May 20, 1958 R. D. BREMER 2,835,780

DOMESTIC APPLIANCE

Filed July 2, 1956 3 Sheets-Sheet 1

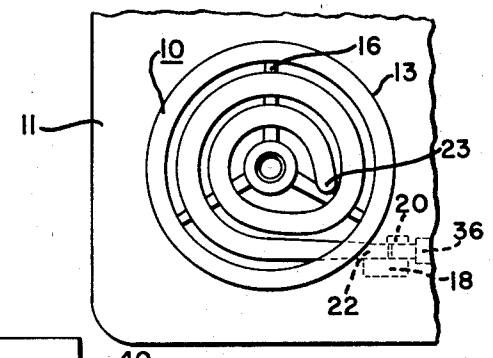


Fig. 1

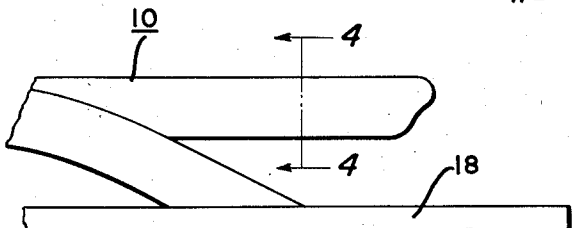
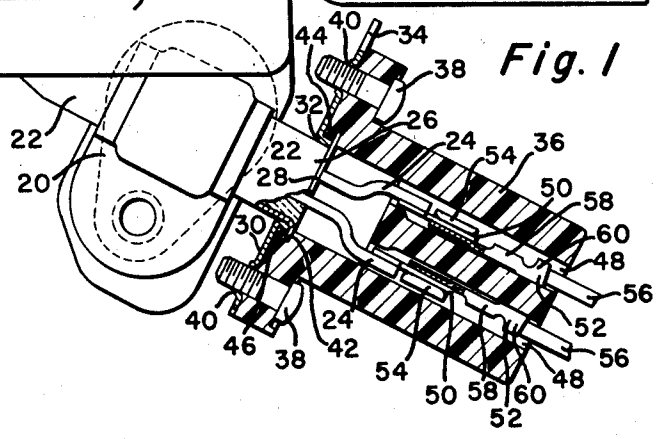


Fig. 3



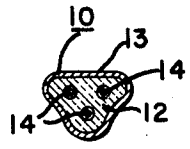


Fig. 4

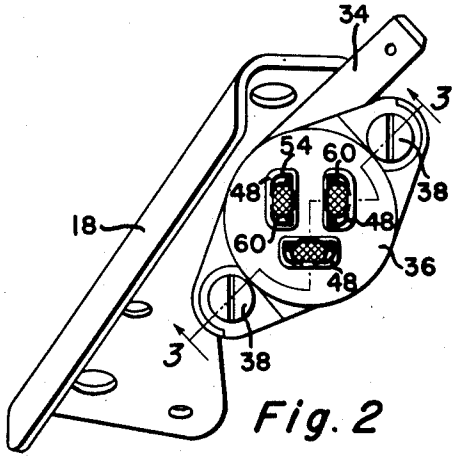


Fig. 2

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DOMESTIC APPLIANCE

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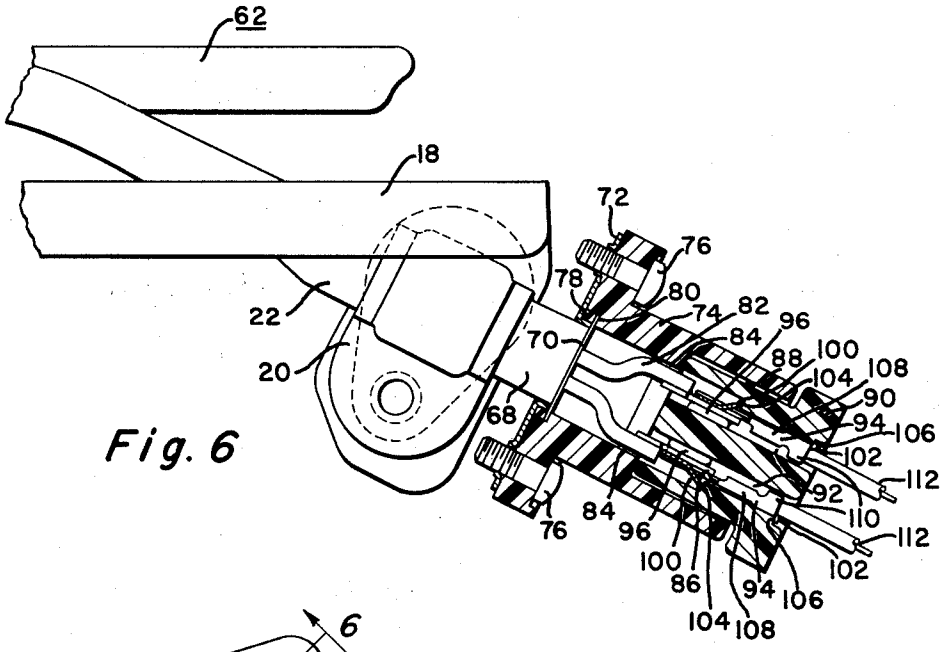


Fig. 6

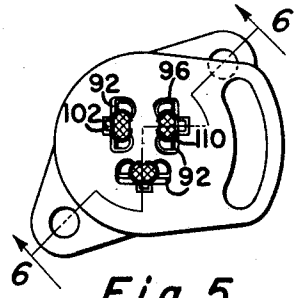


Fig. 5

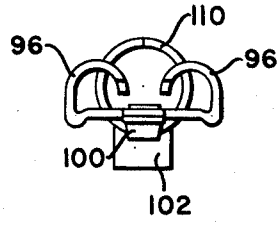


Fig. 8

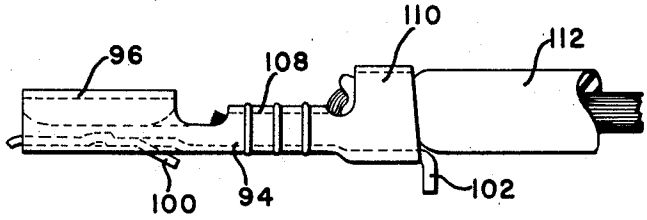


Fig. 7

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May 20, 1958 R. D. BREMER 2,835,780

DOMESTIC APPLIANCE

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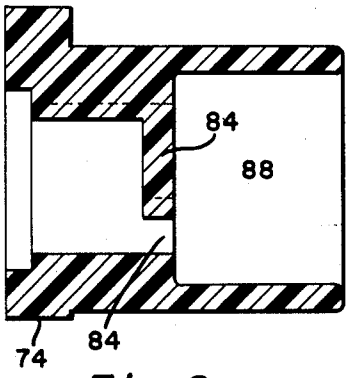


Fig. 9

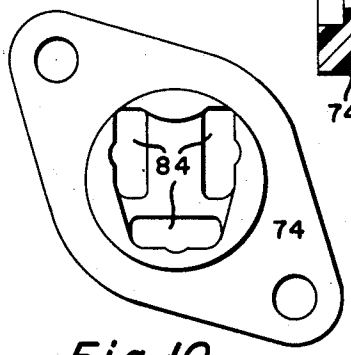


Fig. 10

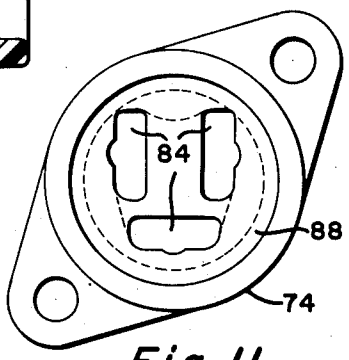


Fig. 11

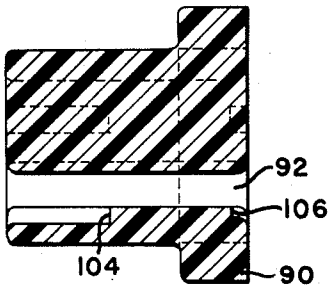


Fig. 12

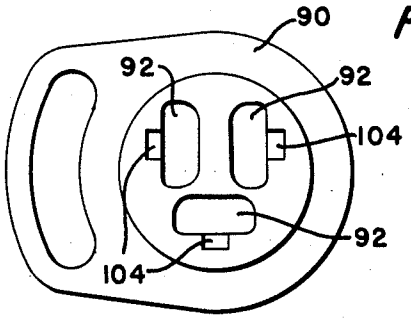


Fig. 13

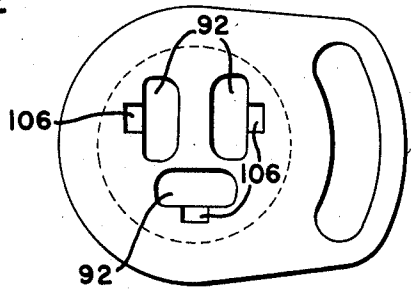


Fig. 14

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United States Patent Office 2,835,780 Patented May 20, 1958

2,835,780

DOMESTIC APPLIANCE

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Application July 2, 1956, Serial No. 595,351

8 Claims. (Cl. 219—37)

This invention relates to a domestic appliance, and more particularly to an electrical connector for detachably connecting the top surface heating unit of an electric range with a voltage supply.

An object of the invention is to provide an electrical connector between the top surface heating unit of a range and a voltage supply, the connector being of the detachable type whereby the heating unit may be quickly connected or disconnected from the voltage supply.

A more specific object is to provide a tubular heating unit containing a plurality of heating elements with an electrical connector including an insulator secured to the tubular heating unit with a liquid-tight fit.

Another object is to provide a tubular electrical heating unit containing a plurality of heating elements with an electrical connector, and with means for preventing the flow of grease and the like into the connector and into the tubular heating unit.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 is a top view of a surface heating unit mounted in an electrical range;

Figure 2 is an end view of the electrical connector used with the heating unit shown in Figure 1;

Figure 3 is a side view partly of the heating unit of Figure 1 with the electrical connector shown in a section taken along line 3—3 of Figure 2;

Figure 4 is a sectional view taken along line 4—4 of Figure 3;

Figure 5 is an end view of a modified electrical connector made in accordance with this invention;

Figure 6 is a side view of the modified electrical connector made in accordance with this invention showing the insulated parts of the connector in a section taken along the line 6—6 of Figure 5;

Figure 7 is a side view of an electrical connector that is insertable into one of the insulating parts of the connector shown in Figure 6;

Figure 8 is an end view of the connector shown in Figure 7;

Figure 9 is a sectional view of one of the insulating parts shown in Figure 6 with the electrical connecting elements removed therefrom;

Figure 10 is a left side view of the insulator shown in Figure 9;

Figure 11 is a right side view of the insulator shown in Figure 9;

Figure 12 is a sectional view of an insulator that fits within the insulator shown in Figure 9;

Figure 13 is a left side view of the insulator shown in Figure 12; and

Figure 14 is a right side view of the insulator shown in Figure 12.

Referring now to Figure 1, a top surface electric heating unit generally denoted by reference numeral 10 is

shown mounted in a range top 11. The heating unit comprises a metal tube 13 which contains a filler material of magnesium oxide 12 or other suitable filler material and three electrical heating elements 14, as more particularly shown in Figure 4. The metal tube 13 is triangular-shaped in cross section over a major portion of its length and has a flat top surface that is adapted to support cooking utensils. The heating unit 10 is supported by a spider 16 that is in turn supported by the range top 11. A bracket denoted by reference numeral 18 is secured to the underside of the range top in any suitable manner and carries a conventional mounting clip 20 that encircles a downwardly extending cylindrically shaped end portion 22 of the tubular heating unit 10 in accordance with well known practice. The clip 20 provides a bearing for the portion 22 of the heating unit in order that the portion 22 may rotate therein. With this arrangement, the heating unit 10 may be moved out and away from the range top when desired as the portion 22 is rotatable within clip 20.

The three heating elements 14 are made of coils of conventional high resistance wire and are connected together at their ends adjacent the closed end 23 of tube 13. The opposite ends of heating elements 14 are connected with relatively stiff metal leads or conductors 24, as more particularly shown in Figure 3. The conductors 24 extend part-way into the cylindrical portion 22 of the tube 13 and are connected to the heating elements 14 at a point spaced from the open end 25 of tube 13. It is to be understood that the portions of conductors 24 that extend into tube 13 are embedded in a filler material of magnesium oxide or other suitable material and that this filler material extends to the open end 25 of the tube 13. It should be noted that the open end 25 of cylindrical tubular portion 22 is formed with an outwardly directed flange 28. This flange may be formed by bending tubular portion 22 to form the flange.

A flat metal plate 30 having a central aperture defined by a flanged portion 32 abuts the flange 28 as shown. The flanged portion 32 encircles the lower portion 22 of heating unit 10. The plate 30 is also provided with a terminal portion 34 that is used as a ground connection. An insulator 36 is secured to plate 30 by means of screws 38 that are threaded into tapped holes 40 formed in the plate 30. The insulator 36 has an annular internal shoulder 42 that abuts the flange 28 of the heating element 10 when the screws 38 are tightened. The flanged portion 32 of plate 30 also engages flange 28 when screws 38 are tightened. A silicone rubber O-ring 44 is located between plate 30 and flanged portion 28 and is compressed therebetween when screws 38 are tightened. It should be noted that the O-ring 44 also contacts an inner annular wall 46 of insulator 36. With the above-described construction, any grease or other liquid flowing downwardly along the lower portion 22 of heating unit 10 is precluded from entering the interior of insulator 36, and is also prevented from flowing by capillary action into the interior of lower portion 22 of heating unit 10. Moreover, the method of connecting the insulator to heating unit 10 provides a reliable connection between the insulator 36 and tubular portion 22 and one that is easy to assemble.

The insulator 36 is provided with three longitudinally extending holes or slots 48. The conductors 24 that are connected with the heating elements contained in heating unit 10 project into the slots 48. Each conductor 24 is provided with a connector tab 50 that is preferably welded or otherwise secured to each of the conductors 24. The connector tabs 50 coact with electrical connecting parts 52 that may be slipped onto the tabs 50 or pulled off from the tabs 50, as desired. Each connecting part 52 is provided with clip portions 54 that engage

opposite sides of the tabs 50. The clip portions 54 are so designed as to grip the connector tabs 50 when they are slipped onto the tabs 50, but do not preclude the removal thereof by the exertion of a slight pulling pressure on the connector parts 52. The connector parts 52 are secured to electrical conductors 56 by means of clip portions 58 and 60 that are bent downwardly to engage, respectively, the wire conductor and the insulating portion of conductor 56. The conductors 56 are connectable with a conventional 220-volt three-wire supply system in accordance with conventional practice. With the above-described construction it is apparent that a detachable connection has been provided between a voltage supply and the top surface heating unit 10 of an electric range.

Figure 6 illustrates a modified type of connector wherein a top surface heating unit 62 which is in all respects identical with heating unit 10 shown in Figures 1 and 3 is provided with a lower tubular portion 68 that has an outwardly directed flange 70. A flat metal plate 72 having a central aperture encircles the tubular portion 68 and is secured to an insulator 74 by means of screws 76. A silicone rubber O-ring seal 78 is provided between the plate 72 and an annular shoulder 80 formed in insulator 74. A plurality of stiff metal conductors 82 extend from the heating unit 62 and are located within longitudinally extending slots 84 formed in insulator 74. Each conductor 82 is provided with a connector tab 86 that is welded or otherwise secured to conductor 82. The insulator 74 has a counter bore 88 that is adapted to receive a second insulating part 90. The second insulating part 90 has a plurality of longitudinally extending holes or slots 92, and each slot 92 is provided with an electrical connecting part 94. The electrical connecting part 94 has a clip portion 96 that engages opposite sides of connector tabs 86. The connecting parts 94 are also provided with a downwardly struck lug 100 and with a second lug 102. The lug 100 engages a shoulder 104 that is located normal to longitudinally extending slot 92. The downwardly extending lug 102 engages a second shoulder 106 that is normal to the slot 92. The connector parts 94 have clip portions 108 and 110 that engage, respectively, the wire conductor and insulating portion of conductors 112.

The connecting parts 94 may be assembled within the insulator 90 by first passing conductors 112 through slots 92 and then securing the connector parts 94 to the conductors 112. The conductors 112 and the connecting parts 94 may then be pulled through slots 92 until downwardly struck lugs 100 engage the shoulder 104 of insulator 90. In this position the lug 102 on connecting part 94 engages the shoulder 106 of insulator 90. The lug 100 of connecting part 94 is of sufficient resiliency so that the insulator is tightly gripped between lug 100 and lug 102 when the connecting part 94 is assembled within the insulator 90. When the connecting parts 94 are all secured to the insulator 90, the insulator may be pushed into the counter bore 88 of insulator 74 with the portions 96 of connectors 94 engaging the connector tabs 86 that are secured to conductors 82. It should be noted that the slots 84 in insulator 90 are arranged so that two slots of each insulator are parallel to one another while the transverse axis of the third slot is normal to the transverse axes of the two top slots that are parallel to one another. This arrangement is provided so that a connection between tabs 86 and connector parts 94 can only be made when the insulators 74 and 90 are at some fixed predetermined angular relationship with one another. Thus, the insulating parts 74 and 90 and the connectors contained in each part can only be pushed together when the two upper parallel slots and the lower slot are located in alignment. This insures that the conductors 112 will always be connected with the correct conductors 82. It will be apparent from the foregoing that all that is needed for making an electrical connection between conductors 112 and the heating elements contained within heating unit 62 is an insertion of the insulator 90 within the counter bore 88 of insulator 74. The conductors 112 may be disconnected from heating unit 62 by a removal of insulator 90 from within counter bore 88 of insulator 74. It is to be understood that the conductors 112 are connectable with a conventional 220-volt three-wire supply system.

While the embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. In combination, a top surface heating unit for a range or the like, having a spirally shaped tubular sheath portion enclosing a heating element, said tubular sheath portion having an end portion formed with an integral outwardly directed grease deflecting flange, an insulator removably secured to said tubular sheath portion and abutting said flange, said insulator having a longitudinally extending slot and an annular shoulder engaging said tubular sheath flange, a relatively stiff conductor connected with said heating element and projecting from said tubular sheath portion into said slot, a connector tab secured to said conductor and lying in said slot, and means adapted to be connected with a voltage supply and slidably engaging said connector tab for connecting said heating element with said voltage supply when said tab and said means are in engagement and for disconnecting said heating element from said voltage supply when said tab and said means are out of engagement.

2. In combination, a heating unit having a tubular sheath enclosing a heating element, said tubular sheath having an end portion formed with an integral outwardly directed circumferentially extending flange, an electrical conductor connected to said heating element and extending from said end portion, and an insulator enclosing said electrical conductor and said flange, and means for removably securing said insulator to said tubular sheath, said insulator having an internal shoulder that abuts a face of said flange when said insulator is secured to said tubular sheath.

3. In combination, a heating unit having a tubular sheath enclosing an electrical heating element, said tubular sheath having an end portion formed with an outwardly directed circumferentially extending flange, an electrical conductor connected to said heating element and extending from the end portion of said tubular sheath, an insulator member having an internal shoulder enclosing said conductor, the internal shoulder of said insulator member abutting said outwardly directed flange, a washer encircling said tubular sheath, a resilient sealing member encircling said sheath and interposed between said washer and flange, and fastener means engaging said washer and insulator member for fastening said washer and tubular sheath to said insulator member and for compressing said resilient sealing member between said washer and said flange.

4. In combination, a heating unit having a tubular sheath enclosing an electrical heating element, said tubular sheath having an end portion formed with an outwardly directed circumferentially extending flange, an electrical conductor having a connector tab connected to said heating element and extending from an end portion of said tubular sheath, an insulator enclosing said conductor and tab, said insulator abutting said outwardly directed flange, an insulator supporting member encircling said tubular sheath and slidable thereon, a resilient sealing member encircling said sheath and interposed between said insulator supporting member and said flange, fastener means engaging said insulator supporting member and said insulator for fastening together said insulator supporting member and said insulator and for holding said tubular sheath and resilient member in abutting relationship with said insulator, and a second insulator having an electrical contact, said second insulator and said first-

named insulator slidably fitting together with said electrical contact engaging said connector tab.

5. In combination, a heating unit having a metal tubular sheath enclosing a heating element, an electrical conductor connected with said heating element and extending from an end portion of said tubular sheath, an insulator having an annular internal wall enclosing said electrical conductor with the annular wall encircling at least a portion of said tubular sheath, fastening means for securing said insulator to said tubular sheath, and a flexible sealing member interposed between said tubular sheath and said insulator and abutting said inner annular wall.

6. In combination, a heating unit having a tubular sheath enclosing a heating element, said tubular sheath having an end portion formed with an integral outwardly directed circumferentially extending flange, an insulator mounting member encircling said tubular sheath, an insulator removably secured to said insulator mounting member, and a resilient sealing member encircling said tubular sheath and interposed between said insulator mounting member and said flange.

7. In combination, an electrical heating unit having a tubular sheath enclosing a heating element, an electrical conductor connected to said heating element and extending from an end portion of said tubular sheath, said tubular sheath being formed with an integral outwardly directed circumferentially extending flange, an insulator supporting member encircling said tubular sheath, an insulator member abutting said flange and enclosing said electrical conductor, an annular resilient sealing member encircling said tubular sheath and located between said outwardly directed flange and said insulator supporting member, and fastener means engaging said insulator and insulator supporting member for holding said insulator and insulator supporting member in fixed relationship with said tubular sheath and for compressing said annular sealing member between said flange and said insulator supporting member.

8. In combination, a generally spirally shaped electrical heating unit having a tubular sheath enclosing an electrical heating element, said tubular sheath having an end portion formed with an integral outwardly directed circumferentially extending flange, an electrical conductor having a connector tab connected to said heating element and extending from said end portion of said tubular sheath, an insulator enclosing said conductor and tab, said insulator abutting said outwardly directed flange, an insulator supporting member encircling said tubular sheath, a rubber sealing member encircling said sheath and interposed between said insulator supporting member and said flange, a plurality of threaded fasteners threaded into said insulator supporting member and engaging said insulator for fastening together said insulator supporting member and said insulator and for holding said tubular sheath and resilient member in abutting relationship with said insulator, and a second insulator having an electrical contact, said second insulator and said first-named insulator slidably fitting together with said electrical contact engaging said connector tab.

References Cited in the file of this patent

UNITED STATES PATENTS

2,440,279 Larkins ---------- Apr. 27, 1948

FOREIGN PATENTS

598,127 Great Britain ---------- Feb. 11, 1948