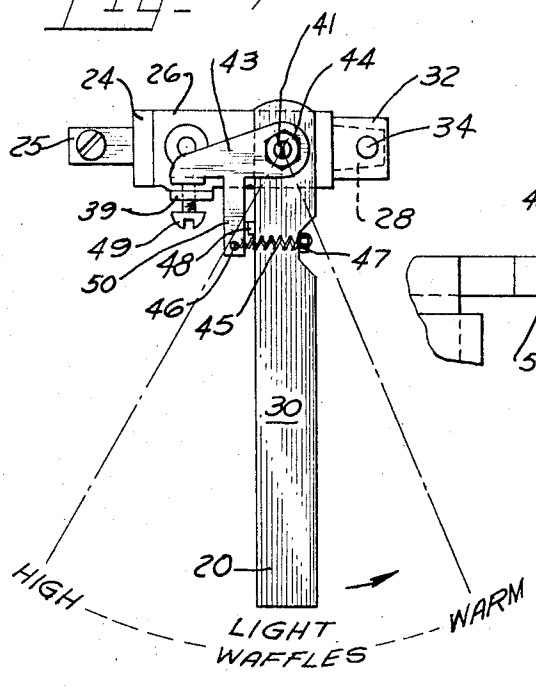


FIG. 8

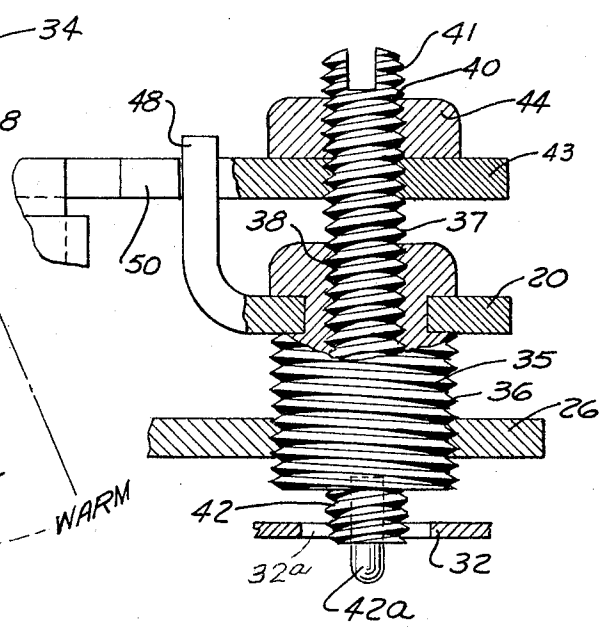
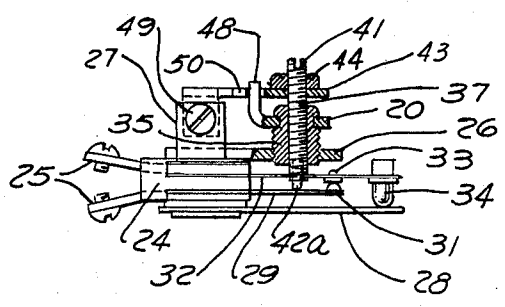


FIG. 9



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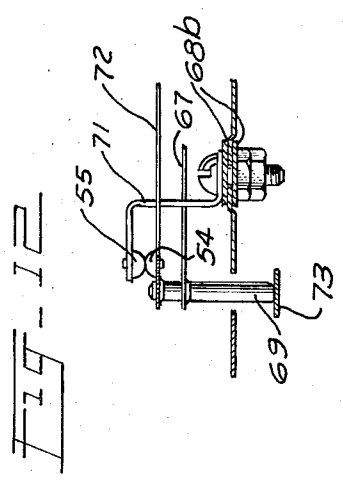
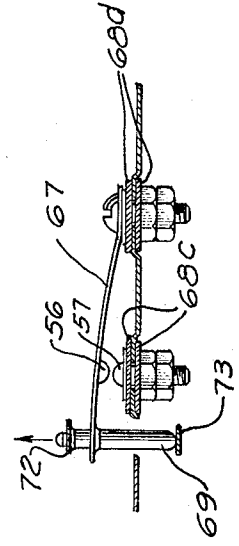
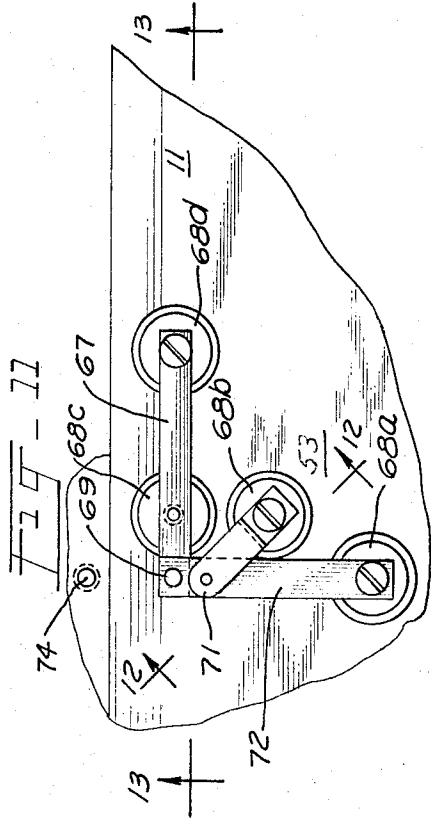
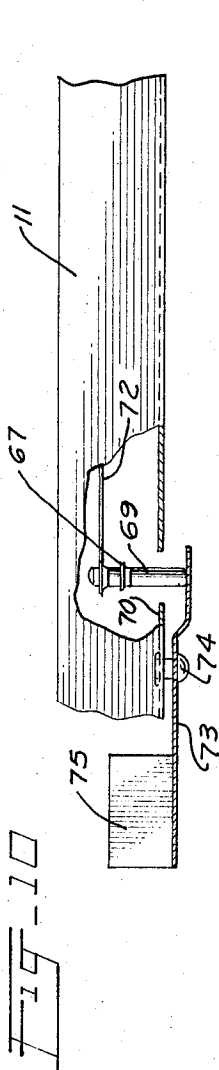
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COMBINED WAFFLE IRON AND MULTIPLE HEAT WARMING APPLIANCE AND CONTROL THEREFOR

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5 Claims. (Cl. 219—524)

This invention relates to a combined waffle iron and multiple heat warming and cooking appliance and control therefor.

It is an object of the invention to provide a new and novel thermostat and switch circuit which makes possible separate thermostatic temperature control of the upper and lower grids of a hinged double grid appliance when the appliance is in the fully opened position for grilling and warming, and without any adjustment or change by the operator when the appliance is closed, to make it possible to utilize a single thermostatic temperature control for those operations which are normally performed with the appliance closed, namely waffle making and sandwich toasting.

It is also an object of the invention to provide an appliance which, when in the open position, has separate controls for the upper and lower grids to make it possible to obtain either low temperature or warming operation on one grid, and grilling or high temperature operation on the other grid.

It is also an object of the invention to provide a novel control circuit for accomplishing the foregoing.

It is a further object of the invention to combine a two-stage thermostat with a novel control circuit to obtain the various temperatures for the grids desired, both when the grids are in the open position and when they are in the closed position.

It is another object of the invention to provide an appliance wherein with the top shell closed and waffle grids inserted it is possible to bake waffles at about 450° F. and also in the closed position sandwich grids may be inserted to toast sandwiches at about 475° F. Also it is an object to be able to use the appliance with the top shell opened for either grilling at temperatures in the order of 450° F. or for food warming at temperatures in the order of 175° F.

It is an additional object of the invention to provide a combined waffle iron and warmer or cooking appliance wherein in the closed position the lower and upper grids of the waffle iron are heated under the control of a single adjustable thermostat, preferably of a two-stage type, and wherein when in the open position, the lower grid and the upper grid may be heated under control of separate adjustable thermostats, one of which is said two-stage thermostat; and to provide a circuit so that when the appliance is in the open position, the upper grid may be supplied with power under the control of its separate thermostat, automatically brought about by the opening of the appliance, and wherein when the appliance is closed, power is automatically no longer supplied through the controlling thermostat for the upper grid but is supplied to both the upper and lower grids through the two-stage thermostat.

The above and other objects and features of the invention will be more readily apparent from the following description when read in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective view of a combination waffle iron, sandwich toaster, grill and warmer in the closed position;

FIGURE 2 is a top view of the appliance shown in

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FIGURE 1 with the halves thereof shown in open position;

FIGURE 3 is a top view of the plate or dial for association with a control knob for the top shell or half of the appliance;

FIGURE 4 is a side view of the appliance shown in FIGURE 1 with the halves thereof shown in open position, the dot and dash lines showing the halves closed;

FIGURE 5 is a wiring diagram for the thermostat elements, switches and heaters for the two halves of the waffle iron;

FIGURE 6 is a top view of the plate or dial bearing various legends attached to the bottom half of the waffle iron;

FIGURE 7 is an elevational view of a thermostat shown inverted from its normal position in the bottom of the waffle iron;

FIGURE 8 is a sectional view of a portion of the thermostat in the same position as it is shown in FIGURE 7;

FIGURE 9 is an enlarged sectional view of a thermostat shown in FIGURE 7;

FIGURE 10 is a view partially in section illustrating a part of the gravity operated switch which is mounted on the upper shell 11;

FIGURE 11 is a top plan view of the gravity switch;

FIGURE 12 is a view partially in section of one set of contacts and a ceramic insulator pin, taken on line 12—12 of FIGURE 11; and

FIGURE 13 is a view of the other set of contacts and the ceramic insulator pin, taken on line 13—13 of FIGURE 11.

Referring specifically to the drawings for a detailed description of the invention, numeral 10 designates a combination waffle iron, sandwich toaster, grill and warmer. The appliance 10 comprises two halves 11 and 12 hinged at 13. A leg 14 is shown in FIGURE 4 and cooperates with feet 17 to support the appliance in the open position with the halves 11 and 12 as shown in FIGURES 2 and 4. Handles 15 and a pair of prongs 16 to cooperate with an electrical plug are provided.

As shown in FIGURE 2, the lower half of the appliance 12 is provided with a dial 18 above which a knob 21 is attached to a control lever 20, is provided. The dial 18 is provided with legends 19 as best shown in FIGURE 6 and, for example, may include the words "Waffles," "Light," "Dark" and "Medium" in the central portion thereof, the word "High" adjacent the right hand side of the dial, and the word "Warm" adjacent the left hand side of the dial.

A thermostat generally shown by the numeral 30 is illustrated in FIGURES 7, 8 and 9. The thermostat assembly is generally attached to and senses the temperature of a grid 12a in the lower half of the appliance. A grid 11a is positioned in the top half 11 of the appliance. A dial 22 and a control knob 23 for adjusting a thermostat 50 are provided in the top half 11.

The body or frame portions of the thermostat 24, 26 and 27 are standard, as are the terminals 25 which are fastened to the insulated body portion 24. The body portion 24 of the thermostat which is formed of a block of insulating material also retains a bi-metal strip 28 which moves in response to changes in temperature. Contact switch blades 29 and 32 are also secured to the insulated material 24, the switch blade 32 being the longer of the two. Contacts 31 and 33 are provided upon switch blades 29 and 32 respectively and are adapted to open and close as the bi-metal element 28 moves in response to changes in temperature and thus move an insulated stud 34. One of the switch blades 32 is biased in a direction tending to close the contacts 31 and 33 and the bi-metal

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element 28 operates against such bias to open the contacts 31 and 33 when the desired temperatures of the grids are reached. Thereafter as the temperature in the lower grid 12a decreases, the bi-metal element 28 moves in the opposite direction to permit the contacts 31 and 33 to again close.

A threaded annular control member 35 having external left hand threads 36 is screwed into the support 26 and has the control arm 20 rigidly secured thereto. The threaded control member 35 is also threaded internally with right hand threads at 38 and a threaded insert or elongated control member 37 having cooperating right hand threads 40 thereon is screwed into the member 35. The threaded member 37 extends out of the threaded annular control member 35 at both ends thereof, as shown at 41 and 42. A tip 42a formed of insulating material is secured, by cementing onto, or by press fit into a recess formed in, the end 42 of control member 35 and contacts the lower switch blade 29 to move it. The blade 32 is provided with a hole 32a to provide for passage through of tip 42a and screw end 42, and for avoiding any electrical contact between blade 32 and control member 37.

A range change arm is shown at 43 and is secured to the internal threaded control member 37 by a lock nut 44, so that after adjustment the arm 43 and nut 44 move together. A spring 45 is connected at 46 to an extension 50 of range change arm 43 and at 47 to control lever 20.

A stop arm 48 is provided on the control lever 20 for a purpose hereinafter described.

The operation of the thermostat 30 will now be described. Assuming that the lever 20 is first in the "High" position, the threaded control member 35 is rotated upwardly in member 26 so that the bimetal element 28 may maintain contacts 31 and 33 closed until a higher temperature is reached. As the control arm 20 is moved from the "High" position down to the "Light Waffles" position, for example, the threaded control member 35 rotates in the mounting plate 26. Since the control member 35 has a left hand thread on the outside, the movement on the part of the control lever 20 causes contacts 31 and 33 to open at a lower temperature of the grid, since the switch blade 29 is forced downwardly by the tip 42a. During the range of movement of the control arm 20 from "High" down to "Light Waffles," the range change arm 43, the lock nut 44 and the low temperature elongated threaded control member 37 all move to the right as viewed in FIGURE 7 because the spring 45 holds these parts together.

When the control lever 20 is moved further to the right, as viewed in FIGURE 6, to the "Warm" position, the thermostat shifts to double thread operation because the high temperature adjusting screw 49, which is attached to a flange 39 on mounting plate 26, stops the range change arm 43 from moving further with the control arm 20. During this latter range of movement of the control arm 20, spring 45 elongates and the threaded control member 35 threads out of the mounting plate 26 and at the same time threads upward on the low temperature elongated control screw 37, and the low temperature elongated control screw therefore moves downwardly. The result is that between the "Light Waffles" position and the "Warm" position of the control arm 20, any change in thermostat knob 21 positioning affects the position of the insulating tip 42a by the addition of two thread movements, one being the threaded movement of control screw 35 in the mounting plate 26 and the other being the threaded movement of control screw 37 in the threaded control member 35. The effect is that bi-metal element 28 will cause the contacts 31 and 33 to open at a lower temperature.

When the control arm 20 is returned from the "Light Waffles" position to the "High" position, it rotates the annular control member only in support 26 to raise tip 42a and thus increase the temperature of the grids before contacts 31 and 33 are opened by the bi-metal strip 28. At

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the same time stop arm 48 contacts the low range control arm 43 and moves it with the control arm 20 so that there is no relative movement between the elongated threaded control member 37 and the annular control member 35. As stated, upon return movement from the "High" to the "Light Waffles" position of the control arm 20, spring 45 retains the parts together and control arm 43 moves with control arm 20, the stop arm 48 being moved back to the position as appears in FIGURE 5 when it is on "Light Waffles."

To calibrate the thermostat both the low temperature threaded control member 37 and the screw 49 must be adjusted. The low temperature range should be calibrated first and in order to accomplish such calibration the lock nut 44 should be loosened slightly and the low temperature threaded control member 37 should be adjusted until the bottom grid temperature stabilizes at 175° F. with the appliance in full open position as shown in FIGURE 2, and with the control knob 21 positioned at the "Warm" marking on the control dial 18. The second adjustment is to calibrate the high temperature setting. This is accomplished by positioning the thermostat knob 21 at the "Medium Waffles" position on dial 18 and then adjusting the high temperature adjusting screw 49 until the waffle grids' temperature stabilizes at approximately 440° F. with the two halves closed as shown in FIGURE 1. The point along the dial 18 where the thermostat shifts to double threaded operation is approximately at the "Light Waffles" position, the exact point of shifting varying slightly depending upon minor tolerance variations in the component parts.

From the foregoing it will be apparent that I have provided a novel two-stage thermostat which is applicable to a variety of control purposes, which provides one range of temperatures in a substantially uniform progression of temperatures and a second range of temperatures in a non-uniform or different rate of progression of temperatures. The thermostat provides two or more different rates of temperature change adjustments with one rate of manual control movement. It also provides readily adjustable built in calibrations for each temperature range.

It is to be understood that it is possible to change the threads' combination in such a manner to obtain temperatures along the dial 18 to reverse their direction after the thermostat has shifted into its second stage or double threaded stage of movement. It is also possible to add a third or fourth threaded position to make possible a three-stage or four-stage thermostat or any number of stages desired.

Also threads of the same pitch or different, both right or both left, may be utilized depending on the result desired. In fact any arrangement which results in one thread movement for a part of the travel of control arm 20 and a double thread movement for another part of said travel is contemplated in practicing my invention.

Referring now particularly to FIGURES 4 and 5, FIGURE 4 shows the appliance in the open position in full lines with the leg 14 in the lowered position to support the top half or shell 11. The top half 11 is shown in this figure in dotted lines in the closed position. The heating elements for the top and the bottom grids 11a and 12a are numbered 11b and 12b respectively. It is understood that the waffle grids 11a and 12a may either be removed and sandwich or cooking plates substituted therefor or, in some instances, such cooking plates are attached to the waffle grids. These plates are not shown.

The bottom two-stage thermostat 30 is illustrated in FIGURE 5, as are the contacts 31 and 33. The thermostat for the top half of the appliance, which is operative only when the shells are opened, as shown in FIGURE 4, illustrated at 50 and includes contacts 51 and 52. This thermostat is a standard thermostat using a bi-metal element and the details are not shown since they form no part of the invention.

A gravity operated switch is shown at 53 and includes one set of cooperating contacts 54 and 55 and a second set of cooperating contacts 56 and 57. The power source is supplied through wires 58 and 59 connected to the prongs 16, and wire 58 is connected to a wire 63 which is connected to one side of the heating elements 11b and 12b. Wire 59 is connected to a wire 61 which connects to contact 31 of thermostat 30 and to contact 55 of the gravity operated switch 53. A wire 62 is connected to the opposite end of heating element 12b and to contact 33. Wire 62 is also connected to contact 56 of the gravity operated switch 53. A wire 64 connects contact 57 of the gravity operated switch 53 to contact 51 of thermostat 50 and a wire 65 connects the contact 51 to the opposite end of heating element 11b. 66 illustrates diagrammatically in FIGURE 5 the flexible connection or leads between the top and bottom heating elements.

The gravity operated switch 53 is constructed so that contacts 54 and 55 are closed when the appliance is in the open position as shown in FIGURES 2 and 4. In this position contacts 56 and 57 are open. In the closed position, as shown in FIGURE 1, contacts 54 and 55 are open and contacts 56 and 57 are closed.

The gravity operated switch is shown in detail in FIGURES 11 to 14 inclusive. The switch is mounted on the upper shell 11 by means of a plurality of insulating washer assemblies 68a, 68b, 68c and 68d. A movable switch arm 67 (FIGURE 13) is shown mounted at one end thereof on the insulating washer means 68d and carries the contact 56 and also a ceramic insulator pin 69. Contact 57, which is adapted to cooperate with contact 56, is shown mounted stationary on the insulating washer means 68c.

The contact 55 is mounted on a Z-shaped, substantially rigid, switch blade 71 which is secured to the shell 11 by the insulating washer means 68b (FIGURES 11 and 12). The stationary contacts 55 and 57 are thereby positioned at a pre-set spacing. The contact 54 which is adapted to cooperate with stationary contact 55 is mounted on a flexible and movable blade 72 which is secured at one end thereof to the shell by the insulating washer 68a (FIGURE 11). The other end of flexible switch blade 72 also is connected to the ceramic insulator pin 69 so that in effect, the extended ends of blades 67 and 72 are linked together by pin 69, and the contacts 54 and 56 move together with pin 69. However, movement of pin 69 in one direction operates to cause one set of contacts to open while the other set closes, and movement in the opposite directions reverses the opening and closing of the pairs of switches.

A weight 75 is mounted on a lever member 73 which is pivoted or fulcrumed at 74 on the upper shell 11. The lever 73 has an extension or arm which is adapted to engage the ceramic insulator pin 69 when the shell 11 is in the open position to bias it upwardly. The flexible switch blades 67 and 72 are normally biased downwardly.

When the shells are open, as shown in FIGURE 4, the weight 75 pivots at 74 and, as stated, forces the ceramic insulator 69 upwardly against the bias of blades 67 and 72, thus opening contacts 56 and 57 and closing contacts 54 and 55. However, when the top shell 11 is in the closed or dot-dash line position in FIGURE 4, the weight 75 moves the member 73 so that it does not contact the ceramic insulator pin 69, whereupon the bias in blades 67 and 72 causes contacts 56 and 57 to close and contacts 54 and 55 to open.

It will be apparent from the foregoing that when the appliance is in the open position, as shown in FIGURE 2, both the bottom thermostat 30 and the top thermostat 50 are supplied with power from the line 58, 59 and likewise both heating elements 11b and 12b are supplied with power through their respective thermostats, the top element 11b having power supplied thereto because contacts 54 and 55 of the gravity operated switch are closed. At this time, contacts 56 and 57 of the gravity operated

switch are open so that no power is supplied through the bottom thermostat 30 to the heating element 11b.

When the appliance is in the closed position, as shown in FIGURE 1, power is supplied to both heating elements 11b and 12b from the line 58 and 59 through contacts 31 and 33 of the bottom two-stage thermostat 30 and through the now closed contacts 56 and 57 of the gravity operated switch 53. At this time, since contacts 54 and 55 of the gravity operated switch are open, no power is supplied to heating element 11b through thermostat 50.

From the foregoing it will be apparent that when the appliance is in the open position, as shown in FIGURE 2, the bottom heating element 12b is under the control of the two-stage thermostat 30 and the top heating element 11b is under the control of the single stage thermostat 50. However, when the appliance is closed, as shown in FIGURE 1, the two-stage thermostat 30 controls the flow of power to both the heating elements 11b and 12b. The normal use of the appliance with the grids closed is for waffle making or sandwich toasting and for these operations it is not necessary to separately control the temperatures of the top heating element because it is standard practice to have the wattage of the top and bottom heating elements designed for such wattage proportions relative to each other, and with single thermostatic temperature control of the lower grid the same color results on the top side of the waffle as on the bottom side thereof. The same is true of sandwich toasting operation.

For grilling operation with the top shell opened and folded down horizontally 180° from its closed position, as stated, separate thermostats control each heating element and any temperature within the range of the separate thermostats may be obtained, the bottom heating element having a wider range of temperatures because of the two-stage thermostat 30. For food warming operation with the top of the appliance in the open position, as shown in FIGURE 2, both the top thermostat 50 and the bottom thermostat 30 will be set to the position "Warm" on the dials.

In utilizing the invention, the circuits and switches make possible separate temperature control of the upper and lower grids or plates when the appliance is in the fully open position (as for grilling and warming) and without any adjustment or change by the operator when the appliance is closed make possible single thermostatic control for those operations (waffle making and sandwich toasting) that are normally performed with the appliance closed. It is also understood that when the appliance is in the open position as for grilling or warming, separate controls for the upper or lower grids or plates make possible low temperature or warming operation on either grid and grilling or high temperature on the other grid.

While one embodiment of the invention has been shown and described herein, it will be understood that it is illustrative only and not to be taken as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

I claim as my invention:

1. An appliance for cooking or warming a variety of foods, comprising a base shell and a cover shell, a pair of surfaces adapted to be heated, one of which is associated with each of said shells, said cover shell being pivotally mounted on said base shell to position said shells, when desired, in closed relation, said pivotal mounting also permitting said shells, when desired, to be positioned in open relation, electric heating means for each of said surfaces, a pair of temperature sensitive thermostats for controlling the supply of electric power to said heating elements, one of said thermostats being associated with each of said shells, each of said thermostats including a pair of contacts which are opened and closed in response to temperature to control the supply of power to said heating elements, a switch, and means

associated with said switch to, in one condition, supply power to one of said thermostats only and to both of said heating elements when the shells are in the closed position, and in a second condition to supply power to both of said thermostats and to each of said heating elements independently through its associated thermostat when the shells are opened.

2. An appliance for cooking or warming a variety of foods, comprising a base shell and a cover shell, a pair of surfaces adapted to be heated, one of which is associated with each of said shells, said cover shell being pivotally mounted on said based shell to position said shells, when desired, in closed relation, said pivotal mounting also permitting said shells, when desired, to be positioned in open relation, electric heating means for each of said surfaces, a pair of temperature sensitive thermostats for controlling the supply of electric power to said heating elements, one of said thermostats being associated with each of said shells, each of said thermostats including a pair of contacts which are opened and closed in response to temperature to control the supply of power to said heating elements, a switch, and means associated with said switch to, in one condition, supply power to one of said thermostats only and to both of said heating elements when the shells are in the closed position, and in a second condition to supply power to both of said thermostats and to each of said heating elements independently through its associated thermostat when the shells are opened, and means for operating said switch automatically by the closing or opening of said shells.

3. An appliance for cooking or warming a variety of foods, comprising a base shell and a cover shell, a pair of surfaces adapted to be heated, one of which is associated with each of said shells, said cover shell being pivotally mounted on said base shell to position said shells, when desired, in closed relation, said pivotal mounting also permitting said shells, when desired, to be positioned in open relation, electric heating means for each of said surfaces, a pair of temperature sensitive thermostats for controlling the supply of electric power to said heating elements, one of said thermostats being associated with each of said shells, each of said thermostats including a pair of contacts which are opened and closed in response to temperature to control the supply of power to said heating elements, a switch, and means associated with said switch to, in one condition, supply power to one of said thermostats only and to both of said heating elements when the shells are in the closed position, and in a second condition to supply power to both of said thermostats and to each of said heating elements independently through its associated thermostat when the shells are opened, and means for operating said switch automatically by gravity by closing or opening said shells.

4. An appliance for cooking or warming a variety of foods, comprising a base shell and a cover shell, a pair of surfaces adapted to be heated, one of which is associ-

ated with each of said shells, said cover shell being pivotally mounted on said base shell to position said shells, when desired, in closed relation, said pivotal mounting also permitting said shells, when desired, to be positioned in open relation, electric heating means for each of said surfaces, a pair of temperature sensitive thermostats for controlling the supply of electric power to said heating elements, one of said thermostats being associated with each of said shells, each of said thermostats including a pair of contacts which are opened and closed in response to temperature to control the supply of power to said heating elements, a switch, and means associated with said switch to, in one condition, supply power to one of said thermostats only and to both of said heating elements when the shells are in the closed position, and in a second condition to supply power to both of said thermostats and to each of said heating elements independently through its associated thermostat when the shells are opened, and means for adjusting the temperature at which at least one of said thermostats operates to open or close its contacts.

5. An appliance for cooking or warming a variety of foods, comprising a base shell and a cover shell, a pair of surfaces adapted to be heated, one of which is associated with each of said shells, said cover shell being pivotally mounted on said base shell to position said shells, when desired, in closed relation, said pivotal mounting also permitting said shells, when desired, to be positioned in open relation, electric heating means for each of said surfaces, a pair of temperature sensitive thermostats for controlling the supply of electric power to said heating elements, one of said thermostats being associated with each of said shells, each of said thermostats including a pair of contacts which are opened and closed in response to temperature to control the supply of power to said heating elements, a switch, and means associated with said switch to, in one condition, supply power to one of said thermostats only and to both of said heating elements when the shells are in the closed position, and in a second condition to supply power to both of said thermostats and to each of said heating elements independently through its associated thermostat when the shells are opened, and means for independently adjusting the temperature at which each of said thermostats operates to open or close its contacts.

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V. Y. MAYEWSKY, Assistant Examiner.