

Aug. 17, 1965

L. C. HANSON

3,201,567

HEATING UNIT

Filed June 9, 1961

3 Sheets-Sheet 1

Fig. 1

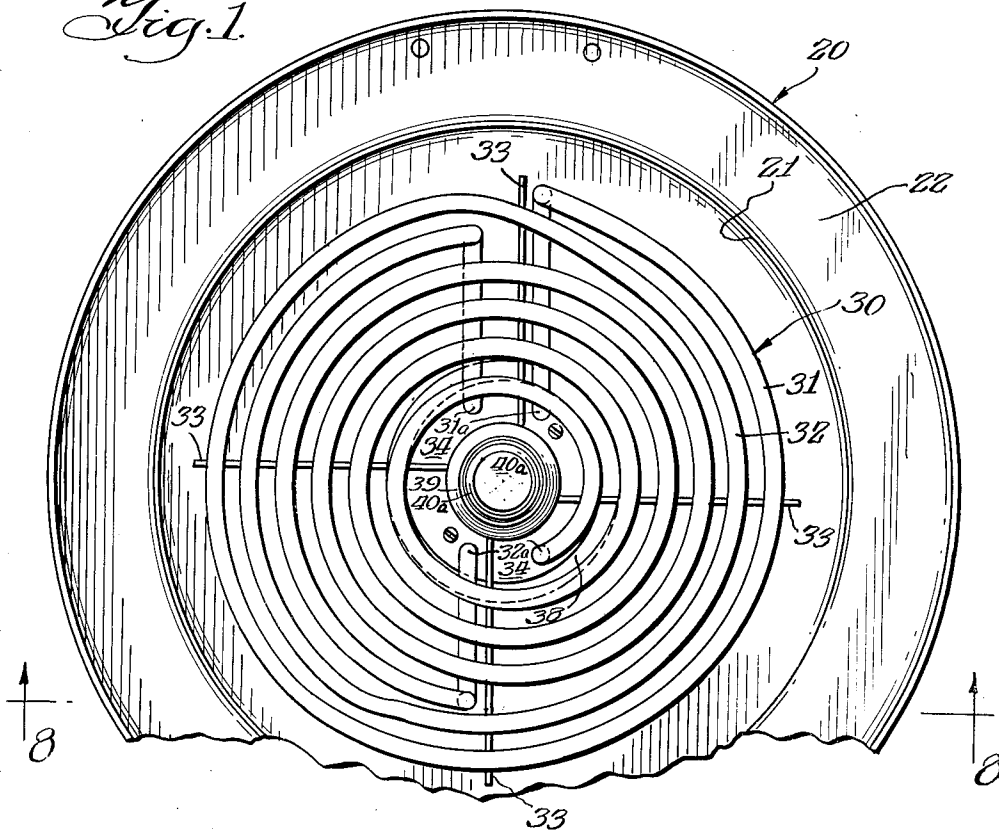
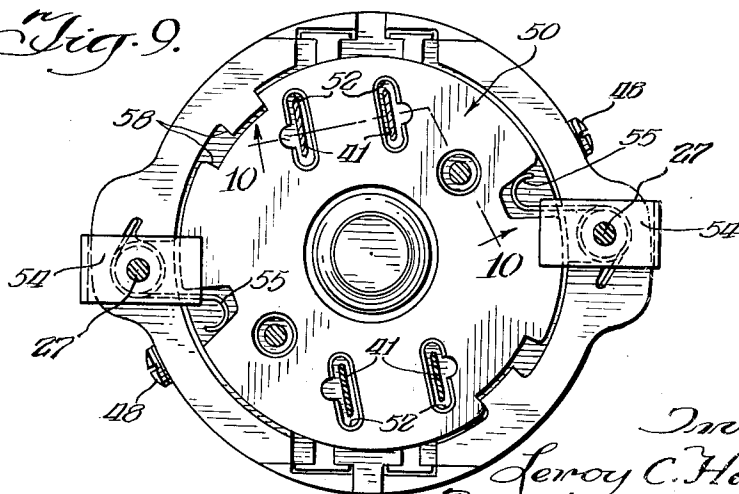


Fig. 9



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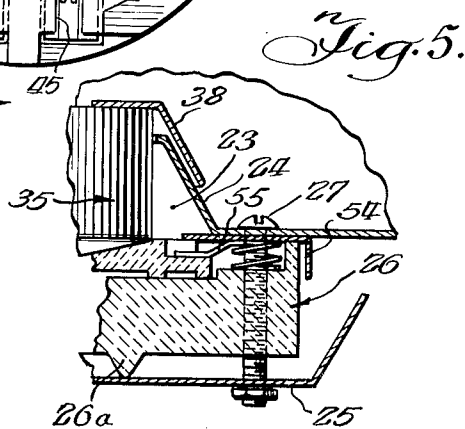
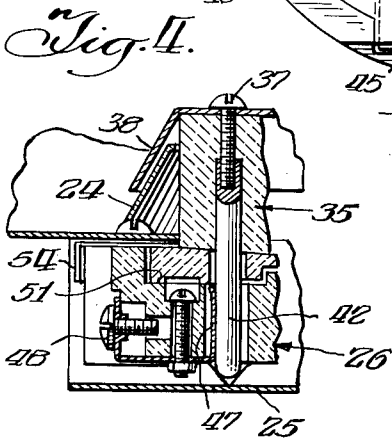
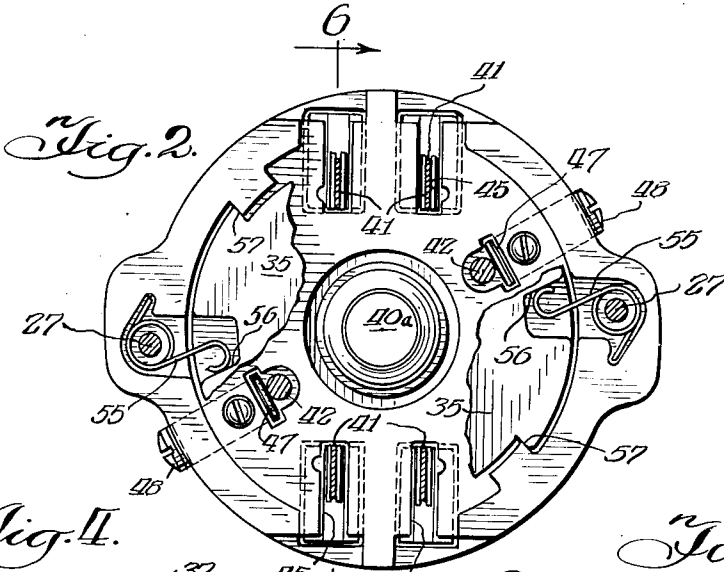
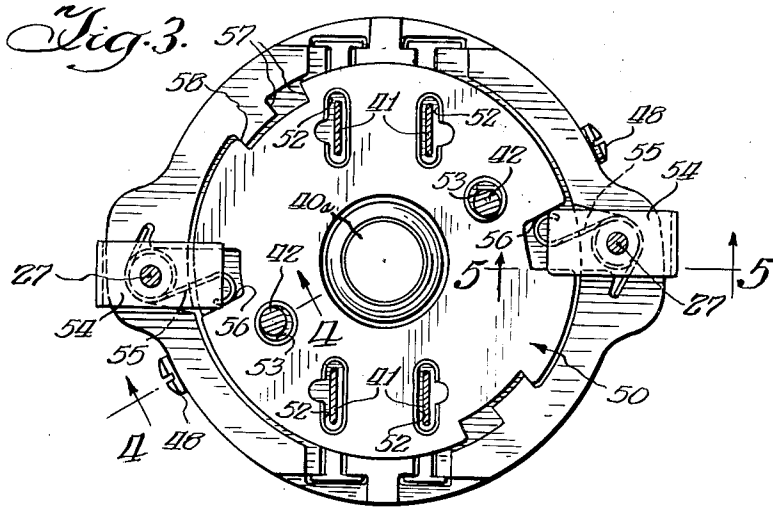
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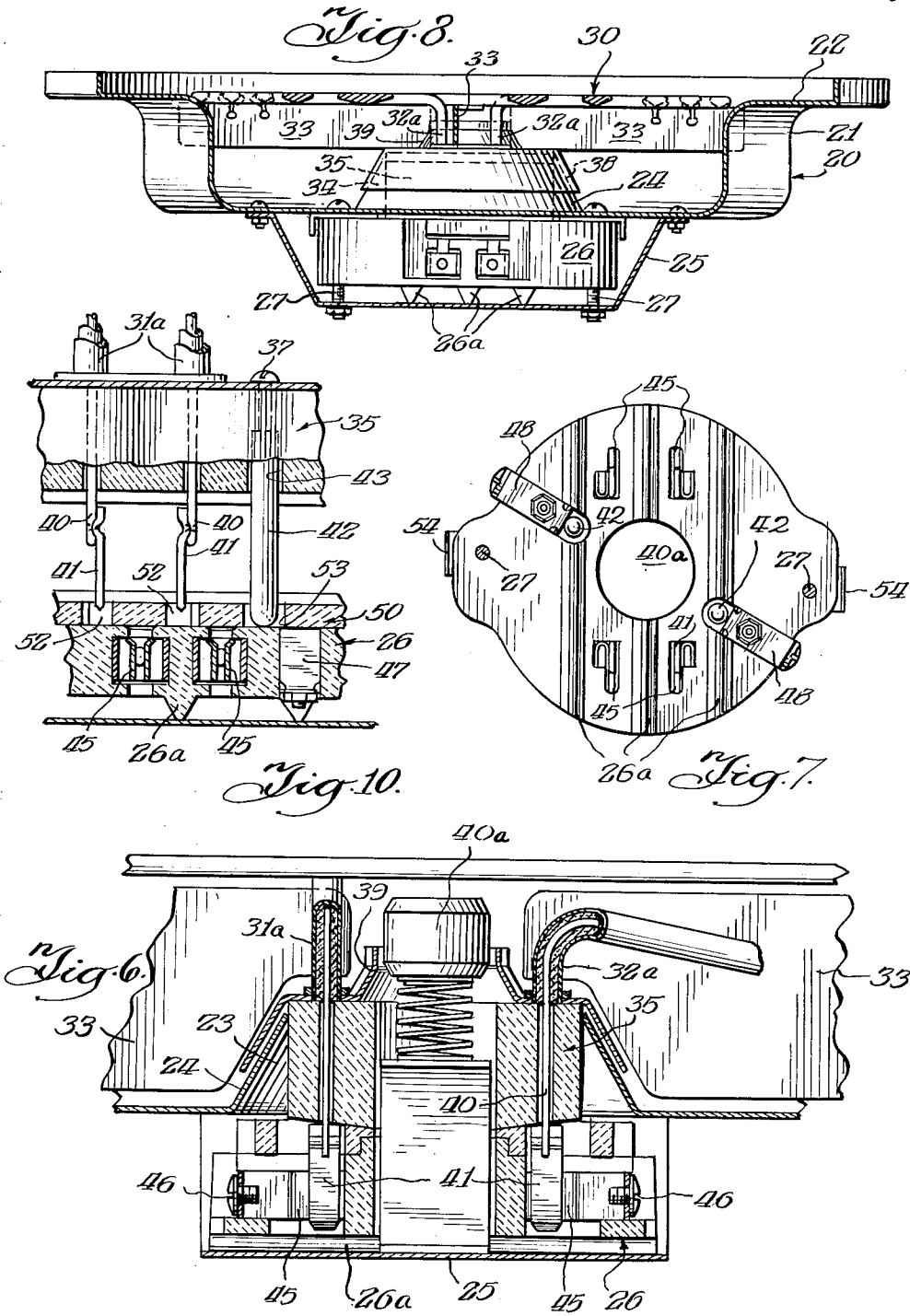
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3,201,567

HEATING UNIT

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 7 Claims. (Cl. 219-450)

This invention relates to an electrical heating unit for a stove or the like, and more particularly to such a unit having a vertically mating terminal block assembly.

A primary object of this invention is to provide a new and improved heating unit for stoves or the like.

An important object of this invention is to provide a new and improved heating unit having a support and a heating element for connection with and removal from the support by vertical movement of the heating element.

Another object of this invention is to provide a new and improved heating unit having a female terminal block adapted to be secured to a stove or similar support, and a heating element having a male terminal block operatively positioned above and removably connected with the female terminal block. A related object is the provision of a closure plate mounted on the female terminal block for closing female contacts therein when the male terminal block is removed, and having openings moved into alignment with the female contacts upon installation of the male terminal block. Another related object is the provision of means on the male terminal block for moving the closure plate from closed to open relationship with the female contacts during installation.

A further object of this invention is to provide a new and improved terminal block having outwardly extending ground and power male contacts, the ground contacts being rigid and extending outwardly past the power contacts to protect the power contacts from damage.

A still further object of this invention is to provide a vertical mating heating unit having a new and improved drip pan assembly.

Further objects and advantages of the invention will be readily apparent from the following specification and the drawings, in which:

FIGURE 1 is a fragmentary plan view of a heating unit embodying the invention;

FIGURE 2 is an enlarged plan view of a terminal block assembly of the heating unit, with parts broken away and removed for clearer illustration;

FIGURE 3 is an enlarged plan view of the terminal block assembly with parts broken away for clearer illustration, and showing the top of a lower terminal block;

FIGURE 4 is a fragmentary vertical section taken generally along the line 4-4 of FIGURE 3;

FIGURE 5 is a fragmentary vertical section taken generally along the line 5-5 of FIGURE 3;

FIGURE 6 is a fragmentary vertical section taken generally along the line 6-6 of FIGURE 2;

FIGURE 7 is a bottom view of the terminal block assembly, to an intermediate scale;

FIGURE 8 is a vertical section taken generally along the line 8-8 of FIGURE 1;

FIGURE 9 is an enlarged, plan view similar to FIGURE 3, but showing the top of the lower terminal block as the upper terminal block is being operatively positioned thereon, with parts broken away for clear illustration; and

FIGURE 10 is a fragmentary vertical section taken generally along the line 10-10 of FIGURE 9.

The invention is, in brief, directed to a heating unit for ranges, stoves, built-in cooking assemblies, and the like. The heating unit includes an upper male terminal block secured to a heating element and a lower female terminal block mounted on a support. In installing the

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heating element on the support the upper terminal block is moved downward and engages a closure plate on the lower terminal block. Slight horizontal rotation of the heating element aligns openings in the closure plate with upwardly opening female contacts in the lower terminal block. Continued downward movement of the heating element then seats male contacts on the upper terminal block in the female contacts. Rigid male ground contacts immediately adjacent male power contacts protect these power contacts from damage. An upstanding continuous flange defines an opening in the support above the lower terminal block, and a depending continuous flange on the upper terminal block encircles the upstanding flange, for retarding the passage of dripping into the opening.

With particular reference to FIGURE 1 and 8 of the drawings, a heating unit includes a support 20 in the form of a drip pan. The drip pan has a dish-shaped portion 21 depending from an outwardly extending circumferential flange 22 adapted to be removably attached to a portion of a cooking assembly (not shown). An opening 23 in the center of dish-shaped portion 21 is defined by a continuous generally frusto-conical flange 24 extending upwardly from the bottom of the dish-shaped portion for effectively preventing the passage of drippings into opening 23. A generally channel-shaped bracket 25 depends from the bottom of dish-shaped portion 21 and is suitably secured thereto as by bolts. A terminal block assembly has a lower terminal block 26 aligned with and below opening 23 and secured to bracket 25 as by bolts 27. Ribs 26a on the bottom of lower terminal block 26 are seated on the bracket and serve as a barrier to the flow of drippings.

A heating element unit 30 illustrated in the form of a pair of concentric flat coiled heating elements 31 and 32 are suitably supported on spider arms 33 secured to a hub 34. Pairs of terminal ends 31a and 32a of heating elements 31 and 32, respectively, are mounted on an upper terminal block 35 of the terminal block assembly.

When operatively assembled upper terminal block 35 overlies lower terminal block 26. Spider hub 34 has an annular body secured to the top of upper terminal block 35 as by bolts 37, and a depending continuous frusto-conical flange 38 encasing support flange 24 to further retard the passage of drippings into opening 23. An upwardly extending generally frusto-conical flange 39 at the center of spider hub 34 defines an opening receiving a suitable temperature sensing device 40a which is suitably mounted on the lower terminal block 26 and extends upwardly through a central opening in the upper terminal block 35.

As may best be seen in FIGURE 10, heating element terminal ends 31a and 32a each have a terminal 40 connected with a downwardly extending male power contact 41. In the illustrated embodiment each of four contacts 41 is in the form of a flat pin securely attached to terminal 40 as by welding. Terminals 40 extend loosely through bores in the upper terminal block so that terminal pins 41 are mounted on the upper terminal block for limited crosswise movement with their tops abutting the terminal block as they are inserted in the lower terminal block 26. As shown in FIGURE 3, pairs of terminal pins 41 for each heating element are diametrically opposed.

Immediately adjacent each pair of terminal pins 41 is one of a pair of diametrically opposed, rigid ground contacts in the form of round pins 42. These pins are firmly secured in sockets 43 in upper terminal block 35 by bolts 37, which also secure the hub 34 to the upper terminal block. Ground pins 42 extend downwardly from the upper terminal block 35 past male power pins 41 to pro-

fect the power pins from damage, as in the event the heating element unit 30 is dropped.

Lower terminal block 26 has upwardly opening female power contacts, in the form of receptacles, each for removably receiving a power terminal pin 41 and connecting the pin with a suitable source of electrical power through power connectors 46. Each ground pin 42 is removably received in an upwardly opening female ground contact 47 in the form of a receptacle having a spring arm grounding the respective ground pin 42 through a suitable ground connector 48. Thus, the heating element unit 30 is removably installed in the heating unit with its male terminal block 35 overlying and connected with lower female terminal block 26 by vertical downward movement of the heating unit onto the lower terminal block.

A closure plate 50 of electrical insulating material is rotatably and slidably mounted in a cup-shaped recess 51 in the top of the lower terminal block for limited movement between an open position, as illustrated in FIGURES 2 and 3, and a closed position, as illustrated in FIGURES 9 and 10. When upper terminal block 35 is operatively positioned on lower terminal block 26 the power pins 41 extend through openings 52 in the closure plate 50 and are received in power receptacles 45, and ground pins 42 extend through openings 53 in closure plate 50 and are received in ground receptacles 47. These openings are defined by surfaces of the closure plate.

A pair of plates 54 overlie closure plate 50 and are secured by the bolts 27 to the lower terminal block 26 for retaining the closure plate in recess 51. Resilient means in the form of wire springs 55 are mounted on lower terminal block 26 by bolts 27 extending through spiral portions of the springs. Inwardly extending portions of the springs engage abutments 56 in the closure plate for resiliently urging the closure plate to closed position as limited by cooperating abutments 57 on the lower terminal block and closure plate 50. Similar cooperating abutments 58 on the lower terminal block and closure plate limit overriding of the closure plate in the open position.

The bottom of upper terminal block 35 is of inverted frusto-conical shape and is received by a cooperating concave portion in the top of closure plate 50 of the lower terminal block 26 for directing any spillage entering the central openings in the terminal blocks away from the contacts.

In operatively installing heating element unit 30 on the support 20 the heating element is moved vertically downwardly until ground pins 42 are received in closure plate openings 53, as may best be seen in FIGURE 10. The heating element unit 30 is now rotated and rigid ground pins 42 engage the surfaces of the respective openings 53 to rotate closure plate 50 from the closed position to the open position in which all closure plate openings 52 and 53 are aligned with their receptacles 45 and 47. Continued downward movement of the heating element removably connects the pins with their respective receptacle. It should be noted that during such rotation of closure plate 50 the power pins 41 are substantially free of the closure plate to avoid bending of these pins. However, power pins 41 extend slightly into their respective closure plate openings 52 to assure proper alignment with their receptacle 45 after closure plate 50 has been rotated to open position. To remove the heating element, it is lifted vertically to disconnect the male and female contacts.

While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims.

I claim:

1. In an electrical heating unit, the combination comprising: a support having a central opening defined by an upstanding continuous flange; a heating element; a lower terminal block secured to said support in vertical alignment with said opening and having upwardly opening power and ground female contacts; a closure plate mounted on the top of said lower terminal block for movement between open and closed positions, said closure plate having openings, one aligned with each female contact in the open position, and imperforate portions overlying said female contacts in the closed position, said openings being defined by surfaces of said closure plate; an upper terminal block secured to said heating element, said upper terminal block being removably and operatively positioned overlying said lower terminal block and having a downwardly extending continuous flange encasing the support flange to retard passage of drippings into said openings, said upper terminal block having downwardly extending male power contacts removably received one in each female power contact and aligned closure opening, and rigid male ground contacts extending downwardly past said male power contacts and removably received one in each female ground contact and aligned closure opening, and when being operatively positioned on said lower terminal block said male ground contacts being received in their closure plate openings and engaging the surfaces thereof to move said closure plate to open position responsive to rotation of said upper terminal block and said male ground contacts being immediately adjacent said male power contacts to protect the male power contacts from damage.

2. In an electrical heating unit, the combination comprising: a support in the form of a drip pan having a central opening defined by an upstanding continuous flange; a heating element; a lower terminal block secured to said support in vertical alignment with said opening and having upwardly opening power and ground female contacts; a closure plate of insulating material slidably and rotatably mounted on the top of said lower terminal block for movement between open and closed positions, said closure plate having openings, one aligned with each female contact in the open position, and imperforate portions overlying said female contacts in the closed position to effectively prevent access to said female contacts, said openings being defined by surfaces of said closure plate; resilient means urging said closure plate to said closed position; an upper terminal block secured to said heating element, said upper terminal block being removably operatively positioned overlying said lower terminal block and having a downwardly extending continuous flange encasing the support flange to retard passage of drippings into said opening, said upper terminal block having downwardly extending male power contacts removably received one in each female power contact and aligned closure opening, and rigid male ground contacts extending downwardly past said male power contacts and removably received one in each female ground contact and aligned closure opening, and when being operatively positioned on said lower terminal block said male ground contacts being received in their closure plate openings and engaging the surfaces thereof to move said closure plate to open position responsive to rotation of said upper terminal block and said male power contacts being substantially free of said closure plate, and said male ground contacts being immediately adjacent said male power contacts to protect the male power contacts from damage.

3. In an electrical heating unit, the combination comprising: a support in the form of a drip pan having a central opening defined by an upstanding continuous flange; a heating element; a lower terminal block on said support in vertical alignment with said opening; a closure plate mounted on said lower terminal block for movement between open and closed positions; and an upper terminal block on said heating element, said upper termi-

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nal block being operatively positioned overlying said lower terminal block and having a downwardly extending continuous flange encasing the support flange to retard passage of drippings into said opening; and means on said upper terminal block for moving said closure plate to open position as said terminal blocks are being operatively positioned.

4. In an electrical heating unit, the combination comprising: a support in the form of a drip pan having a central opening defined by an upstanding inwardly inclined continuous flange; a heating element; lower terminal means on said support in vertical alignment with said opening; upper terminal means on said heating element, said upper terminal means being operatively positioned overlying said lower terminal means; and a downwardly extending outwardly inclined continuous flange on said upper terminal means closely surrounding and encasing the support flange the lower edge of the outwardly inclined flange extending below the upper edge of the inwardly inclined flange, and having a circumference less than the circumference of the lower edge of the inwardly inclined flange, the flanges overlapping over at least half the vertical extent of the flanges, to retard passage of drippings into said opening.

5. In an electrical heating unit, the combination comprising: a support; a heating element; a lower terminal block on said support and having female contacts; a closure plate mounted on said lower terminal block for movement between open and closed positions, said closure plate having openings, one aligned with each female contact in the open position, and imperforate portions overlying said female contacts in the closed position; an upper terminal block on said heating element and having male contacts received one in each female contact and aligned closure opening when operatively positioned; and means on said upper terminal block for moving said closure plate to open position as said terminal blocks are being operatively positioned.

6. In an electrical heating unit, the combination comprising: a support; a heating element; a lower terminal block on said support and having female contacts; a closure plate on said lower terminal block for movement between open and closed positions, said closure plate having openings, one aligned with each female contact in the open position, and imperforate portions overlying said female contacts in the closed position, said openings being defined by surfaces of said closure plate; an upper

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terminal block on said heating element and having male contacts removably received one in each female contact and aligned closure opening when operatively positioned; and rigid pins extending outwardly past said male contacts, and when being operatively positioned on said lower terminal block said pins being received in closure plate openings and engaging the surfaces thereof for moving said closure plate to open position responsive to rotation of said upper terminal block, and said male contacts being substantially free of said closure plate, and said pins being immediately adjacent said male contacts to protect the male contacts from damage.

7. In an electrical heating unit, the combination comprising: a support; a terminal block on said support and having upwardly opening female contacts; a closure plate mounted on said terminal block for movement between open and closed positions, said closure plate having openings, one aligned with each female contact in the open position of said plate, and imperforate portions overlying said female contacts in the closed position of said plate; means urging said closure plate into the closed position; a coiled heating element having opposite ends terminating in downwardly extending male contact portions, said male contact portions each being received in one of said female contacts when said heating element is operatively positioned on said terminal block; and means associated with said heating element for moving said closure plate from closed to open position and said heating element is being operatively assembled on said terminal block.

References Cited by the Examiner

UNITED STATES PATENTS

1,177,254	3/16	Lawrence	219-463
1,773,687	8/30	Mallett et al.	219-451
1,927,316	9/33	Katzman	339-147
2,525,030	10/50	Genlott	219-451
2,759,091	8/56	Kolberg	219-432
2,786,937	3/57	Arnejo	339-147
2,863,037	12/58	Johnstone	219-432

FOREIGN PATENTS

143,719	6/35	Austria.
438,547	11/35	Great Britain.

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