219-22

O. A. COLBY.

ELECTRICALLY HEATED APPARATUS.

APPLICATION FILED JAN. 15, 1913.

1,146,310.

Patented July 13, 1915.

2 SHEETS—SHEET 1.

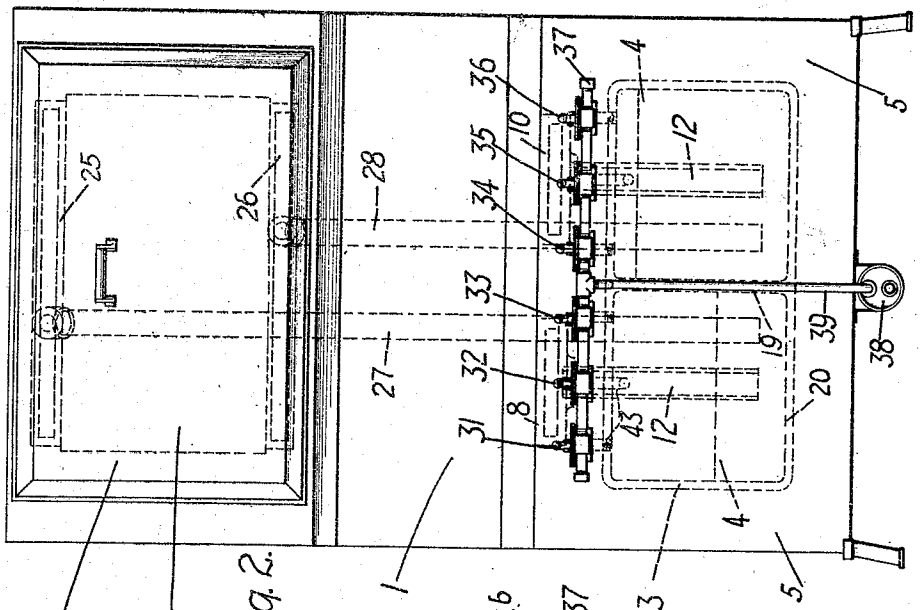


Fig. 2.

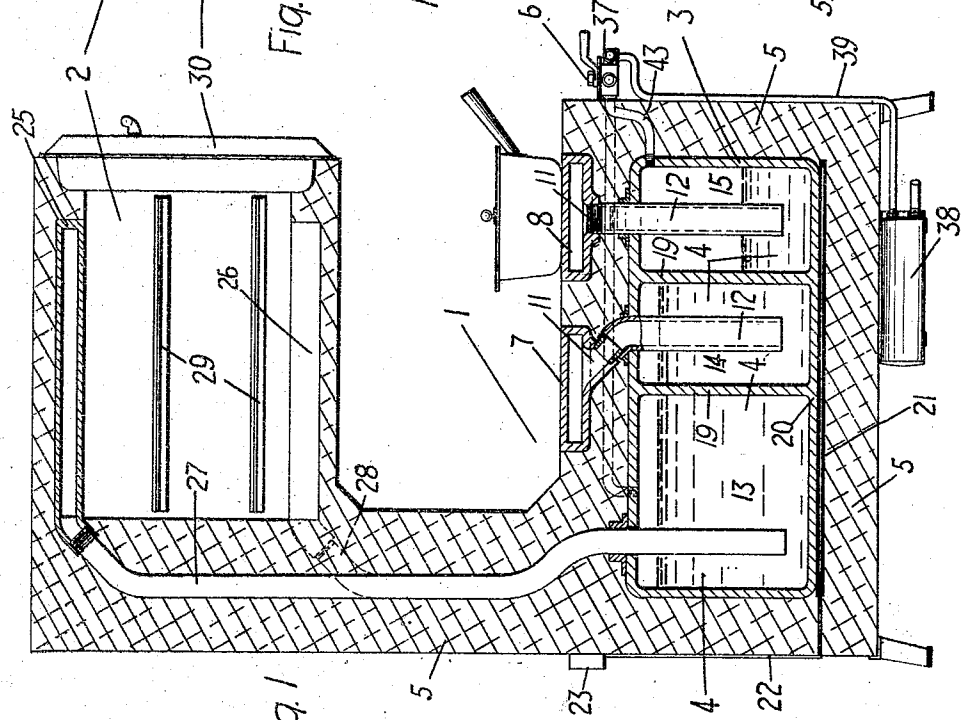


Fig. 1

WITNESSES:

W. R. Coley

INVENTOR

Ora A. Colby

BY

Wesley G. Carr

ATTORNEY

O. A. COLBY.

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2 SHEETS—SHEET 2.

Fig. 3.

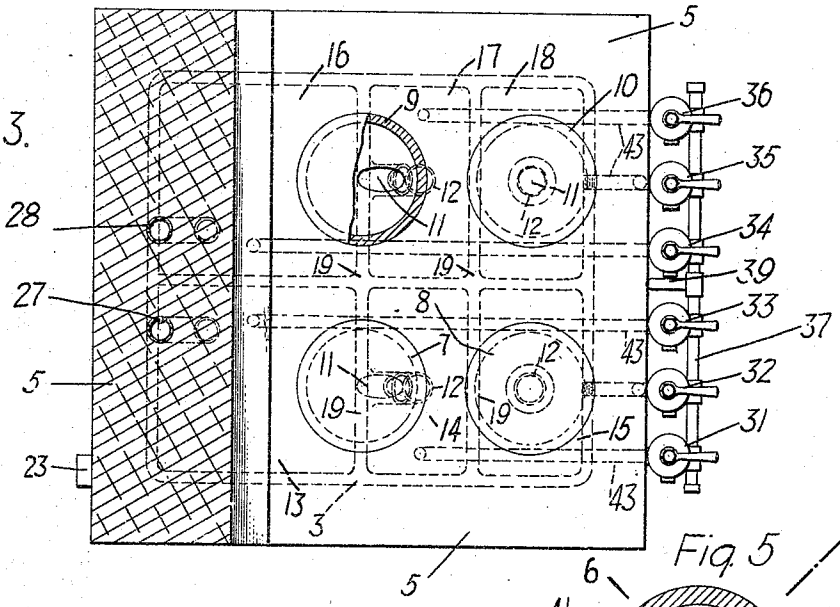


Fig. 5

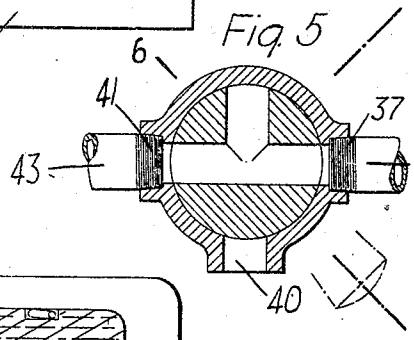
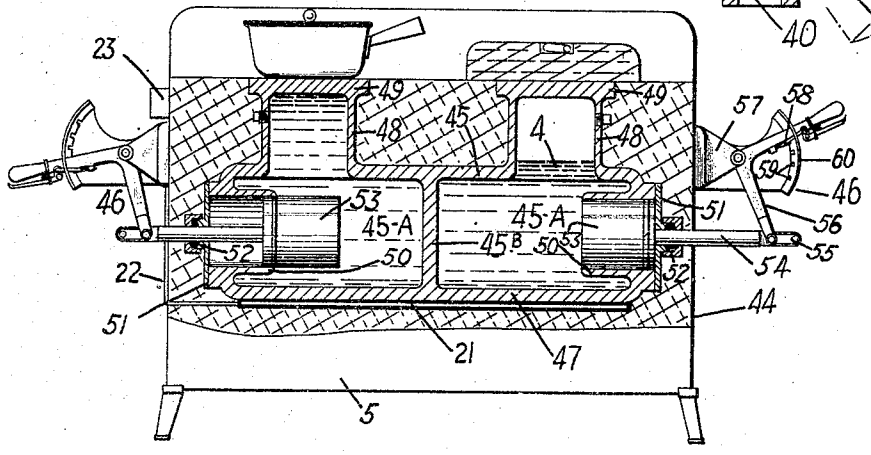


Fig. 4.



WITNESSES:

E. J. Ridge.

W. R. Coley

INVENTOR

Ora A. Colby

BY

Wesley G. Carr

ATTORNEY

UNITED STATES PATENT OFFICE.

ORA A. COLBY, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

ELECTRICALLY-HEATED APPARATUS.

1,146,310. Specification of Letters Patent. Patented July 13, 1915.

Application filed January 15, 1913. Serial No. 742,171.

To all whom it may concern:

Be it known that I, ORA A. COLBY, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electrically-Heated Apparatus, of which the following is a specification.

My invention relates to electrically heated apparatus, and it is has special reference to cooking ranges and ovens of the so-called "heat-storage" type which embody masses of material for accumulating or storing heat which is supplied thereto electrically at a substantially low and constant rate, whereby the heat that is thus accumulated may be available for future use at any desired rate.

One of the objects of my invention is to simplify and improve the construction and operation of devices of the above indicated character, and to provide a compact and durable structure of great utility which may be operated economically by reason of its high thermal efficiency, and which may be readily adapted for a variety of cooking operations.

Another object of my invention is to provide a unitary structure embodying a cooking range and an oven, each of which is provided with a plurality of heaters or so called "hot plates" to be thermally associated with a mass or body of molten material that is contained within a receptacle having a plurality of separate compartments, said receptacle being disposed within the body of the range and enveloped or embedded by suitable heat-insulating material, whereby excessive radiation and loss of heat are prevented.

A still further object of my invention is to provide adequate means which may be readily manipulated and controlled by the operator for thermally associating any one of the hot plates with the heated storage mass, whereby said mass of molten material may be raised or elevated through suitable passages or pipes into the hot plates.

My invention may be best understood by reference to the accompanying drawings, in which—

Figure 1 is a view, partially in section and partially in side elevation, of a device constructed in accordance with my invention. Fig. 2 is a view in front elevation. Fig. 3 is a plan view, partially in section, of the apparatus shown in Fig. 1. Fig. 4 is a view, partially in section and partially in side elevation, of a modified form of my invention, and Fig. 5 is a detail view, partially in section, of a portion of the apparatus shown in Figs. 1, 2 and 3.

Referring now to Figs. 1, 2 and 3, the apparatus shown comprises a range 1, an oven 2, a receptacle 3, a mass of heat-storage material 4, walls of heat-insulating material 5, and a plurality of regulating devices 6.

The range 1 embodies a plurality of hot plates 7, 8, 9 and 10 which are of like construction and each of which comprises a hollow disk-shaped member which may conveniently be of cast iron or other similar material and is provided with an opening 11 into which is fitted a pipe 12, said pipe projecting downwardly into one of the compartments of the receptacle 3, as hereinafter set forth.

The receptacle 3 is shown as a single cast iron member, although other forms of receptacle may be employed, and is divided into several compartments, 13 to 18 inclusive, by means of partitions 19. The receptacle 3 is located centrally within the main body of the range 1, and is embedded in walls of heat-insulating material 5, whereby radiation of heat therefrom is prevented. Disposed immediately beneath bottom wall 20 of the receptacle 3, and in proximity thereto, is an electric heating unit 21 which is provided with leads 22 that terminate in a suitable terminal box 23 having electric connections to an external source of energy. The specific structural details of the electric heater 21 form no material part of my present invention, it being permissible to employ any type of electric heater that is suitable for accomplishing the desired results.

It should be understood that, under normal operating conditions, electric energy is supplied to the heater continuously at a low rate and said energy is delivered and imparted to the heat storage mass that is contained in receptacle 3, whereby said heat is stored and accumulated for future use.

The heat-storage material, hereinbefore referred to as the molten mass, may be bismuth, zinc or tin or any other element or

alloy which has a very low melting point, as well as high volatilization point, and I do not wish to be restricted to any particular elements.

It will, of course, be understood that the several hot plates, 7, 8, 9 and 10, are in communication with the respective compartments 14, 15, 17 and 18, by means of pipes or passages 12. The compartments 13 and 16 are respectively in communication with the hot plates 25 and 26 by means of passages or pipes 27 and 28. The hot plates 25 and 26 are similar in construction to those hereinbefore described and are respectively located adjacent to the upper and to the lower wall of the oven 2, which may be of any well known construction and may have a plurality of shelves 29 and a door 30. The several walls of the oven, as well as the passages or pipes 27 and 28, are amply surrounded with heat-insulating material 5.

The several pipes 12, as well as pipes 27 and 28, project downwardly into the compartments of the receptacle 3 and the lower ends of said pipes are located adjacent to the bottom wall of the receptacle.

In order to individually control the operation of the several hot plates, 7, 8, 9, 10, 25, and 26, a series of regulating devices or valves, 31 to 36 inclusive, are provided, these valves being disposed along the front of the range 1 in a similar manner to that which is employed in the well-known gas ranges. The several valves, just referred to, are of like construction and all are connected to a horizontally disposed pipe 37 which is connected to a reservoir 38 by means of a pipe 39. The reservoir or tank 38 may be of any suitable construction that is familiar to those skilled in the art, and is adapted to contain air, gas or other suitable fluid under compression. Furthermore, each of the valves, 31 to 36 inclusive, is preferably of the "three way" type and is also provided with ports 40 and 41. The ports 40 are open to the atmosphere and the ports 41 are connected, by means of pipes 43, to the several compartments 13 to 18 inclusive. Inasmuch as this type of valve is well known in the art, no further detailed description is considered necessary. It should be understood, however, that the several pipes 43 are connected to the compartments near the upper walls thereof.

Assuming that the control valves just described are all closed, that the mass of molten material occupies its lowermost position within the receptacle 3 and that heat is being supplied thereto from the heater 21, the operation of the apparatus is as follows:—

In case it is desired to perform a cooking operation upon the hot plate 8, it is only necessary to operate the valve 32 in such manner as to allow the compressed medium that is contained within the reservoir 38 to enter the compartment 15 through the valve 32, whereby the molten material in said compartment is forced upwardly through the pipe 12 into the hollow disk-shaped hot plate 8. Thus, heat is transmitted to the surface of the hot plate 8 from the molten material 4 for cooking purposes. Any desired amount of heat may be secured and good regulation of the temperature may be obtained by suitably operating the controlling valve, whereby the height of the molten material within the pipe 12 and hot plate 8 may be adjusted as desired. After the cooking operation is completed, the valve 32 is operated to allow the compressed medium to escape into the atmosphere, thereby relieving the compression within the compartment and permitting the molten material to be lowered to its normal position.

A similar control and regulation of the molten material with respect to the other hot plates of the range, as well as the oven, may be secured and, on account of the similarity of the operation to that which has just been recited, no further description thereof is deemed essential. Obviously, in order to secure satisfactory operation, so far as the oven hot plates 25 and 26 are concerned, it is necessary that pipes or passages 27 and 28 be of liberal size and well surrounded by heat insulating material, so that the molten mass, as it is forced upwardly into the hot plates, shall not become cool and thus obstruct the passages.

Reference may now be had to Fig. 4, which is a view of a modification of my invention, comprising a range 44, a receptacle 45, a mass of heat-storage material 4, walls of heat-insulating material 5, and a plurality of manually operated pressure-regulating devices 46.

The receptacle 45 is located centrally within the main body of the range 44, and is embedded in walls of heat-insulating material 5, whereby radiation of heat therefrom is prevented. The receptacle is divided into a plurality of compartments 45^A by means of partitions 45^B. Disposed immediately beneath bottom wall 47 of the receptacle 45, is an electric heating unit 21 which is provided with leads 22 that terminate in a suitable terminal-box 23 having connections to an external source of energy.

Integral with the receptacle 45 are a plurality of hollow cylindrical projections 48, the integral top surfaces 49 of which serve as hot plates for purposes of cooking. On the outer side of receptacle 45 is an integral cylinder 50 projecting within said receptacle and having a head 51 and a stuffing-box 52. A piston 53 is adapted to reciprocate within the cylinder 50 and is mounted on a rod 54 which extends through the stuffing-box 52. A short link 55 is pivotally mounted on the

free end of rod 54, and a bell crank lever 56 is connected to the link 55 and is pivotally mounted on a bracket 57 to impart motion to the piston 53. The lever 56 is provided with a latching pawl 58 which is adapted to engage notches 59 in a segmental guide 60, whereby the piston 53 is held in any desired position.

Assuming that the level of the molten mass 4, when the piston 53 is at the outward limit of its travel, is some distance below the hot plates 49, the operation of the present device is as follows: The bell crank lever 56 is moved to one of its lower positions to cause link 55 to actuate rod 54 and force piston 53 into molten mass 4, thereby raising the mass into proximity to the hot plates 49, which are thus adapted for cooking. The rate of heating of the hot plates 49 it is understood, depends upon the distance the piston is forced into the molten mass 4, and, consequently, the proximity of the mass to the hot plates 49.

Although I have shown and described my invention as embodying specific structural details and locations and arrangements of parts, it will be understood that many modifications may be effected therein without departing from the spirit and scope of my invention, and such modifications are intended to be covered by the appended claims.

I claim as my invention:

1. In an electric heating apparatus, the combination with a heating surface and a receptacle containing a body of heat-conveying material, of electrical means for maintaining said material in a molten condition, and means for transferring a portion of said molten material to said heating surface and withdrawing it therefrom, as desired.

2. In an electric heating apparatus, the combination with a plurality of heating surfaces and a receptacle containing a body of heat-conveying material having a low melting-point and a high volatilization point, of electrical means for maintaining said material in a molten condition, and means for transferring a portion of said material to each of said heating surfaces and withdrawing it therefrom, as desired.

3. In an electric heating apparatus, the combination with a plurality of fixed members adapted to radiate heat imparted thereto, of an electrically-heated receptacle, molten heat-storage material disposed within the said receptacle, and means for transferring portions of said material to said heat-radiating members and withdrawing it therefrom, as desired.

4. In an electric heating apparatus, the combination with a plurality of fixed members adapted to radiate heat imparted thereto, of an electrically-heated receptacle, fluid heat-storage material disposed therein, and means for transferring a portion of said material to any or all of said heat-radiating members and withdrawing it therefrom, as desired.

5. In an electric heating apparatus, the combination with a plurality of fixed members adapted to radiate heat imparted thereto, of an electrically-heated, plurally-partitioned receptacle, fluid heat-storage material disposed therein, and means for transferring a portion of said material to any or all of said heat-radiating members and withdrawing it therefrom, as desired.

6. In an electric stove, the combination with a plurality of fixed plates adapted to radiate heat imparted thereto, of an electrically-heated receptacle having a plurality of compartments severally associated with said plates, molten material disposed within said compartments, and individually-concontrolled means for transferring a portion of said material from any compartment to the corresponding plate and withdrawing it therefrom, as desired.

7. In an electric stove, the combination with a plurality of fixed plates adapted to radiate heat imparted thereto, of an electrically heated receptacle having a plurality of compartments severally associated with said plates, molten material disposed within said compartments, and a plurality of individually-controlled means for imposing pressure upon said material in any compartment to transfer a portion thereof to the corresponding plate and withdraw the same therefrom, as desired.

8. In an electric stove, the combination with a plurality of fixed heat-conducting plates, of an electrically-heated receptacle having a plurality of compartments severally associated with said plates, molten material disposed within said compartments, and a plurality of individually controlled means for imposing fluid pressure upon said material in the respective compartments to raise a portion thereof from any compartment to the corresponding plate for cooking purposes and for withdrawing said fluid pressure, as desired.

9. An electric heating apparatus, embodying an electrically-heated, thermally-insulated receptacle having a plurality of compartments, a plurality of heat-radiating members severally associated therewith, heat storage liquid material in said compartments and means for exerting pressure within said compartments to transfer a portion of the liquid therein to said heat-radiating members.

10. An electric stove, embodying an electrically-heated, thermally-insulated receptacle having a plurality of compartments, a plurality of heat-conducting plates, a plurality of pipes or passages for severally connecting said compartments to said plates, and a plurality of individually-controlled

means for exerting fluid pressure within said receptacles.

11. In an electric stove, the combination with a range having a plurality of heat-conducting plates, an electrically-heated, thermally-insulated receptacle embodied within said range and provided with a plurality of compartments, and molten material disposed therein, of an oven provided with a plurality of heat-conducting plates associated with said receptacle, pipes or passages severally connecting said plates with said compartments, and means for forcing said molten material through said passages to said plates in said range and said oven for cooking purposes.

12. A heating apparatus embodying a heat-radiating member, an electrically-heated receptacle, heat-insulating material surrounding the same, molten material disposed within said receptacle, and means for transferring a portion of said material to said member and withdrawing it therefrom, as desired.

13. A heating apparatus embodying an electrically-heated, thermally-insulated receptacle, molten heat-storage material disposed therein, and means for utilizing the stored heat in said material by forcing portions of the material to heat-radiating points and withdrawing the same, as desired.

14. A stove embodying an electrically-heated receptacle, heat-insulating material forming a casing therefor, heat-storage fluid disposed within said receptacle, and means for raising portions of said fluid to the top of said casing for cooking purposes and restoring the same to the receptacle, as desired.

15. In a heating apparatus, the combination with a receptacle provided with a plurality of hot plates, means for heating said receptacle, and molten material disposed therein, of an independent pressure system for forcing said material into proximity to any desired hot plate.

16. A heating apparatus embodying a heated receptacle, a heat-insulating casing for the same, molten material disposed within said receptacle, and means for displacing a certain portion of said material.

17. A heating apparatus embodying an electrically-heated, thermally-insulated receptacle provided with a plurality of hot plates, molten material disposed within said receptacle, and manually-operated displacement-members for forcing said material into proximity to any desired hot plate.

18. A stove embodying an electrically-heated thermally-insulated receptacle provided with a plurality of hot plates, molten material disposed within said receptacle, and manually-operated reciprocating plungers for displacing a certain portion of said material and forcing the same into proximity to any desired hot plate.

In testimony whereof, I have hereunto subscribed my name this 9th day of January, 1913.

ORA A. COLBY.

Witnesses:
H. J. McHALE,
B. B. HINES.