

1,392,802.

4 SHEETS—SHEET 1.

Fig. 1.

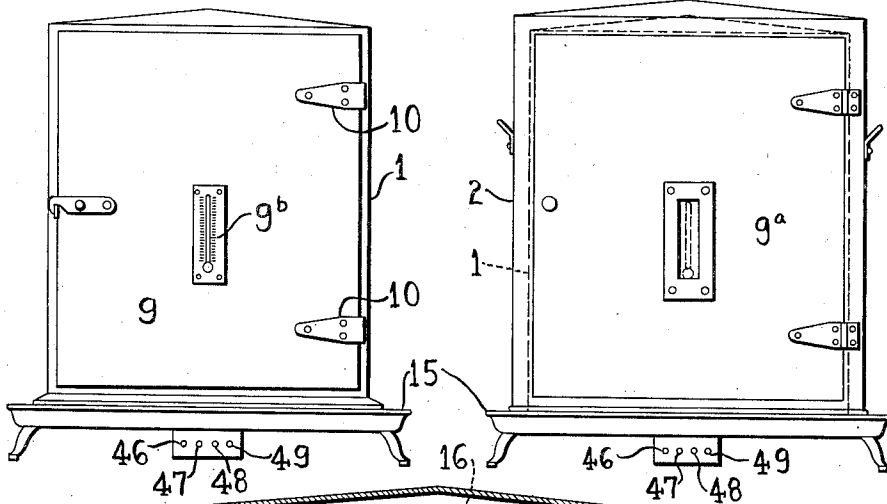
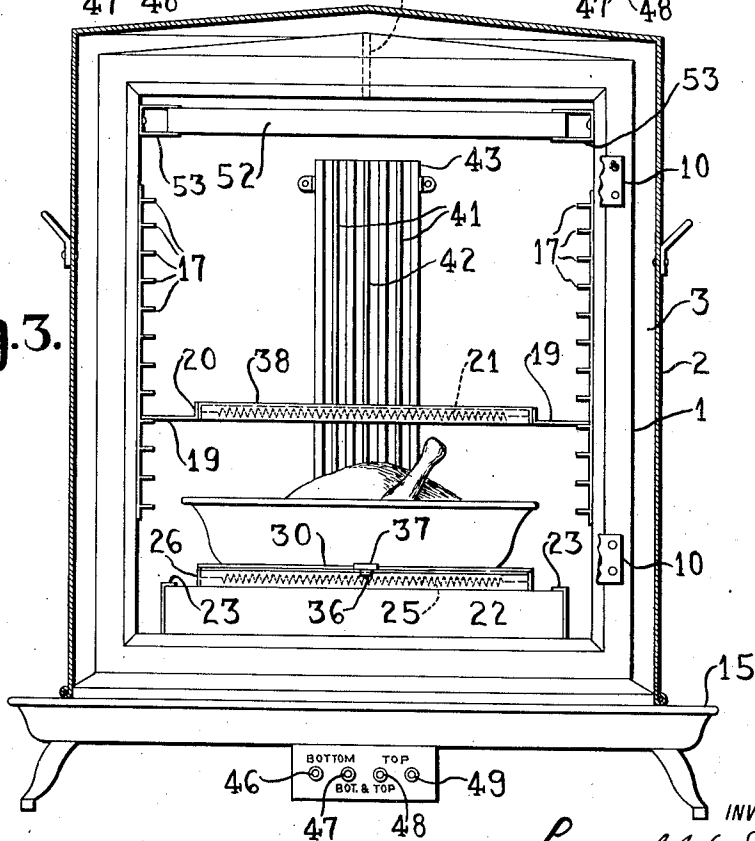


Fig.3.



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ELECTRIC FIRELESS COOKER AND RANGE.
APPLICATION FILED OCT. 31, 1919.

1,392,802.

Patented Oct. 4, 1921.

4 SHEETS—SHEET 2.

Fig. 4.

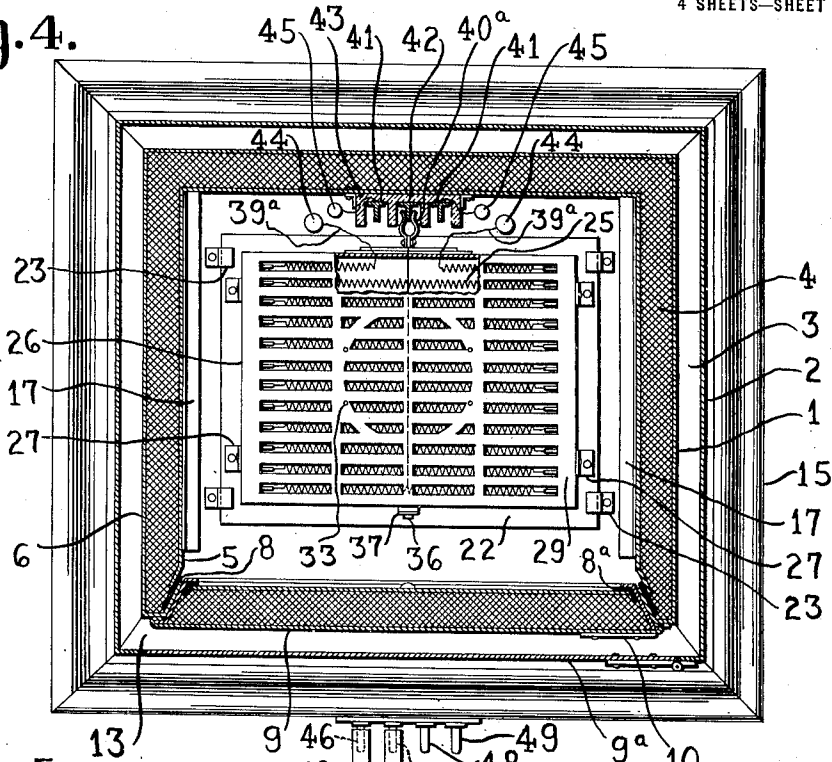


Fig. 5.

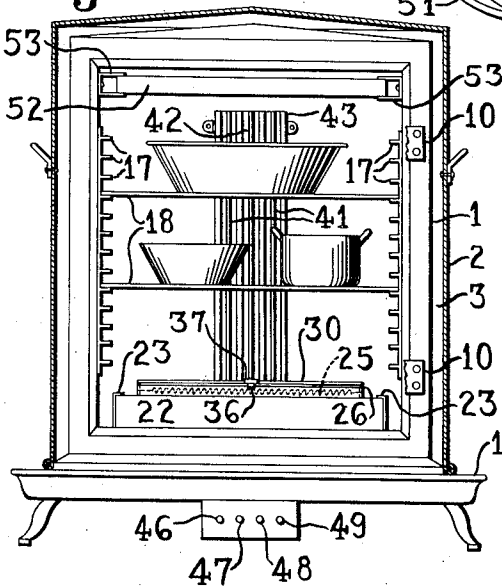
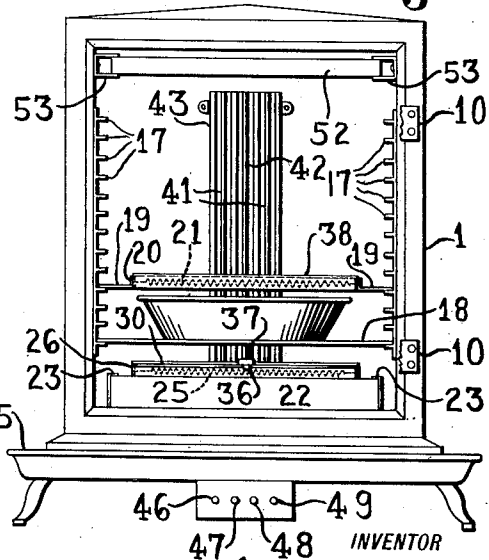


Fig. 6.



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4 SHEETS—SHEET 3.

Fig. 7.

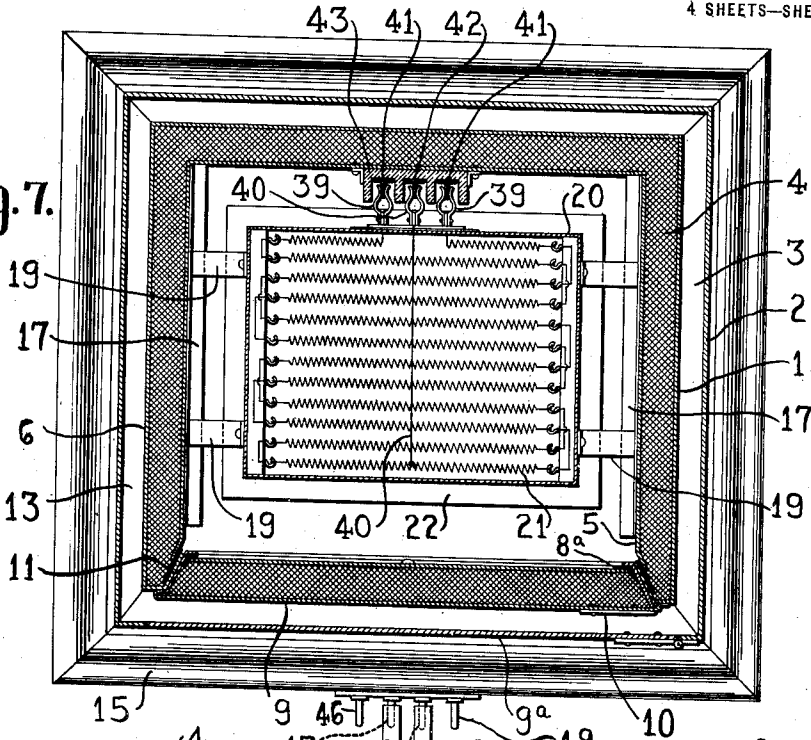


Fig. 8.

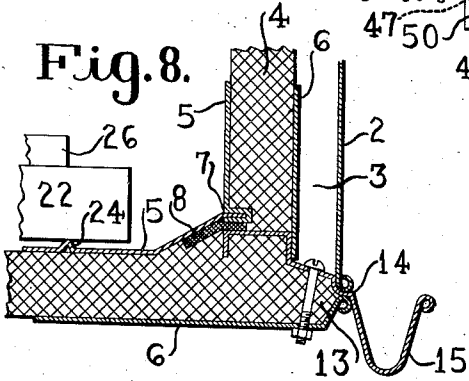


Fig. 9.

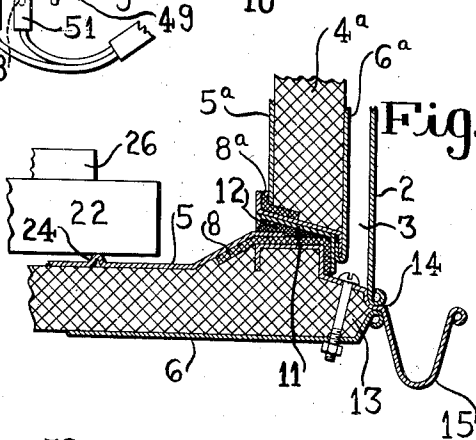
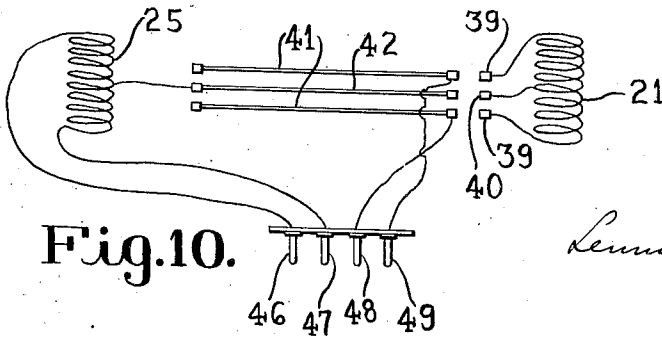


Fig. 10.



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4 SHEETS—SHEET 4.

Fig. 11.

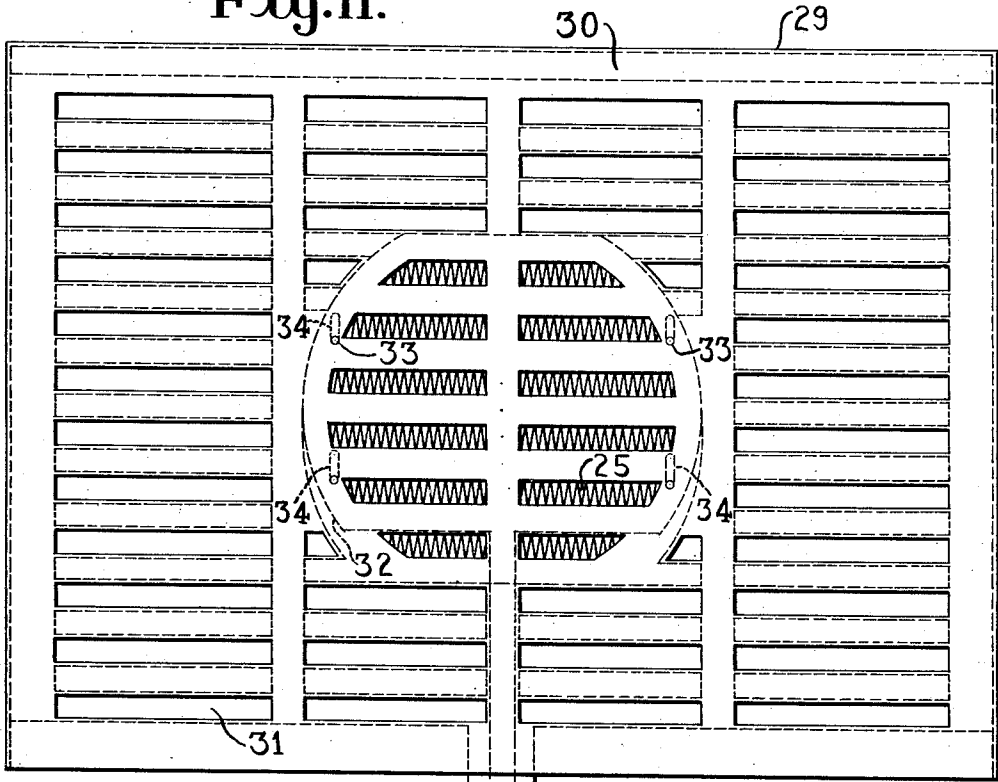


Fig. 12.

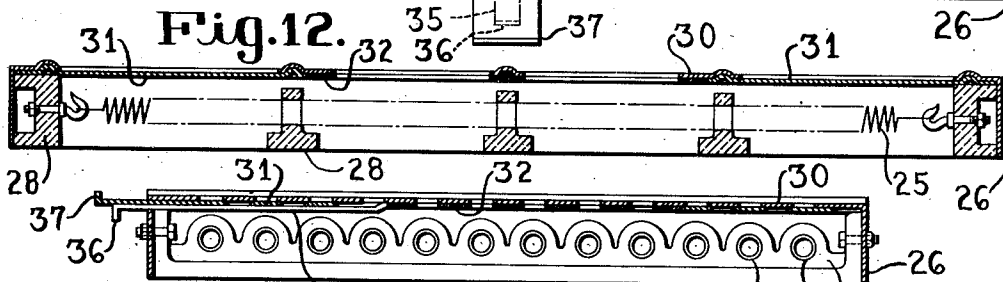
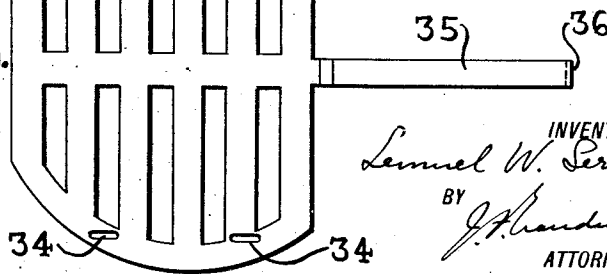


Fig. 13.



Fig. 14.



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UNITED STATES PATENT OFFICE.

LEMUEL W. SERRELL, OF NEW YORK, N. Y.

ELECTRIC FIRELESS COOKER AND RANGE.

1,392,802.

Specification of Letters Patent.

Patented Oct. 4, 1921.

Application filed October 31, 1919. Serial No. 334,729.

To all whom it may concern:

Be it known that I, LEMUEL W. SERRELL, a citizen of the United States, and resident of the borough of Manhattan, in the city, county, and State of New York, have invented a new and useful Electric Fireless Cooker and Range, of which the following is a specification.

The object of the invention is to provide an electrical cooking apparatus, of moderate size and simple construction, combining in one oven the capabilities of both a range and a fireless cooker, and in these capabilities having special utility in respect to the amount and kinds of things that can be cooked, the adaptability and convenience of the device for cooking different articles in the manner most effective therefor, and its economy in consumption of electrical energy.

The oven as herein disclosed comprises a heat-insulated inclosure having a door and guides at different heights for racks. An electrical heating element is disposed at the bottom of the oven, over a soapstone or equivalent heat-absorbing body, and another electrical heating element is positionable at any height by sliding it in and out on the wall guides. An important feature of the invention comprises vertical trolleys or continuous conductors by which this upper heater is supplied with current and with which it makes connection at any height.

In practice I find it desirable to use a three-track trolley or conductor system, and to arrange the windings in both the fixed bottom heating element and the movable heating element in such a way that the entire heat can be thrown into the bottom element or into the top element, or divided between the two elements, at will. If it is desired to make more room in the cooker, the movable element may be entirely removed, allowing more space for cooking utensils, but when using the oven as a grill or a range, the movable element is preferably placed in the oven at such elevation as to bring it close to the surface of the meat or whatever one desires to cook, so that the food is subjected to radiant heat from above, but preferably from both above and below, this mode of operation being suitable especially for cooking by the range process rather than by the fireless cooker process, although the fireless process can be used in

conjunction therewith, as might be the case where a roast or poultry was to be cooked. The movable element in such case may be placed close to the surface and by turning the current in both elements, a heat of approximately 1200° is developed, which quickly sears or browns the surface, thus keeping in the moisture and juices. Then the current is turned off and the roasting completed by the fireless process. Numerous other useful modes of cooking are made possible by the combination.

I also provide a movable cover or reflector for the lower heating element, whereby either the greater part of the heat generated by the coil can be stored in the bottom soapstone to be given out over a prolonged period, or the element can be used as an open radiant grill.

To obtain the greatest efficiency in the fireless cooker, the loss of the heat must be kept down to a minimum. To do cooking a certain number of heat units are required. Cooking, therefore, is not only a question of temperature, but a continuance of temperature and heat must be supplied from some source to make up losses due to conduction and radiation. When heat is supplied to an oven through an internal heater, the oven air is first heated, that heat is absorbed from the oven air by the walls of the oven, and that no matter what insulation is used, the heat travels through the oven walls to the outer wall. As soon as the outer oven wall is raised to a temperature above the surrounding atmosphere, the oven loses heat by external radiation. It is therefore essential that there be some form of a cake of material to supply positive heat, as in the refrigerator the cake of ice supplies negative heat. Soapstone appears to be one of the best materials to use for this purpose, and it is evident upon reflection that there must be some relation between the amount of heat absorbed by the soapstones, the amount of heat delivered to the oven air, and consequently to the oven walls themselves, that will give when established a maximum efficiency in the utilization of the heat units developed by the electric heater in the oven, and I have found that when a radiant electric coil is placed on a bottom soapstone of proper dimensions and is covered with a sheet of asbestos or metal, a greater per-

centage of heat is absorbed by the soapstone than when the face of the heater is open to the oven air, that the inner oven walls heat more uniformly to the temperature of the oven air, that there is less loss of heat units by conductivity and radiation, and that the efficiency of the oven as a heat retainer can be practically doubled. I, therefore, provide at the bottom of the oven a soapstone of the proper relative size to the oven itself, placed on the top of which is a radiant electric heater covered over by a reflector or interceptor wherein the coils can be covered or uncovered at will, being covered when the oven is to be used as a fireless cooker, in which case a very much greater amount of heat units generated by the electricity is absorbed by the soapstone, while sufficient heat is conducted through the closed cover plate to properly warm the oven air and the walls of the oven in a given time. Thus the total number of heat units generated by the electric heater are divided up the most efficiently and the oven air and oven walls are heated with a minimum amount of loss of heat due to conductivity and radiation, so that when the current is turned off, the oven will take much longer to cool down to a predetermined temperature than it would without the arrangement mentioned.

When the oven, however, is used as an electric range, the advantage of the direct intense open radiant heat for quick cooking cannot be overestimated, and for this purpose the cover is moved, so that the heat from the coils may act directly on the broiling pan or other vessel that may be used.

In the accompanying drawings, forming a part hereof:

Figure 1 is a front elevation of an embodiment of the oven in which the outermost wall or inclosure at the sides and top is in the form of a removable hood;

Fig. 2 is a similar view with such hood removed;

Fig. 3 is a front elevation, looking at the interior, with the outermost wall in section and the inner door broken away at its hinges, illustrating one way in which food may be cooked;

Fig. 4 is a horizontal section looking down upon the bottom heating element, soapstone and register, a portion of the latter being broken away to indicate the connections;

Fig. 5 is a view similar to Fig. 3 on a smaller scale, illustrative of the fireless cooking process with the upper heating element removed;

Fig. 6 is a similar view illustrative of the range process, using both heating elements, the outermost inclosure being dispensed with;

Fig. 7 is a view similar to Fig. 6 looking down upon the upper or removable heating

element, the plane of section being just below the top reflector plate of this element;

Fig. 8 is an enlarged vertical section at the angle between one of the fixed side walls and the base;

Fig. 9 is a similar view at the angle between the front door and the base;

Fig. 10 is an electrical wiring diagram;

Fig. 11 is an enlarged plan view of the register and the lower heating element, showing the outer part of the register closed and the inner part open;

Fig. 12 is a vertical section of the same taken in the direction of the longer horizontal dimension;

Fig. 13 is a central vertical section at right angles to Fig. 12; and

Fig. 14 is a plan of the inner movable section of the register.

The oven is shown as comprising an oven proper 1 having heat-insulating walls and an outer inclosure 2 in the form of a removable hood spaced at top and sides from the outer wall of the oven proper by an air space 3 forming a part or supplementary part of the heat insulation. It is to be understood, however, that the outer air-space-forming wall may be fixed and that I do not limit myself to the particular form and proportions of the heat insulation, which I prefer to constitute, however, by a thickness of asbestos or equivalent material 4 for the inner part and an air space for the outer part. If desired, insulation of one kind only can be employed. In the particular construction shown, the fixed walls comprise inner and outer approximately cubical shells 5 and 6, with the heat non-conducting filling 4 between them. The joints where they occur in the inner shell, as at 7 in Fig. 8, are closed, so as to prevent access of moisture from the interior to the insulation 4, and the shells are so constructed that metal contact between them is avoided, heat insulation spaces 8 being interposed at the regions where the shells would otherwise bear upon each other. The front of the part of the inclosure which has been termed the oven proper is formed by a door 9 swung on side hinges 10 and of similar construction to the fixed walls, being formed of inner and outer shells 5^a and 6^a with interposed insulation 4^a and insulation spacers 8^a at the joints. The edges of the door are beveled to fit a correspondingly beveled frame 11 held out of metallic contact with the shells 5 and 6 by insulation spacers 8 and 12.

The outer portion 13 of the base is continued in the form illustrated to provide a sloping ledge with seat 14 for the lower edge of the hood 2; and outside of said seat is a trough 15 to catch any condensation. A vent 16 (Fig. 3) passing through the shells 5, 6 and insulation 4 at the top permits steam to escape so that the cooking takes place

without pressure; and the steam may be delivered into the air space 3, there to condense and give up its latent heat, though this is not essential. The front of the inclosure 2 has a door 9^a, the opening of which is large enough to enable the door 9 to be opened without taking off the hood. A suitable temperature indicator 9^b is mounted in the inner door, and may be seen through a window in the outer door.

The interior of the oven, at opposite sides of the doorway is provided with horizontal ledges 17 extending from front to rear and forming guides whereon removable and adjustable racks 18 may be slid to support the food and utensils. The same guides are also adapted to receive laterally projecting lugs 19 on the frame 20 of an upper, movable electrical heating element 21, which can be placed at any height desired.

In the bottom part of the oven interior is a relatively large soapstone slab 22, suitably held by clips 23 and resting on ribs 24 (Figs. 8 and 9), whereby a small air space is left between it and the bottom of the shell 5, the edges of the slab being likewise spaced from the inner side walls. The dimensions of this slab can advantageously be approximately as shown in the drawing, though needless to say the exact size can be varied.

A lower electrical radiant heating element 25 in a suitable frame 26 is mounted on said bottom soapstone 22, where it may be held by suitable clips 27. As shown more particularly in Figs. 12 and 13 the coils of the element are supported in an open inner frame 28 of porcelain or other insulation, so that they are exposed at the under side to the soapstone or heat reservoir beneath. At the upper side they can be covered or uncovered by means of a movable heat-interceptor or reflector, represented by a register 29. The function of the movable cover is to cause the heat from the coil to be thrown into the stone or to permit it to be used for direct radiant cooking, at will, and its form may be varied. The register shown in the drawing comprises an upper, fixed plate 30 slotted in vertical coincidence with the coils, and under slidable plates 31, 32 similarly slotted and adapted to be moved to open or blank the stationary slots. The movable register member 32 is located preferably at the middle and is of comparatively small area and generally circular, and occupies an opening in the outer member 31, which opening is large enough to permit of independent movement of the two members. The inner member may be guided by pins 33, projecting downward from the stationary top plate into slots 34 in the inner member, and has a forwardly extending stem 35 terminating in an accessible finger-piece 36. The outer section 31 has another forwardly projecting handle 37; and the relations are

such that both of the sections can be opened or closed at the same time, or the smaller inner section alone can be opened. The entirely open condition is seen in Fig. 4 and the partly open condition in Fig. 11. In the latter view pushing in on the handle 37 will open the outer section, with the result seen in Fig. 4, and pulling out on the handle 36 will close the inner section, both sections being then closed.

The upper, movable heating element is similarly constructed and mounted, and could also be provided with a register at one side, but for most purposes it will be sufficient to furnish it with a fixed cover plate 38, which will cause it to throw its heat downward. If desired to radiate upward, the heating element can be turned upside down on the guides.

As shown in Fig. 7 the coils of the movable heating element 21 are connected alternately in series, the current passing from one of two outside terminals 39 at the back through every other coil to the front, and then through the remaining coils to the back and out at the other terminal 39. A middle conductor 40 is connected to the forward coil and extends, without connection with the other coils to the back, to a mid-terminal 42. By outside and mid-terminals I do not mean necessarily that the terminal 40 is between the terminals 39, but that the terminals 39 are at the ends of the complete heating element, whereas the terminal 40 is connected to furnish a return path for the current, under certain conditions, after it has traversed only half or other part of the coils.

The terminals 39 and 40 are contact members adapted to slip into and out of connection with triple conductors 41, 41, 42, which extend up the back of the interior of the oven from the bottom, the construction being such that the terminals are adapted to slip automatically into and out of connection with the fixed conductors at any height, by the mere act of inserting or removing the heating element on its guides 17. This may be accomplished in a variety of ways, but preferably the conductors or trolleys consist of bars projecting from the backs of channels in an insulation member 43, while the terminals are spring clips formed to embrace these bars.

The lower heating element is similarly wired, but in this instance the outside terminals 39^a are fastened to suitable binding posts 44 on the bottom. The mid-terminal 40^a is a contact like those of the upper element, to connect with the conductor 42. The conductors 41 are represented as connected with binding posts 45 on the bottom of the interior. The binding posts 44, 44, 45, 45 are connected with four main terminals 46, 47, 48, 49, adapted to be connected in different

pairs with an outside circuit, terminals of which are represented at 50 and 51. Referring to the diagram of Fig. 10 and assuming the movable heating element 21 to be in place in one or other of its positions, current is caused to flow through one or either of the elements in its entirety, or can be divided between the two. Thus if the outside circuit is connected with the terminals 46, 47, the current will enter the lower heating element 25 only, and will pass through all of its coils. When the terminals 47, 48 are selected the current flows through one part of each of the elements, these parts being connected in series by the said terminals 40, 40^a, the trolley conductor 42 and one of the conductors 41, and the other parts of both elements being cut out of circuit. Finally, when terminals 48 and 49 are connected with the outside circuit, the upper element only receives the current, which traverses all of its coils, by way of the conductors 41.

A relatively thin soapstone 52 is supported in the upper part of the interior slightly spaced from the top inner wall, and also from the side walls. Clips 53 are indicated for holding the soapstone in a removable manner, it being desirable to take out both stones occasionally for cleaning. While I have used the term soapstone, as it appears to be the best and typical example of a heat-absorbing reservoir or "cake" suitable for the purpose of fireless cooking, it is to be understood of course that I do not limit myself to one material.

The cooker constituted as described is serviceable for a variety of cooking operations and takes the place of both the range and the fireless cooker. For fireless cooking, the upper heating element may be removed if it is in the way, and any appropriate number of racks 18 are inserted to support the vessels containing the food (Fig. 5). The oven is closed and the current turned on into the lower heating element, the register 29 over this element being closed. The heat given off from the radiant coils is largely taken up by the bottom soapstone 22, and enough passes through the cover to heat the air, the food and the walls to the desired temperature. The current is then turned off, and the food left to cook by the heat confined in the oven and gradually given off by the soapstones.

In the case of roasting or baking, it is desirable to use both heating elements, above and below the food. Thus, as shown in Fig. 3, the baking pan or other receptacle can be placed directly on the frame or register of the bottom heater, and the upper heater can be disposed close over the fowl or other article, with its radiant coils facing downward. In this way the surface can be nicely browned or seared, and the cook-

ing of the interior completed in the fireless way, after the current has been turned off.

Or the oven can be used as a range, without the hood or outer inclosure 2 if desired, and with the door open or not as desired. In such case, for example, steaks, chops and other articles can be quickly cooked between the upwardly and downwardly striking radiant heat from both heating elements, the register 29 being open. The pan or other receptacle can be placed on the open register, or supported at a greater or less elevation by one of the racks 18, as seen in Fig. 6, and the upper element can also be placed at any desired height. In this form of cooking the lower heating element alone can be used, or all the current can be thrown in the upper, movable element if for any reason desirable. When making coffee or heating any small bottomed vessel, current can be saved and the action hastened by opening only the portion 32 of the register. At the same time other articles can be heated in the upper part of the oven, or upon the closed part of the register. Numerous other modes of use are also possible.

What I claim as new is:

1. In a cooking apparatus, an oven, a movable electrical heating element adapted to be supported in the oven at various heights, and continuous vertically extending stationary conductors coöperative with said heating element at any height.

2. In a cooking apparatus, an oven provided with guides, vertical conductor trolleys at the back of the oven, and a removable electrical heating element adapted to make connection with said trolleys at any height.

3. In a cooking apparatus, the combination of an oven provided with guides, an electrical heating element at the bottom of the oven, an upper electrical heating element positionable at various heights, and vertical conductor trolleys for coöperation with said upper element.

4. In a cooking apparatus, the combination of an oven, a lower electrical heating element, an upper electrical heating element positionable at different heights, means for supplying current to the entirety of either one of the elements or connecting halves of the two elements in series with the supply circuit at will.

5. In a cooking apparatus, the combination with an oven, of upper and lower electrical heating elements therein, each of said elements having three terminals, means for connecting the mid-terminals of the two elements, and means for selectively connecting the outside terminals of the elements with a supply circuit, whereby the current may be caused to pass through the whole of either element or through half each of both elements in series, at will.

6. In a cooking apparatus, the combination of an oven, a lower electrical heating element, an upper electrical heating element positionable at different heights, each of
 5 said heating elements having two outside terminals and a mid-terminal, four main terminals, and three conductors with which the terminals of the movable element engage, two of said conductors being connected with two of the main terminals, the
 10 outside terminals of the lower heating element being connected with the other two main terminals, and the mid-terminal of the lower element being connected with the
 15 third conductor.

7. In a cooking apparatus, a heat insulated oven, a heat-absorbing body therein, an electrical heating element immediately over said body, and a register over the heating element.
 20

8. In a cooking apparatus, the combination of a heat-insulated inclosure, a heat-absorbing body therein, an electrical heating element immediately over said body,
 25 and a movable cover for the heating element whereby the heat can be forced principally into the heat-absorbing body to be

given out over a period, or the radiant coils exposed for direct cooking, at will.

9. In a cooking apparatus, the combination of a heat-insulated inclosure, a heat-absorbing body therein, an electrical heating element immediately over said body, and a register over the heating element comprising outer and inner parts, both of
 30 which, or the inner part alone, can be opened at will. 35

10. In a fireless cooker, the combination of an oven having heat-insulating walls with a door in one side and guides for the
 40 racks, an electrical heating element and a heat-absorbing body therein, a hood inclosing the oven with air space between, and a steam vent from the oven into said air space.

11. In a fireless cooker, the combination
 45 of an oven having heat-insulating walls with a door in one side and guides for racks, an electrical heating element and heat-absorbing body in the oven, and a removable hood adapted to surround the oven in spaced
 50 relation and having a door outside the door of the oven.

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