Feb. 21, 1950 H. W. SCHULZE 2,498,583

ELECTRIC OVEN

Filed Dec. 28, 1945 2 Sheets-Sheet 1

Fig. 1.

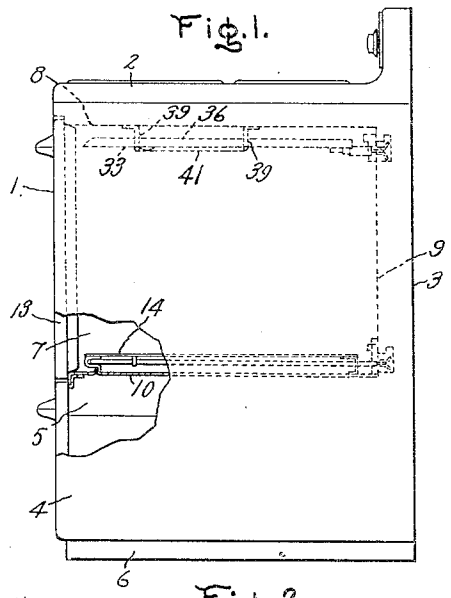


Fig. 4.

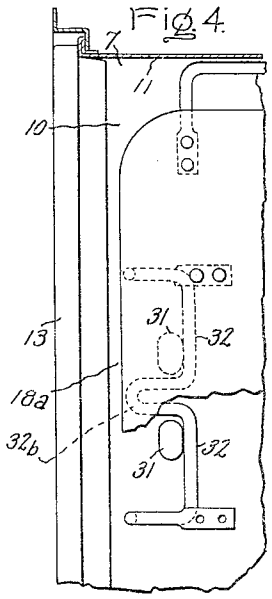


Fig. 2.

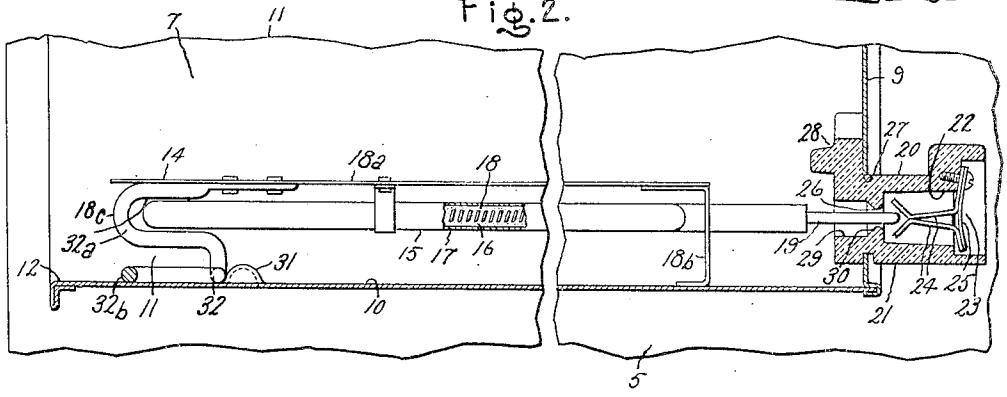
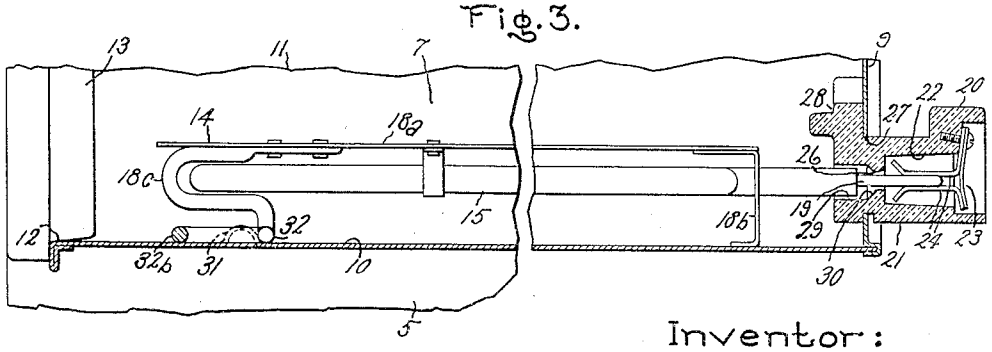


Fig. 3.



Inventor:
Herman W. Schulze,
by Alfred V. Bobst.
His Attorney.

Feb. 21, 1950 H. W. SCHULZE 2,498,583

ELECTRIC OVEN

Filed Dec. 28, 1945 2 Sheets-Sheet 2

Fig. 5.

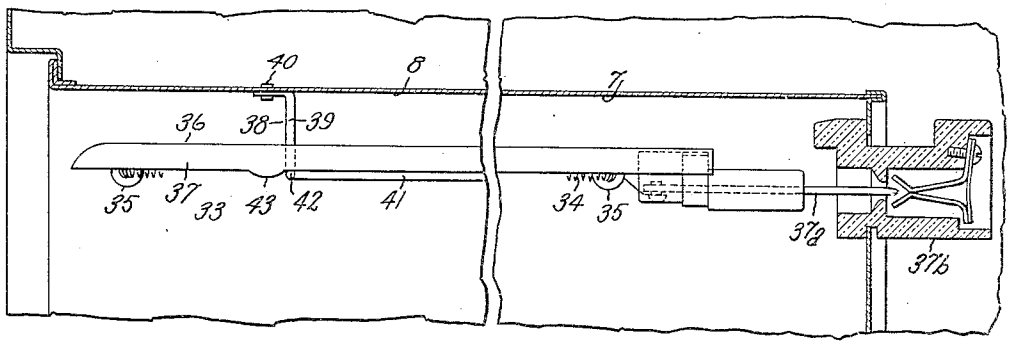


Fig. 6.

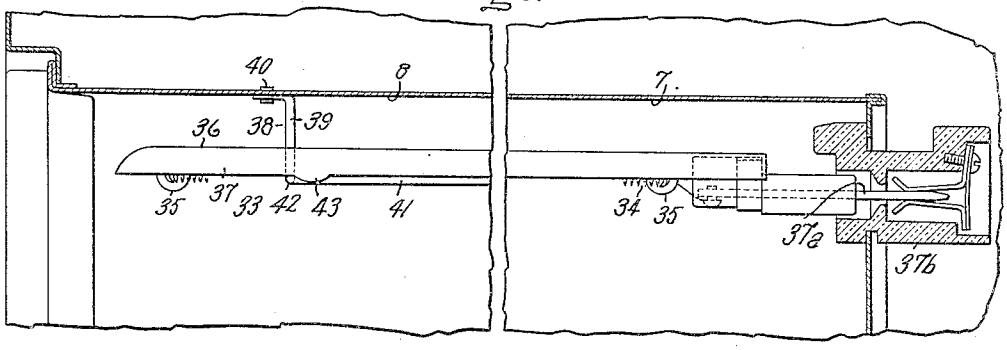
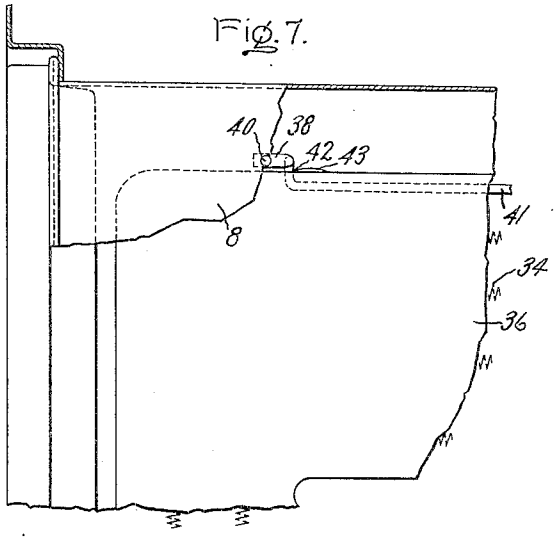


Fig. 7.



Inventor:
Herman W. Schulze,
by Alfred V. Robst,
His Attorney.

Patented Feb. 21, 1950

2,498,583

UNITED STATES PATENT OFFICE

2,498,583

ELECTRIC OVEN

Herman W. Schulze, Elmwood Park, Ill., assignor to Hotpoint Inc., a corporation of New York

Application December 28, 1945, Serial No. 637,601

5 Claims. (Cl. 219—35)

1

This invention relates to electric ovens, more particularly to such ovens provided with a removable heating unit which has electrical terminals that engage fixed electrical supply terminals when the unit is placed within the oven compartment in its proper heating position, and it has for its object the provision of an improved oven structure of this character having means for insuring the location of the heating unit in the proper heating position wherein its terminals have full electrical contact with the fixed supply terminals, and for preventing the unit from working loose during heating and cooling cycles.

Electric ovens usually are provided with removable heating units which have terminal pins projecting from the rear end, and which are received in fixed supply terminals, located at the rear of the oven, when the unit is pushed back into its proper heating position.

Heretofore, if the heating unit inadvertently was not fully pushed back in the oven, there would be a poor and likely loose connection between the unit terminals and the fixed supply terminals. This would cause arcing at the contacts with attendant burning and pitting. Also, even though the heating unit was placed in its proper position initially, there was a tendency for the unit to work loose by "walking out" so to speak. This resulted from the expansion and contraction of the unit when alternately heated and cooled; as the unit heated up it expanded, and as a result its front end moved out, and on subsequent cooling, the chances are that when the unit contracted the front end would remain in its advanced position and the terminals at the rear pulled out somewhat. As this operation continued the terminals eventually would be completely separated.

Efforts have been made heretofore to assure that the heating unit was in its proper position initially and could not work out of it. In some cases, ovens were provided with a guard on the front of the unit which was engaged by the front door when it closed to insure full electrical contact at all times between the unit and supply terminals. This proved to be objectionable because at times the oven door was damaged. In other cases, spring retainers were provided but these have not been entirely satisfactory both from a temperature and a sanitary viewpoint.

In accordance with this invention, a wall of the oven compartment and the heating unit are provided with coacting, projecting parts. These parts are constructed and arranged so that the projection on the heating unit is located on that

2

side of the wall projection nearest the fixed electrical supply contacts when the heating unit is in its proper heating position with its terminals in full electrical engagement with the supply contacts. The oven wall projection is further so arranged that in the event the unit projection is on its other side, the heating unit terminals will be completely disengaged from the supply contacts. Furthermore, the coacting projections are so shaped that in most cases where the heating unit is not "pushed home" so that the contacts are in full electrical engagement, but are only in partial engagement, the unit will slide down this other side of the projection so as to completely disconnect the unit from these terminals.

For a more complete understanding of this invention, reference should be had to the accompanying drawing in which Fig. 1 is a side elevation of an electric range embodying oven structure provided with upper and lower heating units arranged in accordance with this invention, a part of the structure being broken away so as to illustrate certain structural details; Fig. 2 is an enlarged fragmentary vertical sectional view through a part of the range structure shown in Fig. 1, and illustrating the lower heating unit disconnected from its supply terminals; Fig. 3 is a view similar to Fig. 2 but showing the lower heating unit in its proper heating position; Fig. 4 is a plan view of a part of the range structure of Figs. 1 to 3; Figs. 5 and 6 are fragmentary vertical sectional views similar to Figs. 2 and 3, but illustrating in the respective views the upper heating unit disconnected from its supply terminals and connected therewith; and Fig. 7 is a plan view of a portion of the structure shown in Figs. 5 and 6, parts shown in section so as to illustrate certain structural details.

Referring to the drawings, this invention has been shown as applied to an electric range having a metal cabinet 1 which is provided with a cooking top surface 2, a rear wall 3, a pair of spaced-apart side walls 4 and 5 and with a base 6. Mounted within the cabinet 1 is an oven heating compartment 7 which is defined by a metal top wall 8, rear wall 9, bottom wall 10, and a pair of opposed side walls 11. The compartment 7 at the front is provided with an opening 12 through which the articles to be cooked are inserted and withdrawn, and which is provided with a door 13 which, of course, normally is closed during the heating operation.

Mounted on the bottom wall 10 of the oven is a lower electrical heating unit 14. This heat-

ing unit comprises a rod-like sheathed electric heating element 15 which is provided with a helical resistance conductor 16 mounted within an outer metallic sheath 17 and supported in spaced relation with reference to the sheath by a compacted mass 18 of electrically insulating and heat conducting material, such as magnesium oxide. The heating element 15 is supported by and below a suitable baffle 18a. This baffle in turn is provided with a support 18b at the rear and a wire-like support 18c at the front.

Secured to the ends of the resistance conductor 16 and projecting outwardly from the sheath 17 are a pair of pin-like terminals 19. These terminals are electrically supplied by means of a connector structure 20 which preferably will be like that described and claimed in the United States Patent No. 2,172,181 to R. J. Sutton, dated September 5, 1939. This connector structure comprises an insulator 21 which is provided with a pair of spaced-apart chambers 22—one for each terminal 19 and only one shown—in which are mounted clip structures 23 comprising a pair of jaws 24 which are biased together, as shown in Fig. 2, by means of a spring 25 attached to their bases. The chambers 22 are provided with front openings 26 for the insertion of the terminal pins 19 of the heating unit and when these terminals are projected into the chamber they are received between the pairs of jaws 24 in the fashion shown in Fig. 3 so that the terminals are in full electrical engagement with the jaws.

Preferably and as shown, the insulator 21 will be located on the rear side of the rear wall 9 of the oven, which wall is provided with an opening 27 in which the insulator is mounted. Also, preferably the insulator will be provided with an enlarged front section 28 located within the oven compartment 7 and which is provided with spaced-apart apertures 29 through which the terminal pins 19 are projected. Also preferably, the insulator will be flared outwardly as indicated by the numeral 30 between the openings 29 and the openings 26 which tapered to guide the terminal pins in.

In order to insure full electrical engagement between the terminals 19 and the jaws 24, I provide the bottom wall 10 of the oven with a pair of upraised bead-like projections 31 which are spaced apart transversely, as shown in Fig. 4; and which cooperate with downwardly extending projections 32 formed on the heating unit 14, and which preferably are a part of the lower end of the front support 18c. The projections 31 preferably and as shown will be formed of the metal of which the bottom wall 10 is made. The support 18c, as shown, is of wire-like formation, and has two U-shaped side sections 32a (Figs. 2 and 3), the lower legs of these sections terminating in the sections 32 which are directed toward each other (Fig. 4) and are horizontal when the unit is in the oven; furthermore the two inner ends of the sections 32 are joined by an outwardly extending U-shaped section 32b which is arranged to fit between the projections 31 when the unit is in its proper heating position in the oven.

The projections 31 have substantially semi-circular cross-sections, and so do the wire-like projections 32. The projections 31 and 32 are located with reference to each other so that when the projections 32 are placed on the rear side of the projections 31, as shown in Fig. 3, full electrical engagement is effected between the terminals 19 and the jaws 24, as there shown. Furthermore, the diameter of the projections 31 is such that in the event the heating unit is placed within the oven compartment in such position that its projections 32 lie in front of the projections 31—even though it is directly against them, as shown in Fig. 2—then the terminals 19 are completely out of engagement with the jaws 24 and the electric circuit is broken.

Also by reason of the fact that the projections 31 and 32 are provided with coacting semi-circular shapes, if the heating unit be placed in the oven carelessly so that the projections 32 lie on top of the projections 31 slightly forwardly of the vertical line passing through the center of these projections then the unit will slide forwardly in the oven to its position shown in Fig. 2, and thereby automatically prevent the terminals 19 from engaging the jaws 24.

Therefore, the projections 31 and 32 function as a means for insuring full electrical contact between the terminal pins 19 and their supply jaws 24. They further prevent the unit from working out of its proper heating position due to the alternate heating and cooling.

Also when the heating unit is in its proper operative position shown in Fig. 3 the U-shaped section 32b joining the two projections 32 lies between the upright projections 31, as shown in Fig. 4, so as to prevent any substantial lateral movement of the heating unit within the oven.

In Figs. 5–7 inclusive the upper heating element 33 is illustrated in detail, together with means for insuring full electrical contact between its terminals and the electrical supply terminals. This means also involves the use of interacting projecting parts on the heating element and on the oven structure.

As there shown, a helical resistance element 34 of the resistance type is employed, this element being mounted in suitable insulators 35 which are supported on a pan-like reflector 36, which reflector, as shown, is provided with down-turned marginal flanges 37 at the sides. The heating unit is provided at the rear with pin-like projecting terminals 37a similar to the terminals 19 of the lower heater and which are received in connector structure 37b which are the same as the connectors 20 of the lower heater and are positioned at the rear of the oven in the same way.

The heating unit 33 is supported in its elevated position in the oven by means of a pair of brackets 38 at the opposite sides of the oven. Each bracket has a pair of upright legs 39 which at their upper ends are secured to the top wall of the oven in any suitable way as by rivets 40. Each bracket further is provided with a transverse rail-like supporting section 41 of elongated U-shaped form. The ends of the two legs 42 are secured to the lower ends of the legs 39 whereby the parts 41 are projected into the oven space from the plane containing the two vertical legs 39, as clearly shown in Fig. 7. The two side flanges 37 of the reflector 36 slide upon the sections 41 to guide the unit into its proper heating position shown in Fig. 6 and are supported thereby in this position. When the unit is in this position, the terminals 37a are in full electrical contact with their cooperating fixed supply terminals 37b.

The legs 42 of the brackets 38 coact with projections 43 formed on the two side flanges 37 of the reflector 36 in order to insure the full electrical contact between the terminals 37a and 37b and to hold the unit from working loose. Here

the legs 42, which are the fixed projections of this form of the invention, also are of circular cross section, while the projections 43 are formed on the arc of a circle, and the parts are so constructed and arranged that when the projections 43 are in front of the legs 42, the terminals 37*a* are completely disconnected from the terminals 37*b* (Fig. 5), whereas when the projections 43 are at the rear of the legs 42 then the terminal pins 37*a* are in complete electrical contact with the supply terminals 37*b* (Fig. 6). And, as in the case of the lower heating element, should the upper heater be carelessly placed in the oven so that the projections 43 are not pushed back of the projections 42, but lie thereon slightly forwardly of their centers they will ride down over the projections 42 to completely withdraw the projections 37*a* from the terminals 37*b*.

The vertical legs 39 of the brackets 38 prevent lateral shifting of the unit within the oven.

While I have shown and described particular embodiments of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from my invention in its broader aspects and I therefore aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent by the United States is:

1. An electrical oven comprising walls defining a heating compartment having a front opening therein for the insertion of edibles to be cooked, a separable unitary heating unit inserted through said opening into a working position on the bottom wall of said oven, said heating unit being provided with an electrical heating element and with electrical terminals therefor projecting outwardly from the rear of said unit, electrical supply terminals mounted on the rear wall of said compartment and arranged to engage said projecting terminals when said heating unit is inserted in said compartment and placed in its proper operative position, said heating unit being provided with a downwardly extending rigid projection adjacent the front thereof, and said bottom wall being provided with a rigid rib extending upwardly therefrom also adjacent the front of said oven, said rib having the shape of a semicircle and the lower end of said projection also having the shape of a semicircle, said rib and projection coacting in such fashion that when the projection on said unit is in engagement with the rear of said rib full electrical contact is established between said heating unit and said supply terminals and said heating unit is prevented from moving outwardly from said rear wall, the diameter of said rib being such that when said projection on said unit is placed before it electrical contact between said terminals is broken, and said semicircular shapes of said projection and rib camming said unit to slide forwardly from said rear wall and effect complete disconnection of said terminals in the event the heating unit is in such position that its projection lies on any part of the forward upper side of said rib.

2. An electrical oven comprising walls defining a heating compartment having a front opening therein for the insertion of edibles to be cooked, a separable unitary heating unit inserted through said opening into a heating position on the bottom wall of said oven, said heating unit being provided with an electrical heating element and with electrical terminals therefor projecting outwardly from the rear of said unit, electrical supply terminals of the socket type mounted on the rear wall of said compartment and arranged to receive said projecting terminals when said heating unit is inserted in said compartment and placed in its proper heating position, said heating unit being provided with a downwardly extending projection adjacent the front thereof, said projection having a pair of transverse sections joined by a forwardly extending U-shaped section, and said bottom wall of said compartment having a pair of upraised members spaced apart transversely of said oven, said members being positioned with reference to said supply terminals so that said transverse sections engage the rear thereof when said heating unit is in its proper heating position with its terminals in full electrical contact with said supply terminals, and further so proportioned that when said projections are in front of said members sad terminals are disconnected, and when said heating unit is in said proper heating position said U-shaped section is received between said upraised members to prevent lateral movement of the front end of said unit in said oven.

3. An electrical oven comprising walls defining a heating compartment having a front opening therein for the insertion of edibles to be cooked, a separable unitary heating unit inserted through said opening into a working position in the upper part of said oven, supporting means in said upper part supporting said unit, said heating unit being provided with an electrical heating element and with electrical terminals therefor projecting outwardly from the rear of said unit, electrical supply terminals mounted on the rear wall of said compartment and arranged to engage said projecting terminals when said heating unit is inserted in said compartment and placed in its proper operative position, said heating unit being provided with a downwardly extending projection and said supporting means having a coacting rigid projection, said projections being positioned and arranged so that when said heating unit is in said working position said projection on said unit is positioned to the rear of the projection on said supporting means to insure full electrical contact between said heating element and said terminals and prevent said unit from moving out, and further the projection on said supporting means being so proportioned that in the event the projection on said heating unit is on the front side thereof the electrical contact between said terminals is broken.

4. An electrical oven comprising walls defining a heating compartment having a front opening therein for the insertion of edibles to be cooked, a separable unitary heating unit inserted through said opening into a heating position in the upper part of said oven, said heating unit having a reflector plate and a heating element supported thereby and also having electrical terminals for said heating element projecting outwardly from the rear of said plate, fixed electrical supply terminals mounted at the rear of said compartment and arranged to engage said projecting terminals when said heating unit is inserted in said compartment and placed in its proper heating position therein, said reflector plate having at its sides a pair of downwardly projecting flanges and a pair of brackets in the upper part of said oven having rails upon which said flanges slide to slidably mount said unit, and said flanges having arc-shaped projections extending downwardly therefrom and said brackets having transverse sec-

tions coacting with said projections so that when said projections are at the rear side of said transverse sections, said heating unit terminals and said fixed supply terminals are in complete electrical engagement, whereas when the projections are in front of said transverse sections said terminals are completely broken, said arc-shaped projections further coacting with said transverse sections so as to cam said unit forwardly to effect complete disconnection of said terminals in the event said heating unit is in such position that said arc-shaped projections lie on the forward upper sides of said transverse sections.

5. An electric oven comprising walls defining a heating compartment having an opening therein for the insertion of articles to be heated, a separable unitary heating unit insertable through said opening into an operative position in said compartment, said heating unit having a heating element and electric terminals electrically connected to said element, fixed cooperating electrical supply terminals mounted in said compartment and adapted to be engaged and disengaged by said element terminals, said terminals being of the quick-detachable type permitting ready placement and removal of said heating unit through said opening with respect to said compartment, and means including coacting parts respectively carried by a wall of said compartment and by said heating unit for positively locating said heating unit either in said operative

position or in an inoperative position and for positively preventing location of said heating unit in an intermediate partially operative position with respect to said operative position and said inoperative position, said element terminals being disposed in good circuit-closing relation with said fixed terminals when said heating unit occupies said operative position and said element terminals being disposed in complete circuit-breaking relation with said fixed terminals when said heating unit occupies said inoperative position, said coacting parts being constructed and arranged so that said heating unit may be readily moved manually between said operative position and said inoperative position but so that said heating unit cannot work by itself out of said operative position.

HERMAN W. SCHULZE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,982,386	Heinbruch	Nov. 27, 1934
2,078,681	Otte	Apr. 27, 1937
2,151,446	Shakespeare	Mar. 21, 1939
2,220,607	Mayo	Nov. 5, 1940
2,221,595	Lockwood	Nov. 12, 1940