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(54) Hob assembly for range cookers

Kochfeld für Herde

Ensemble de plaque de cuisson pour cuisinières

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Description

[0001] This invention relates to range cookers, especially heat storage range cookers, and to hob assemblies for use in range cookers or other cooking devices.

[0002] It is known to provide domestic cookers which are known as heat-storage type cookers. Perhaps the most well known and loved are the applicant's own Aga and Rayburn Ranges of heat storage cookers. These cookers differ from the pressed steel type because the oven walls are formed of a thick material with high specific heat capacity so that the walls have a relatively high thermal mass. The cavity does not contain a heating element, and the walls also are not provided with a direct heating element. Instead the one or more ovens are in thermal contact with a system of ducts communicating with a combustion chamber which serves as heat source.

[0003] The combustion chamber is fed with a solid fuel, or, and more commonly nowadays, with fuels such as kerosene, natural gas or propane. By making the shell from cast iron, heat from the heat source is stored residually allowing the device to provide constant high temperatures with heat source constantly topping it up if heat is lost (for instance by opening a door to the oven).

[0004] It is also known to provide a heat storage stove with the heat exchange chamber containing one or more resistance heating elements. Two types of electric heat store stoves have been proposed. In the first the heat store is "charged" with heat to a high level using a high power heating element rated at 30 amps at 240 volts. This charging can be performed overnight when electricity is cheaper and then released from the store during the day as required to keep the stove at its operating temperature.

[0005] In all traditional, pre-1980's, heat storage range cookers, heat from the store passes underneath the top of the cooker on the way toward heating the oven cavities or on a return path to the heat store. The top of the cooker comprises a hob (sometimes called a stovetop or cooktop in some countries, the three terms being interchangeable) that is provided with, typically, two circular cast iron plates. The heat raises the temperature of the underside of the cast iron plates, making the top of the plates heat up due to conduction. The plates can then be used as heating zones to heat pans. Insulated lids are provided which cover the plates when not used for cooking, retaining most of the heat in the plates but allowing some warmth to escape. One of the plates is closer to the heat source than the other and will heat up to a higher temperature suitable for boiling water in a pan, the other heating up to a lower temperature suitable for simmering water in a pan. They are sometimes called the hotplate and simmer plate for this reason.

[0006] Because it takes a long time to heat up the cookers are usually left on for extended periods so they are ready to use at meal times. This style of cooking is very different to cooking with a sheet steel cooker, and many people feel that food cooked in a range cooker is preferable. A beneficial side effect of the heat stored in the cast iron of the ovens and heating plates is that a gentle background heat is emitted constantly which gives the room in which it is located a cosy warm feel.

[0007] In another arrangement, the top of the stove may be insulated from the stored heat and a conventional electric hob may be provided, perhaps using ceramic heating elements. These have the advantage that they heat up quickly when required, but do not give the same impression as the conventional range cooker and do not provide the same useful levels of residual heat. Whilst convenient to use, some cooks find conventional electric hobs to lack character compared with the traditional cast iron range cooker hobs, and find they lack the same level of versatility and cosiness. DE4111848 describes an electric stove having recessed boiling plates with heat insulating side walls to continue cooking when current switches off on reaching boiling point.

[0008] An object of the present invention is to provide an alternative hob assembly for a range cooker that provides the same, or a similar, cooking style as a conventional heat storage range cooker with cast iron hot plates, and which may be used with both heat storage and non-heat storage cookers.

[0009] According to a first aspect the invention provides a hob assembly for a range cooker comprising a base having a heating zone, a heating means comprising at least one electric heating element, a thermally insulated lid which can be moved between a closed position in which it covers the heating zone and permits a controlled amount of heat from the heating zone to escape through the lid and an open position in which it is open to allow a pan to be placed on the heating zone, and a control means for controlling the operation of the heating means when in use, characterised in that during use of the hob assembly when the heating zone is switched on and the insulated lid is closed the control means is adapted to apply a current to the heating means to maintain the temperature at a predefined value suitable for cooking and in the event that the lid is subsequently opened the control means automatically causes more current to be applied to the heating means in order to attempt to maintain the temperature of the heating zone close to the predefined value, and in which the control means includes at least one temperature sensitive switch means which is connected in series between a part of the heating means and a power supply, the temperature sensitive switch means being open when the heating zone is switched on and both the temperature is at the predefined value and the lid is closed so that current does not flow through the temperature sensitive switch means, and in response to opening of the lid the temperature sensitive switch means is closed to allow current to flow from the power supply to part of the heating means through the temperature sensitive switch means.

[0010] The assembly of the invention provides a heating zone which can be switched on permanently with the lid closed and which will hold the temperature of the zone

at a predefined cooking temperature in the same way as a traditional heat storage Aga cooker, and upon opening the lid will automatically maintain the temperature of the heating zone close to the predetermined value by applying more current. By providing a highly insulated lid only a small amount of current is needed to maintain the predefined temperature when the lid is closed, the amount of power consumed being dependent on the rate of heat loss through the lid.

[0011] By close to the predefined temperature we mean it maintains a temperature that fluctuates around a temperature within, say, 10 degrees, or 20 degrees or 30 degrees.

[0012] The skilled person will understand that any control system trying to track a target will fluctuate depending on conditions. For example if a cold pan of water is placed on the heating zone the temperature will drop rapidly until the current heating the element brings it back up, and there may be some overshooting and undershooting of the desired temperature. Nevertheless, the invention attempts to maintain the desired temperature automatically.

[0013] The heating means may comprise a first electric heating element that has a first power rating associated with the heating zone and a second electric heating element having a second power rating associated with the heating zone, the first and second heating elements being selectively connected in parallel to an electrical supply through the control means, and a thermally insulated lid which can be moved between a closed position in which it covers the heating zone and permits a controlled amount of heat from the heating zone to escape through the lid and an open position in which it is open to allow a pan to placed on the heating zone.

[0014] The heating zone may be raised above the surrounding base, or otherwise demarcated so that it is easy to identity the heating zone. For instance it may be flush with the surrounding base but marked out by being a different colour to the surrounding base or the same colour but marked by a coloured outline. It may be a different material to the surrounding base. It may typically be circular, and may be heated uniformly or substantially uniformly by the first and/or second heating elements. Where it is circular it may have a diameter of between 20cm and 30cm, or up to 40cm.

[0015] The insulated lid may be fixed to the base or to a part of the range cooker adjacent the base. It may be fixed by a hinge. It may include a handle on the opposite side of the lid to the hinge by which it can be grabbed during opening and closing. The lid may be oversized relative to the heating zone so that the edge of the lid sits outside of the hotspot when it is closed. The edge of the lid may be provided with an insulated, heat resistant, seal, the seal sitting flush with the base or edge of the heating zone when it is closed. The seal may, for instance, comprise a length of insulated rope material. The lid may include a metal outer shell lined with insulating material.

[0016] The lid may be shaped so that when closed it defines an enclosed volume above the heating zone which is sealed by engagement of an edge part of the lid with a region of the hotplate that surrounds the heating zone. Alternatively, when closed the lid may contact the heating zone over the whole or substantially the whole of the heating zone.

[0017] The lid when closed may permit heat to escape from the heating zone at substantially the same rate that heat energy is produced by the first heating element. Thus, the first heating element can be run continuously at its rated value (or some other predefined power level) with the lid closed and maintain a stable temperature of the heating zone. Indeed it is preferred that enough heat escapes from the lid to allow items such as tea towels to be placed on the closed lid and dried or warmed through.

[0018] The lid and first heating element may maintain a constant temperature when the heating element is running at its rated output, i.e. when connected directly to a voltage source and can freely draw current from the power supply. For example, where the first element is rated at 200 watts and connected to a 230 volt power supply it will draw 200/240 Amps of current. The ratings set out herein after are defined in relation to a power supply of a nominal 230 volts.

[0019] The first electric heating element may be rated at between 100 watts and 400 watts and the second may be rated at between 1000 watts and 4000 watts. Other ratings could be used. In one preferred arrangement the first heating element comprises 200 watts or 400 watts, and the second element is rated at 2000 watts. It is preferred that the first heating element has a low rating as this will be on constantly when in use, and the more insulation provided in the lid the lower the rating that can be used for a given predefined temperature value. The second element is preferably of a higher rating to allow rapid heating as the heating zone cools following opening of the lid.

[0020] The first element may comprise two sub-elements, for example two 200 watt sub-elements connected in parallel to give a 400 watt total rating and means for receiving a removable link which permits one or both of the sub-elements to be connected to a supply rail according to the overall rating required from the first heating element, one of the elements being inoperable when the link is removed. The link may, for instance, comprise a brass plate.

[0021] Each heating element may comprise a resistive element which is located below an upper surface of the heating zone. It may be embedded within a portion of the hob that that forms the upper surface of the heating zone. For example, each heating element may comprise a generally flat plate of ceramic or glass ceramic covering a coil of electrical resistive heating element.

[0022] The temperature sensitive switch means may comprise a temperature sensing means, such as a thermostat, the set point of the thermostat at which it starts to close being slightly lower than the predefined temperature value. Alternatively it may comprise a discrete

switch, such as a transistor, that is opened and closed under the control of a discrete temperature sensor. This would allow the current to be modulated in a precise manner.

[0023] The control means may also include an on/off switch which may comprise a rotary knob, a button, a lever or a switch, or a touch sensitive pad or a non-contact switch such as a capacitive switch. The on/off switch may be operated to selectively switch the heating zone on and off as required.

[0024] The hob assembly may be operable, upon operation of the on/off switch in at least two control modes:

a first mode (OFF) in which no current is passed through any of the heating elements of the hotspot; and

a second mode (ON) in which current is passed through one or both of the heating elements.

[0025] The user may select the first or second modes using the on/off switch.

[0026] The hob assembly may be adapted when switched on and at a steady temperature to pass current through the first heating element but not the second heating element when the temperature is above a threshold temperature, and in the event that the temperature drops below the threshold is adapted to cause current to flow through the second heating element to provide increased heat output from the hot plate, the flow of current being regulated to control the temperature to a preset temperature. This preset temperature may be above the threshold at which the second heating element is switched on.

[0027] When first switched on, current may flow through both first and second elements to ensure rapid heating of the heating zone, or perhaps the current may only flow through the second heating element with the first element being switched once it is up to temperature to ensure it remains at the predefined temperature.

[0028] Thus, when above the threshold the switch means may connect the first heating element to the supply but not the second, and when below the threshold may selectively connect the second element to the supply. When the second element is connected the first element may remain constantly connected, or may be disconnected from the supply. Because the first element and lid are in thermal equilibrium at the set temperature the first element can be permanently on and does not require any modulation to maintain the predefined temperature value.

[0029] The assembly may be arranged such that the first element alone is sufficient to hold the temperature above the threshold when the insulated lid is closed and the heating zone is switched on in the second mode, the rating of the first element being chosen so that the temperature drops below the threshold upon opening the lid. With the lid closed the first element may hold the hotspot at a temperature of around 250 degrees Centigrade or 365 degrees Centigrade. The should allow enough heat to escape when closed to prevent the first heating element from burning out if left on for an extended period, say for 24 hours. The rating of the first element, and the amount of power applied to it, should be tailored to the amount of heat loss permitted by the lid, yet allow the heating zone to reach the predetermined temperature value at which it is ready for use in cooking. For the avoidance of doubt this temperature could be anywhere in the range of 150 degrees Centigrade to 400 degrees Centigrade or more.

[0030] The temperature sensor may comprise a thermostat which performs the combined role of sensing temperature and selectively connecting the second heating element to the supply when the temperature drops to or below the threshold, the threshold corresponding to the changeover point of the thermostat.

[0031] The set point of the thermostat may correspond to a temperature that is just below that which is achieved at the hotspot by continuously passing an unmodulated current from the power supply through the first heating element with no current flowing through the second element while the lid is closed. The temperature at which the control means applies current to the second heating element may be no more than 20 degrees, or 10 degrees, or 5 degrees, below the predefined temperature value. Keeping it close to the equilibrium temperature achieved when the lid closed effectively means that the temperature when the lid is open is kept the same as that when closed within a tolerance range of no more than 20 degrees, or 5 degrees.

[0032] By unmodulated we mean that the power supply comprises a continuous sinusoidal AC signal and is able to allow the heating element to draw power at its rated value. The switch connecting the element to the power supply remains closed, and does not alternate between open and closed states as a function of temperature. The switch needs only move between open and
closed position (or vice versa) when the heating zone is switched on or off. This means that the life of the switch will be prolonged compared with a switch that is constantly cycling, such as a thermostatic switch or other temperature controlled switch. This allows the heating zone to be left on with the lid closed for extended periods of time.

[0033] In contrast, the control circuit may modulate the current flowing through the second heating element when it is in use to maintain the temperature of the hot sport at the set temperature when the lid is open. This modulation may comprise switching the current to the element on and off periodically using a pulse width modulation scheme, which will occur as the thermostat or other temperature controlled switch opens and closes.

[0034] When current is flowing in the second heating element it may also flow in the first heating element. The elements may, in the second mode, be connected in parallel across the power supply, the current flowing in both elements being modulated.

[0035] In an additional or alternative arrangement, the hob assembly may include a position sensor which sens-

es the position of the insulated lid. This may be used to provide a signal causing the control circuit to apply current only to the first element if the lid is closed and to the first and/or second elements if the lid is opened. This may, for example, mean that there is no need to wait for the temperature to drop on opening the lid before the second heating element is brought into use to bring the temperature back up. Heat can be applied the instant the lid is opened rather than waiting for a drop in temperature.

[0036] The control circuit may be further arranged to cut the power supply to the first heating element in the event that the temperature of the heating zone exceeds a maximum allowable temperature. This will ensure that the heating element does not burn out if there is insufficient heat loss through the closed lid, perhaps if the lid is covered by accident with a highly insulated item, or if there is otherwise a fault in the electrical circuit that might cause overheating.

The hob assembly may include a second heating zone, a secondary first electric heating element having a fourth rating associated with the heating zone and a secondary second electric heating element having a fifth rating associated with the heating zone, the fourth rating exceeding the third rating, and an additional insulated lid which can be moved between a closed position in which it covers the heated zone and a second position in which it is open to allow a pan to be placed on the heated zone during cooking.

[0037] The first and second heating elements of the first and second heating zones may be identical. Where the first element comprises two sub-elements, the first hotspot may have both sub-elements connected together or one of the hotspots may have only one of the sub-elements connected, such that the ratings of the first elements of the two hotspots are different.

[0038] Each hotspot may have a respective temperature sensing means, and may be controlled by the switch means to allow independent control of the hotspots. The set temperature of each hotspot may be different, one being higher than the other.

[0039] Each heating zone may be covered by its own lid.

[0040] The two heating zones and respective lids may be located side by side along the hotplate.

[0041] Where there is a second heating zone, a second switch means may also be provided that is operable to control a heating circuit that in use selectively connects the first and second heating elements to an electrical supply.

[0042] The present invention provides a hot plate assembly for a range cooker which mimics the behaviour of the traditional insulated cast iron hotplate of a range cooker. When not in use the hotplates are covered and will provide a gentle heat from the cover yet are ready to use instantly if required as they can be left heated with the lids closed. On opening the lid, additional energy is provided to stop the temperature from dropping rapidly.

[0043] According to a second aspect the invention provides a range style cooker comprising in combination a body including at least one oven cavity and a hob assembly mounted to the body, the hob assembly being in accordance with the first aspect of the invention.

[0044] The oven cavity may be electrically heated or heated indirectly using heat stored in a heat store. Because the hotplate does not require indirect heating from a heat store, the electrically heated cavity is preferred.

[0045] The range style cooker may comprise a heat storage cooker comprising a least one oven cavity formed by walls of high thermal mass, such as cast iron. By walls of high thermal mass we mean walls which are made of cast iron or similar and are relatively thick so that they retain heat for gradual release over an extended period of time.

[0046] An example provides a heating element module for use in making a hotplate assembly, the heating element module comprising a heating means and a support which carries the heating means and enables the module to be secured to the underside of a base of the hotplate assembly.

[0047] The module may be secured to the underside of a glass plate forming the base of the hotplate assembly.

[0048] There will now be described, by way of example only, one embodiment of a hotplate assembly according to the present invention fitted to a range style cooker to form a cooker in accordance with the second aspect of the invention, with reference to the accompanying drawings of which:

Figure 1 is an overview of the key parts of an embodiment of a range cooker in accordance with the present invention that includes a hob assembly showing two heating zones with closed lids;

Figure 2 is a view from above and in front of the hob assembly with the lids of the heating zones opened;

Figure 3 is a circuit diagram for the range cooker of Figure 1;

Figure 4 illustrates the different operating modes of the hob control switch of Figure 3 for controlling the hob; and

Figure 5 illustrates the different operating modes of the oven control switch of Figure 3.

[0049] A range cooker 1 for domestic use is shown in Figure 1 of the drawings. It comprises a shell comprising front, side, rear and base panels (although only the front is shown) bolted and screwed to a support frame (not shown). The front panel 2 is about 120cm wide in this example, although it may be wider or narrower, and is located above a plinth 3. It can be styled in a variety of different manners depending on whether a traditional or contemporary effect is required, and also can be provided

in a range of different colours. It is provided with three openings which are covered by respective hinged insulated doors 4,5 and 6 Each door is provided with a handle (not shown) to enable the door to be opened and closed. Behind each door is an oven cavity (not shown), each one intended to be maintained at a different temperature.

[0050] The top panel 7 forms a hob, and is inset with two circular hotplates defining respective heating zones 8, 9. Each hot plate is covered by a hinged insulated lid 8a, 9a, not shown in Figure 1 but visible in the open position in Figure 2 . Each lid is fixed to the top panel by a respective hinge 10, 11 and provided with a respective grab handle 12, 13. Figure 1 shows the lids in the lowered position, and Figure 3 shows the lids raised to expose the heating zones beneath the lids.

[0051] Each lid comprises a metal or enamel shell that is lined with a highly thermally insulating material.

[0052] The edge of the lid is provided with a rope seal that contacts the top plate in a region surrounding the hotplate. When lowered, the lids 8a, 9a retain heat in the heating zones whilst allowing a controlled amount of heat to escape through the lid, and perhaps also between the seal and the top plate. As will be explained, when the hotplates are switched on the lids provide sufficient insulation for the heating zone to be held at a constant predefined temperature when a constant level of power is supplied to the heating zone as will be described. The heat loss from the closed lids should therefore be closely matched to the heat input of the heating zone to achieve the desired thermal equilibrium.

[0053] As shown in Figure 3 a first one of the heating zones 8 is provided with two heating elements each comprising resistive coils, a first heating element rated at 400 watts and a second heating element rated at 2000watts. The first heating element actually comprises two sub-elements 14a, 14b of 200 watts each that are connected in parallel by a removable electrically conductive link 16. The second element comprises a single element 15 rated at the 2000 watts, although this again could be made up from multiple sub-elements. This first heating zone defines a Hotspot and the amount of insulation provided by the closed lid ensures the heating zone is held at a predefined temperature of 365 degrees Centigrade when the first element is running at its rated temperature and the second element is switched off.

[0054] The second heating zone 9 is also provided with three heating elements 17a, 17b and 18, each the same as those of the first heating zone, with one rated at 200 watts, one more at 200 watts and the other at 2000 watts. The second heating zone differs from the first in that no electrical link is provided (the link is removed during installation) so that the first element is made up of only one active 200 watt sub-element 15a with the other sub-element having no part in any heating. This allows an identical unit to be fitted for each of the heating zones during assembly with the two zones having different ratings. Using an identical lid to the first zone, the higher rating of the first element will hold the temperature of this heating zone at a lower temperature of 250 degrees with the lid closed and the first element run at its rated power.

[0055] In each case, the second heating element is connected to the power supply through a respective thermostatic switch. The set point of the thermostat, by which we mean the temperature at which it changes from an open to a closed position, is chosen to be approx 20 degrees below the temperature of the heating zone, i.e. 240 degrees and 345 degrees respectively, the difference being considered to be no more than an acceptable tolerance. The arm containing the second heating element and thermostat is connected in parallel with the arm containing the first heating element.

[0056] The heating elements of the two heating zones 8,9 are connected by an electrical circuit through electrical wires to a power cord, optionally terminated with a plug, which can be connected to a domestic electrical power supply of 230 volts (for the UK and Europe). A control means comprising an on/off switch 16 and a pair of thermostats is provided in the electrical circuit.

[0057] Located behind a door 11 at the upper left front of the cooker is a user interface panel 19 with the two switches of the electrical circuit. One switch permits the mode of operation of the hob to be set, and the other permits the mode of operation of the ovens to be set. This panel can be seen in Figure 1 of the drawings.

[0058] The hob control switch can be placed in the following positions:

Position 1:	All hotplates off;
Position 2:	One hotplate on;
Position 3:	The other hotplate on;
Position 4:	Both hotplates on.

[0059] These positions are illustrated in Figure 4 which should be interpreted in combination with Figure 3 . The switch may comprise a rotary switch and Figure 6 shows the actual angular position of the rotary switch for each mode.

[0060] When a hotplate is switched off, the On/off switch is opened and isolates all of the resistive heating elements of that hotplate from the supply voltage so that no current flows in the elements.

[0061] When a hotplate is switched on with the insulated lid closed and starting from cold, initially both of the elements of that hotplate are connected to the supply voltage by the switch and the thermostat which will be closed as it is below its set point temperature. Current then flows through the both of the first and second heating elements at their maximum rated power causing them to heat up the heating zone to a predetermined temperature. For the higher rated heating zone, both of the sub-elements of the associated first heating element are connected to the supply and so current flows through both elements. This means that the heating zone will be at a higher temperature than the other one when that is switched on, as only one sub-element of that other zone

conducts current.

[0062] Once a predefined temperature value is nearly reached, the thermostat associated with the heating zone opens and cuts off current from flowing in the second heating element. Current continues to flow unmodulated through the first heating element. The temperature of the heating zone is then set by the rating of the first heating element and the insulating properties of the lid.

[0063] The amount of insulation provided by the lid and the heat output of the elements is chosen to provide a known predefined temperature value of the two heating zones, the so called hotspot (the higher rated zone) and the simmerspot (the lower rated zone). These temperatures correspond to those achieved by a conventional heat storage range cooker in which heat is applied to the underside of a cast iron hotplate from an energy store. The temperatures are as already stated 365 degrees centigrade and 250 degrees centigrade in this example. The hotplates can be left in this switched on state as long as desired, and a pleasant heat will be radiated from the insulated lids while the hotplates remain ready for instant use. If not needed for longer periods of time they can be switched off.

[0064] Upon opening the lid of a heating zone, the temperature will start to drop as the heating elements are no longer insulated by the lid. When it has dropped to the set point of the thermostat, the thermostat will start to close allowing current again to flow in the second heating element of the hotspot.

[0065] The set point of the thermocouple is selected so that it maintains the temperature of the hotspot at a level slightly below the temperature of the hotspot that is achieved with the lid closed and the hotspot switched on, in this example 20 degrees Centigrade below the predefined temperature value. This ensures that the thermocouple does not cause any current to flow in the higher rated element with the lid closed and that the temperature only drops slightly when the lid is opened, cycling around the set point of the thermostat.

[0066] The use of the lower rated elements and the higher rated elements enables a constant "ready to use" heat level to be achieved with the lid closed. This is achieved without the need to open and close switches repeatedly to provide a steady temperature by matching the heat output to the heat loss of the lid. Since it is envisaged that the hotspot may be left in this constant on state for extended periods of time, this ensures that there is no switch that could wear out over time, as would be the case if a higher power element was used and has to be regulated when the lid is closed to prevent the temperature of the hot spot reaching an excessive level above that at which it is ready to be used to cook.

[0067] The use of the higher rated element allows additional heat to be applied when the lid is open, maintaining the temperature at a preset level. This allows a lower power first element to be used with a better insulated lid whilst still raising the hotspot to the cooking temperature when the lid is closed. Of course, if too low a power first element is used it may take too long to reach a ready to use temperature. An acceptable heat up time of less than 1 minute is considered ideal. Because it is of a higher rating it is well suited to achieving the rapid rise in temperature that may be needed after the lid is opened and, perhaps, a cold pan is placed on the hotspot.

[0068] Although not shown, it is envisaged that the hob switch and switch for the ovens could be controlled on a timer circuit, and may be programmable to set one or more times for turning the heating zones and ovens on or off. For instance, it may be arranged to cause the switch to turn both heating zones off in the evening so they do not consume any significant electrical energy overnight, and then to switch them back on (if they were previously on) at a preset time the following morning. They may be controlled remotely by connecting the controller to a wide area network such as the internet.

Claims

1. A hob assembly (7) for a range cooker comprising a base having a heating zone (8, 9), a heating means comprising at least one electric heating element (14a, 14b, 15, 17a, 17b, 18), a thermally insulated lid (8a, 9a) which can be moved between a closed position in which it covers the heating zone (8, 9) and permits a controlled amount of heat from the heating zone (8, 9) to escape through the lid (8a, 9a) and an open position in which it is open to allow a pan to be placed on the heating zone (8, 9), and a control means for controlling the operation of the heating means when in use, wherein during use of the hob assembly (7) when the heating zone (8, 9) is switched on and the insulated lid (8a, 9a) is closed the control means is adapted to apply a current to the heating means to maintain the temperature at a predefined value suitable for cooking and in the event that the lid (8a, 9a) is subsequently opened the control means automatically causes more current to be applied to the heating means in order to attempt to maintain the temperature of the heating zone (8, 9) close to the predefined value, **characterized in that** the control means includes at least one temperature sensitive switch means which is connected in series between a part of the heating means and a power supply, the temperature sensitive switch means being open when the heating zone (8, 9) is switched on and both the temperature is at the predefined value and the lid (8a, 9a) is closed so that current does not flow through the temperature sensitive switch means, and in response to opening of the lid (8a, 9a) the temperature sensitive switch means is closed to allow current to flow from the power supply to part of the heating means through the temperature sensitive switch means.

2. A hob assembly (7) according to claim 1 in which the

temperature sensitive switch means comprises a temperature sensing means, such as a thermostat, the set point of the thermostat at which it starts to close being slightly lower than the predefined temperature value.

3. A hob assembly (7) according to claim 1 or 2 in which the heating means comprises a first electric heating element (14a, 14b, 17a, 17b) having a first power rating associated with the heating zone (8, 9) and a second electric heating element (15, 17) having a second power rating associated with the heating zone (8, 9), the first heating element (14a, 14b, 17a, 17b) being permanently connected to the power supply when the heating zone (8, 9) is switched on so that the current through the first element (14a, 14b, 17a, 17b) is not modulated and the second heating element (15, 18) being selectively connected to the power supply by the switch means.

4. A hob assembly (7) according to claim 3 in which the output of the first heating element (14a, 14b, 17a, 17b) when running at its rated power output is balanced with the insulating property of the lid (8a, 9a) such that with the lid (8a, 9a) closed the thermal equilibrium temperature at the surface of the heating zone (8, 9) under the lid (8a, 9a) is substantially equal to the predefined temperature.

5. A hob assembly (7) according to claim 3 or 4 in which the first electric heating element (14a, 14b, 17a, 17b) is rated at between 100 and 300watts.

6. A hob assembly (7) according to claim 3, 4 or 5 in which the second heating element (15, 18) has a higher rating than the first heating element (14a, 14b, 17a, 17b).

7. A hob assembly (7) according to claim 6 in which the second heating element (15, 18) is rated at between 500 and 3000 watts.

8. A hob assembly (7) according to one of claims 3 to 6 in which the first heating element (14a, 14b, 17a, 17b) additionally comprises two sub-elements (14a, 14b, 17a, 17b) and means for receiving a removable link (16) which permits one or both of the sub-elements (14a, 14b, 17a, 17b) to be connected in parallel to a supply rail according to the overall rating required from the first heating element (14a, 14b, 17a, 17b).

9. A hob assembly (7) according to any one of claims 3 to 8 in which each heating element (14a, 14b, 15, 17a, 17b, 18) comprises a resistive element (14a, 14b, 15, 17a, 17b, 18) which is located below the surface of the heating zone (8, 9).

10. A hob assembly (7) according to any preceding claim which further comprises a second heating zone (9), a second heating means associated with second heating zone (9) comprising at least one electric heating element (17a, 17b, 18), a thermally insulated lid (9a) associated with the second heating zone (9) which can be moved between a closed position in which it covers the second heating zone (9) and permits a controlled amount of heat from the second heating zone (9) to escape through the second lid (9a) and an open position in which it is open to allow a pan to be placed on the second heating zone (9), the control means being adapted to control the operation of the second heating means independent of the first heating means,
characterised in that during use of the hob assembly (7) when the second heating zone (9) is switched on and the insulated lid (9a) is closed the control means is adapted to apply a current to the heating means that raises the temperature to a predefined value suitable for cooking and in the event that the lid (9a) is subsequently opened the control means automatically causes more current to be applied to the heating means in order to maintain the temperature of the heating zone (9) at the predefined value.

11. A hob assembly (7) according to claim 10 in which the heating elements (14a, 14b, 15, 17a, 17b, 18) of the first heating zone (8) and second heating zone (9) are substantially identical.

12. A range style cooker (1) comprising in combination a body including at least one oven cavity and a hob assembly (7) mounted to the body, the hob assembly (7) being in accordance with any preceding claim.

13. A range style cooker (1) according to claim 12 in which the oven cavity is directly heated or heated indirectly using heat stored in a heat store.

14. A hob assembly (7) according to any of Claims 1 to 11, comprising a heating element module, the heating element module comprising the heating means and a support which carries the heating means and enables the module to be secured to the underside of a base of the hotplate assembly,
in which the heating means comprises a first electric heating element (16) having a first power rating associated with the heating zone and a second electric heating element (15) having a second power rating associated with the heating zone, and in which the first heating element (16) comprises two sub-elements (14a, 14b) and means for receiving a removable link (16) which permits one or both of the sub-elements (14a, 14b) to be connected together in parallel.

Patentansprüche

1. Kochstellenanordnung (7) für einen Range Cooker, umfassend eine Basis, die eine Heizzone (8, 9) aufweist, ein Heizmittel, umfassend mindestens ein elektrisches Heizelement (14a, 14b, 15, 17a, 17b, 18), einen wärmeisolierten Deckel (8a, 9a), der zwischen einer geschlossenen Position, in der er die Heizzone (8, 9) abdeckt und eine kontrollierte Menge an Hitze von der Heizzone (8, 9) durch den Deckel (8a, 9a) entweichen kann, und einer offenen Position bewegt werden kann, wobei er offen steht, damit eine Pfanne in die Heizzone (8, 9) gestellt werden kann, und ein Steuermittel zum Steuern des Betriebs des Heizmittel bei Gebrauch, wobei das Steuermittel während der Verwendung der Kochstellenanordnung (7), wenn die Heizzone (8, 9) eingeschaltet ist und der isolierte Deckel (8a, 9a) geschlossen ist, dazu ausgelegt ist, einen Strom in das Heizmittel einzuleiten, um die Temperatur bei einem vordefinierten Wert zu halten, der für das Kochen geeignet ist, und für den Fall, dass der Deckel (8a, 9a) anschließend geöffnet wird, das Steuermittel automatisch bewirkt, dass mehr Strom in das Heizmittel eingeleitet wird, um zu versuchen, die Temperatur der Heizzone (8, 9) nahe am vordefinierten Wert zu halten, **dadurch gekennzeichnet, dass** das Steuermittel mindestens ein temperaturempfindliches Schaltmittel beinhaltet, das zwischen einem Teil des Heizmittels und einer Leistungszufuhr in Reihe verbunden ist, wobei das temperaturempfindliche Schaltmittel geöffnet ist, wenn die Heizzone (8, 9) eingeschaltet ist und sowohl die Temperatur beim vordefinierten Wert steht als auch der Deckel (8a, 9a) geschlossen ist, sodass der Strom nicht durch das temperaturempfindliche Schaltmittel fließt, und das temperaturempfindliche Schaltmittel als Reaktion auf das Öffnen des Deckels (8a, 9a) geschlossen wird, damit der Strom von der Leistungszufuhr zum Teil des Heizmittels durch das temperaturempfindliche Schaltmittel fließen kann.

2. Kochstellenanordnung (7) nach Anspruch 1, wobei das temperaturempfindliche Schaltmittel ein Temperaturfühlmittel, wie etwa einen Thermostat, umfasst, wobei der Sollwert des Thermostats, bei dem er beginnt, sich zu schließen, geringfügig niedriger als der vordefinierte Temperaturwert ist.

3. Kochstellenanordnung (7) nach Anspruch 1 oder 2, wobei das Heizmittel ein erstes elektrisches Heizelement (14a, 14b, 17a, 17b), das eine erste Nennleistung in Verbindung mit der Heizzone (8, 9) aufweist, und ein zweites elektrisches Heizelement (15, 17), das eine zweite Nennleistung in Verbindung mit der Heizzone (8, 9) aufweist, umfasst, wobei das erste Heizelement (14a, 14b, 17a, 17b) permanent mit der Leistungszufuhr verbunden ist, wenn die Heizzone (8, 9) eingeschaltet ist, sodass der Strom durch das erste Element (14a, 14b, 17a, 17b) nicht moduliert ist und das zweite Heizelement (15, 18) selektiv durch das Schaltmittel mit der Leistungszufuhr verbunden ist.

4. Kochstellenanordnung (7) nach Anspruch 3, wobei der Ausgang des ersten Heizelements (14a, 14b, 17a, 17b) beim Laufen zu seiner Nennleistungsausgabe mit der isolierenden Eigenschaft des Deckels (8a, 9a) ausgeglichen ist, sodass die Temperatur des thermischen Gleichgewichts bei geschlossenem Deckel (8a, 9a) an der Oberfläche der Heizzone (8, 9) unter dem Deckel (8a, 9a) im Wesentlichen gleich der vordefinierten Temperatur ist.

5. Kochstellenanordnung (7) nach Anspruch 3 oder 4, wobei das erste elektrische Heizelement (14a, 14b, 17a, 17b) mit zwischen 100 und 300 Watt eingestuft wird.

6. Kochstellenanordnung (7) nach Anspruch 3, 4 oder 5, wobei das zweite Heizelement (15, 18) eine höhere Einstufung als das erste Heizelement (14a, 14b, 17a, 17b) aufweist.

7. Kochstellenanordnung (7) nach Anspruch 6, wobei das zweite Heizelement (15, 18) mit zwischen 500 und 3.000 Watt eingestuft wird.

8. Kochstellenanordnung (7) nach einem der Ansprüche 3 bis 6, wobei das erste Heizelement (14a, 14b, 17a, 17b) zusätzlich zwei Teilelemente (14a, 14b, 17a, 17b) und Mittel zum Empfangen einer abnehmbaren Verbindung (16) umfasst, mit der eines oder beide der Teilelemente (14a, 14b, 17a, 17b) mit einer Versorgungsschiene gemäß der Gesamteinstufung, die vom ersten Heizelement (14a, 14b, 17a, 17b) verlangt wird, parallel verbunden sein können.

9. Kochstellenanordnung (7) nach einem der Ansprüche 3 bis 8, wobei jedes Heizelement (14a, 14b, 15, 17a, 17b, 18) ein widerstandsfähiges Element (14a, 14b, 15, 17a, 17b, 18) umfasst, das sich unter der Oberfläche der Heizzone (8, 9) befindet.

10. Kochstellenanordnung (7) nach einem der vorstehenden Ansprüche, die ferner eine zweite Heizzone (9), ein zweites Heizmittel in Verbindung mit der zweiten Heizzone (9) umfassend mindestens ein elektrisches Heizelement (17a, 17b, 18), einen wärmeisolierten Deckel (9a) in Verbindung mit der zweiten Heizzone (9), umfasst, die zwischen einer geschlossenen Position, in der er die zweite Heizzone (9) abdeckt und eine kontrollierte Menge an Hitze von der zweiten Heizzone (9) durch den zweiten Deckel (9a) entweichen kann, und einer offenen Position bewegt werden kann, wobei er offen steht, damit

eine Pfanne in die zweite Heizzone (9) gestellt werden kann, wobei das Steuermittel angepasst ist, um den Betrieb des zweiten Heizmittels unabhängig vom ersten Heizmittel zu steuern, **dadurch gekennzeichnet, dass** das Steuermittel während der Verwendung der Kochstellenanordnung (7), wenn die zweite Heizzone (9) eingeschaltet ist und der isolierte Deckel (9a) geschlossen ist, dazu ausgelegt ist, einen Strom in das Heizmittel einzuleiten, das die Temperatur auf einen vordefinierten Wert ansteigen lässt, der zum Kochen geeignet ist, und für den Fall, dass der Deckel (9a) anschließend geöffnet wird, das Steuermittel automatisch bewirkt, dass mehr Strom in das Heizmittel eingeleitet wird, um die Temperatur der Heizzone (9) auf dem vordefinierten Wert zu halten.

11. Kochstellenanordnung (7) nach Anspruch 10, wobei die Heizelemente (14a, 14b, 15, 17a, 17b, 18) der ersten Heizzone (8) und der zweiten Heizzone (9) im Wesentlichen identisch sind.

12. Herd im Range-Cooker-Stil (1), der in Kombination einen Körper umfasst, der mindestens eine Ofenröhre und eine Kochstellenanordnung (7), die am Körper befestigt sind, beinhaltet, wobei die Kochstellenanordnung (7) nach einem der vorhergehenden Ansprüche ausfällt.

13. Herd im Range-Cooker-Stil (1) nach Anspruch 12, wobei die Ofenröhre direkt geheizt oder indirekt unter Verwendung der gespeicherten Hitze in einem Wärmespeicher geheizt wird.

14. Kochstellenanordnung (7) nach einem der Ansprüche 1 bis 11, umfassend ein Heizelementmodul, wobei das Heizelementmodul das Heizmittel und einen Träger umfasst, der das Heizmittel trägt und ermöglicht, dass das Modul an der Unterseite einer Basis der Kochplattenanordnung abgesichert ist, wobei das Heizmittel ein erstes elektrisches Heizelement (16), das eine erste Nennleistung in Verbindung mit der Heizzone aufweist, und ein zweites elektrisches Heizelement (15), das eine zweite Nennleistung in Verbindung mit der Heizzone aufweist, umfasst und wobei das erste Heizelement (16) zwei Teilelemente (14a, 14b) und Mittel zum Empfangen einer abnehmbaren Verbindung (16) umfasst, mit der eines oder beide der Teilelemente (14a, 14b) parallel miteinander verbunden sein können.

Revendications

1. Ensemble de plaque de cuisson (7) pour cuisinière comprenant une base comportant une zone de chauffage (8, 9), un moyen de chauffage comprenant au moins un élément chauffant électrique (14a, 14b, 15, 17a, 17b, 18), un couvercle isolé thermiquement (8a, 9a) qui peut être déplacé entre une position fermée dans laquelle il recouvre la zone de chauffage (8, 9) et permet à une quantité régulée de chaleur provenant de la zone de chauffage (8, 9) de s'échapper à travers le couvercle (8a, 9a) et une position ouverte dans laquelle il est ouvert pour permettre à une casserole d'être placée sur la zone de chauffage (8, 9), et un moyen de commande pour commander le fonctionnement du moyen de chauffage lorsqu'il est utilisé, durant l'utilisation de l'ensemble de plaque de cuisson (7) lorsque la zone de chauffage (8, 9) est mise en marche et que le couvercle isolé (8a, 9a) est fermé, ledit moyen de commande étant adapté pour appliquer un courant au moyen de chauffage afin de maintenir la température à une valeur prédéfinie appropriée pour la cuisson et dans le cas où le couvercle (8a, 9a) est ensuite ouvert, ledit moyen de commande entraînant automatiquement l'application d'un courant plus important au moyen de chauffage afin de tenter de maintenir la température de la zone de chauffage (8, 9) proche de la valeur prédéfinie, **caractérisé en ce que** le moyen de commande comprend au moins un moyen de commutation sensible à la température qui est connecté en série entre une partie du moyen de chauffe et une alimentation électrique, le moyen de commutation sensible à la température étant à l'état non passant lorsque la zone de chauffage (8, 9) est mise en marche et que la température est à la valeur prédéfinie et que le couvercle (8a, 9a) est fermé de sorte que le courant ne passe pas à travers le moyens de commutation sensible à la température, et en réponse à l'ouverture du couvercle (8a, 9a), le moyen de commutation sensible à la température est à l'état passant pour permettre au courant de circuler à partir de l'alimentation électrique vers une partie du moyen de chauffage à travers le moyen de commutation sensible à la température.

2. Ensemble de plaque de cuisson (7) selon la revendication 1, ledit moyen de commutation sensible à la température comprenant un moyen de détection de température, tel qu'un thermostat, le point de consigne du thermostat auquel il commence à passer à l'état passant étant légèrement inférieur à la valeur de température prédéfinie.

3. Ensemble de plaque de cuisson (7) selon la revendication 1 ou 2, ledit moyen de chauffage comprenant un premier élément chauffant électrique (14a, 14b, 17a, 17b) présentant une première puissance nominale associée à la zone de chauffage (8, 9) et un second élément chauffant électrique (15, 17) présentant une seconde puissance nominale associée à la zone de chauffage (8, 9), le premier élément chauffant (14a, 14b, 17a, 17b) étant connecté en permanence à l'alimentation électrique lorsque la

zone de chauffage (8, 9) est mise en marche afin que le courant traversant le premier élément (14a, 14b, 17a 17b) ne soit pas modulé et le second élément chauffant (15, 18) étant sélectivement connecté à l'alimentation électrique par le moyen de commutation.

4. Ensemble de plaque de cuisson (7) selon la revendication 3, ladite sortie du premier élément chauffant (14a, 14b, 17a, 17b) lorsqu'il fonctionne à sa puissance nominale étant équilibrée avec la propriété isolante du couvercle (8a, 9a) de sorte qu'avec le couvercle (8a, 9a) fermé, la température d'équilibre thermique à la surface de la zone de chauffage (8, 9) sous le couvercle (8a, 9a) soit sensiblement égale à la température prédéfinie.

5. Ensemble de plaque de cuisson (7) selon la revendication 3 ou 4, ledit premier élément chauffant électrique (14a, 14b, 17a, 17b) possédant une valeur nominale comprise entre 100 et 300 watts.

6. Ensemble de plaque de cuisson (7) selon la revendication 3, 4 ou 5, ledit second élément chauffant (15, 18) possédant une valeur nominale plus élevée que le premier élément chauffant (14a, 14b, 17a, 17b).

7. Ensemble de plaque de cuisson (7) selon la revendication 6, ledit second élément chauffant (15, 18) étant évalué entre 500 et 3000 watts.

8. Ensemble de plaque de cuisson (7) selon l'une des revendications 3 à 6, ledit premier élément chauffant (14a, 14b, 17a, 17b) comprenant également deux sous-éléments (14a, 14b, 17a, 17b) et un moyen pour recevoir une liaison amovible (16) qui permet à l'un ou aux deux sous-éléments (14a, 14b, 17a, 17b) d'être connectés en parallèle à un rail d'alimentation selon la puissance nominale globale requis du premier élément chauffant (14a, 14b, 17a, 17b).

9. Ensemble de plaque de cuisson (7) selon l'une quelconque des revendications 3 à 8, chaque élément chauffant (14a, 14b, 15, 17a, 17b, 18) comprenant un élément résistif (14a, 14b, 15, 17a, 17b, 18) qui est situé sous la surface de la zone de chauffage (8, 9).

10. Ensemble de plaque de cuisson (7) selon l'une quelconque des revendications précédentes, qui comprend en outre une seconde zone de chauffage (9), un second moyen de chauffage associé à la seconde zone de chauffage (9) comprenant au moins un élément chauffant électrique (17a, 17b, 18), un couvercle thermiquement isolé (9a) associé à la seconde zone de chauffage (9) qui peut être déplacé entre une position fermée dans laquelle il recouvre la seconde zone de chauffage (9) et permet à une quantité régulée de chaleur provenant de la seconde zone de chauffage (9) de s'échapper à travers le second couvercle (9a) et une position ouverte dans laquelle il est ouvert pour permettre la mise en place d'une casserole sur la seconde zone de chauffage (9), le moyen de commande étant adapté pour commander le fonctionnement du second moyen de chauffage indépendamment du premier moyen de chauffage, **caractérisé en ce que** durant l'utilisation de l'ensemble de plaque de cuisson (7) lorsque la seconde zone de chauffage (9) est mise en marche et que le couvercle isolé (9a) est fermé, le moyen de commande est adapté pour appliquer un courant au moyen de chauffage qui élève la température à une valeur prédéfinie pour la cuisson et dans le cas où le couvercle (9a) est ensuite ouvert, le moyen de commande entraîne automatiquement l'application d'un courant plus important au moyen de chauffage afin de maintenir la température de la zone de chauffage (9) à la valeur prédéfinie.

11. Ensemble de plaque de cuisson (7) selon la revendication 10, lesdits éléments chauffants (14a, 14b, 15, 17a, 17b, 18) de la première zone de chauffage (8) et de la seconde zone de chauffage (9) étant sensiblement identiques.

12. Installation de cuisson de type cuisinière (1) comprenant en combinaison un corps comprenant au moins une cavité de four et un ensemble de plaque de cuisson (7) monté sur le corps, l'ensemble de plaque de cuisson (7) étant selon l'une quelconque des revendications précédentes.

13. Installation de cuisson de type cuisinière (1) selon la revendication 12, ladite cavité de four étant directement chauffée ou indirectement chauffée à l'aide de la chaleur stockée dans un réservoir de chaleur.

14. Ensemble de plaque de cuisson (7) selon l'une quelconque des revendications 1 à 11, comprenant un module d'élément chauffant, le module d'élément chauffant comprenant le moyen de chauffage et un support qui porte le moyen de chauffage et permet au module d'être fixé au dessous d'une base de l'ensemble de plaque chauffante, ledit moyen de chauffage comprenant un premier élément chauffant électrique (16) présentant une première puissance nominale associée à la zone de chauffage et un second élément chauffant électrique (15) présentant une seconde puissance nominale associée à la zone de chauffage, et ledit premier élément chauffant (16) comprenant deux sous-éléments (14a, 14b) et un moyen pour recevoir une liaison amovible (16) qui permet à l'un ou aux deux des sous-éléments (14a, 14b) d'être connectés ensemble en parallèle.

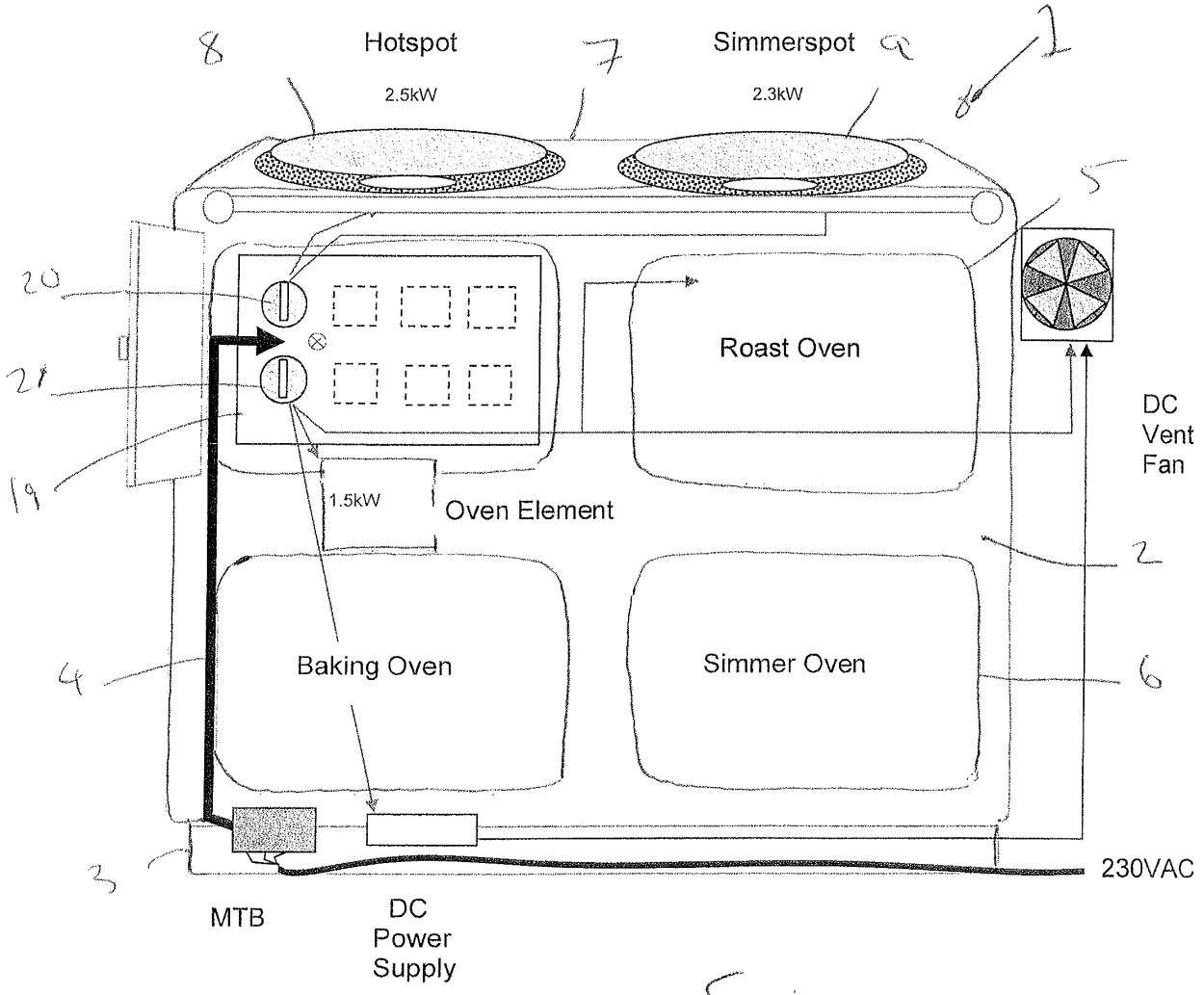

Hotspot
2.5kW
Simmerspot
2.3kW
Roast Oven
DC
Vent
Fan
1.5kW
Oven Element
Baking Oven
Simmer Oven
230VAC
MTB
DC
Power
Supply

Fig 1

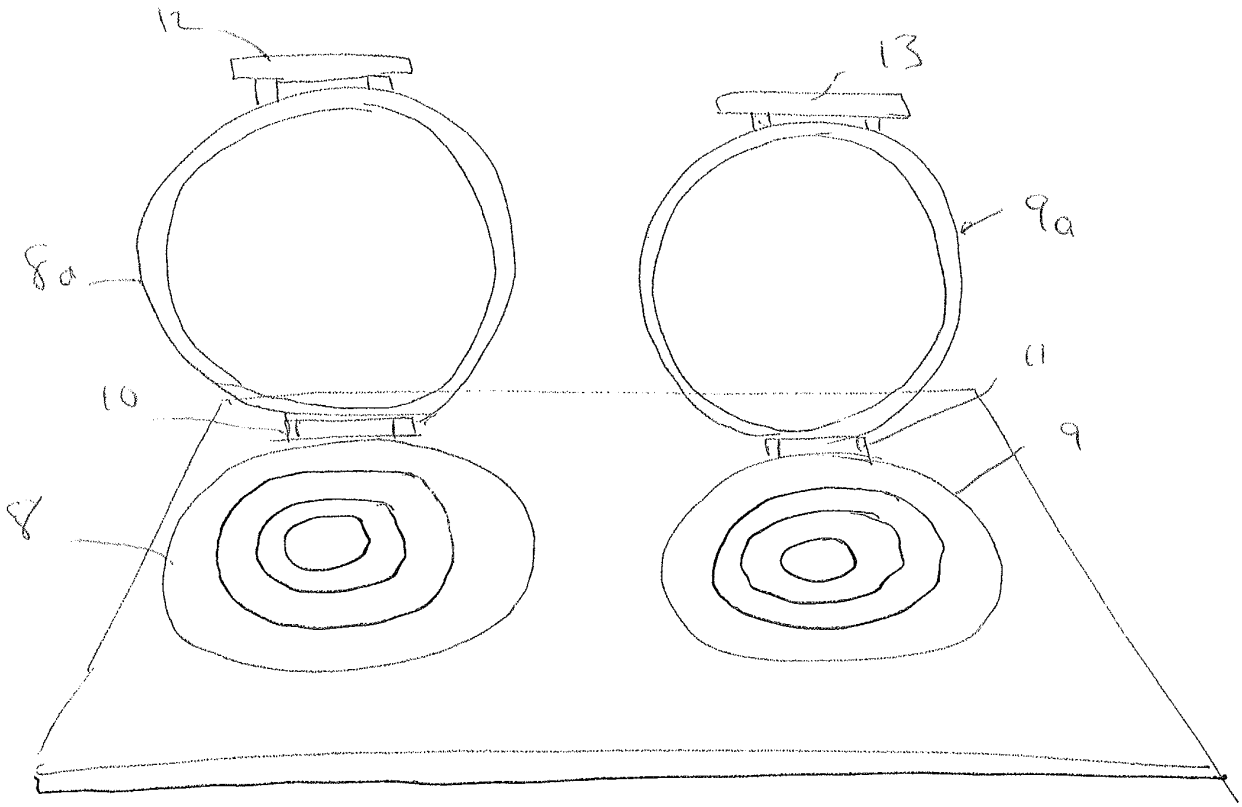


Figure 2

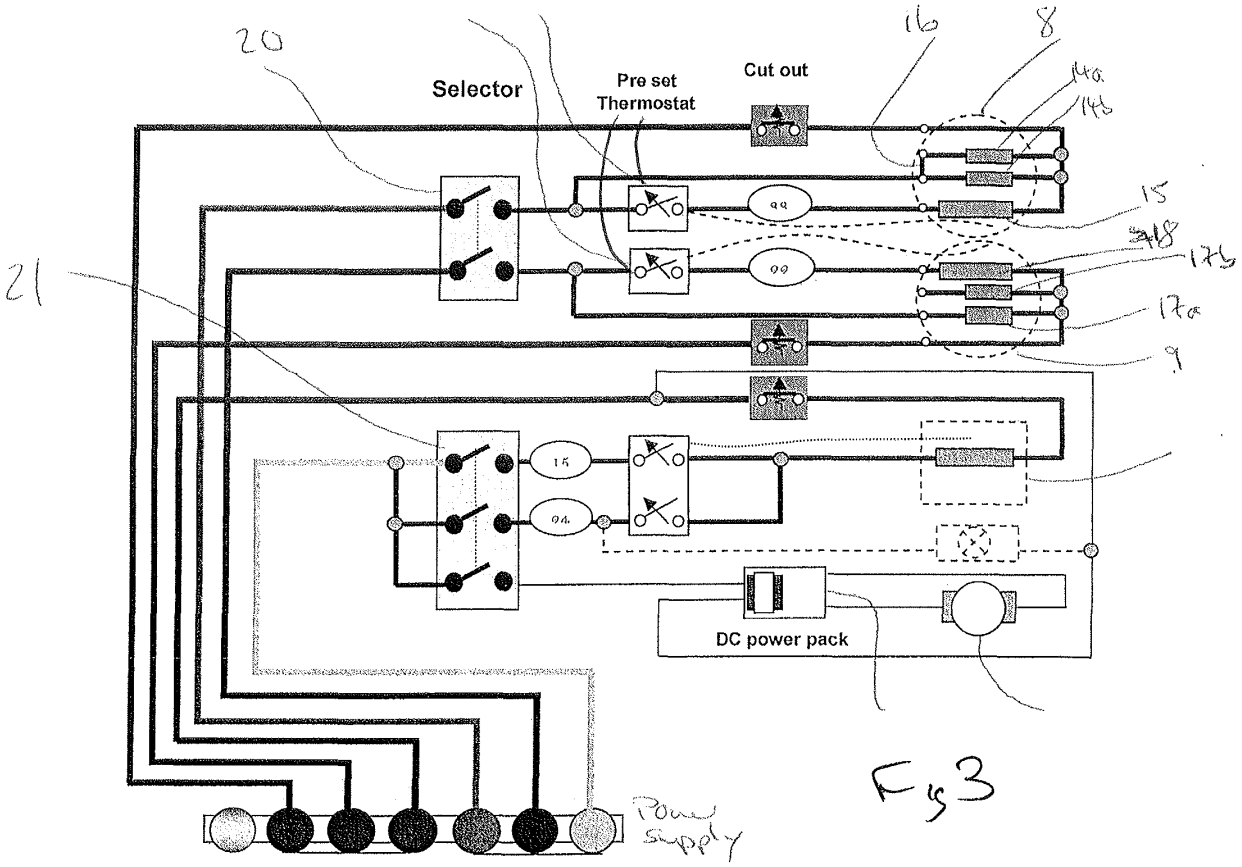
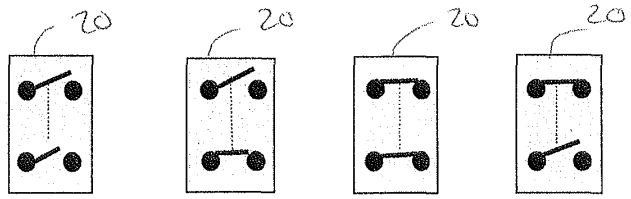


Fig 3

PLATE CONTROL

Load 2.5kW @ 230V
Temp 80-120C

Fig 4



1 OFF	2 SIMMER	3 BOTH	4 HOTSPOT

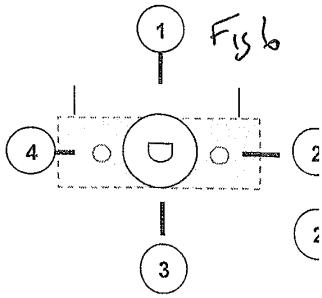
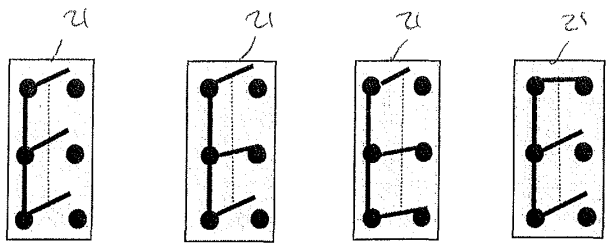


Fig 6

OVEN CONTROL
Load 1.75kW @ 230V
Temp 80 - 120C

Fig 5



1 OFF	2 OVEN	3 OVEN + VENT	4 SLUMBER

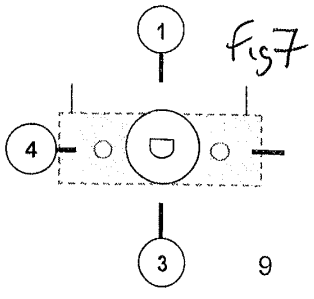


Fig 7

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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