A terminal board arrangement for a cooking assembly including a pair of frangible utensils supporting cover plates supported by clamping means in the assembly wherein the board contacts provide continuity between electrically conductive fracture detector stripes on the underside of each plate. Spring means biases the terminal board upwardly against the underside of the cover plates in bridging fashion such that three of the fixed terminal board contacts are in a coplanar triangular formation for positive contact with their mating cover plate contacts while a fourth floating contact is positioned on a spring arm operative for seeking its mating cover plate contact thereby compensating for any out-of-plane condition which may exist between the cover plates.
TERMINAL BOARD ASSEMBLY FOR OUT-OF-PLANE CONTACTS

This invention relates to domestic cooktops and more particularly to a bridging terminal board arrangement for providing continuity between a pair of adjacent fragile cover plates with each plate incorporating a fracture detector conductor stripe thereon.

In a domestic cooktop or a free standing range having fragile cover plates of the type described in copending U.S. Patent application Ser. No. 90,948, filed Nov. 19, 1970 now U.S. Pat. No. 3,636,309, and assigned to the same assignee as the instant application; the problem of the breakage of the cover plate is discussed and a fracture detector conductor stripe circuit arrangement is provided on the plate to avoid possible electrical shock hazard in case of the fragmentation thereof whereby the power circuit to the cooktop will be immediately open cirticened. In certain cooking assemblies it is desirable to provide two or more rectangular side-by-side cover plates each of which overlies one or more electric heating units with a clamping device for use in simultaneously securing the plates in the cooktop. It was found that the use of conventional terminal boards was unsatisfactory in providing continuity of the electrical circuit between conductive strips on adjacent plates when warpage, excessive heat or manufacturing tolerances caused an out-of-plane condition between a plurality of contacts on each of the plates.

An object of the present invention is to provide a new and improved terminal board bridging connector for a cooking assembly protective control circuit in which a pair of fragile cover plate cooking members are retained in side-by-side relation with the common underlying terminal board providing positive electrical continuity between a conductive stripe on each of the cover plates.

Another object of the invention is to provide a cooking assembly comprising a pair of heat transmissive cover plates of fragile material supported by clamping means in a cooktop wherein each plate has an electrically conductive fracture detector stripe on the underside thereof and an underlying terminal board bridging the plates along their common support juncture, wherein a spring means bias the terminal board upwardly into contact with the plates and the terminal board provided with a pair of contacts for each plate arranged in a rectangular formation whereby three of the contacts are fixed in a coplanar triangular formation for positive contact with the plates by virtue of the spring means exerting pressure within the triangular formation while a fourth floating contact is positioned on a flexible arm operative for seizing its mating plate contact thereby compensating for any out-of-plane condition which may exist between the cover plates.

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 embodiment of the present invention is clearly shown.

In the Drawings:

FIG. 1 is a fragmentary perspective view of a domestic range with parts broken away to show the setting of the present invention;

FIG. 2 is an enlarged fragmentary plan view of a cooking top surface of the range of FIG. 1;

FIG. 3 is an enlarged view in vertical section taken along the line 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary view in vertical section taken along the line 4—4 of FIG. 2;

FIG. 5 is a fragmentary view in vertical section taken along the line 5—5 of FIG. 4;

FIG. 6 is a top plan view of the terminal board and biasing spring;

FIG. 7 is a side view of the terminal board taken along the line 7—7 of FIG. 6;

FIG. 8 is an end view of the terminal board taken along the line 8—8 of FIG. 6;

FIG. 9 is a fragmentary vertical section taken on the line 9—9 of FIG. 2;

FIG. 10 is a side edge view of the retaining U-shaped clip shown in its unstressed condition.
between the collar 14 and the outer longitudinal and transverse edges of the cover plates 24, 25 together with a depending stem 45 disposed in the gap 44. The stem 45 has four arms along its lower end a hook portion 46 which provides shoulder means for interlocking engagement with a cooperating hook portion 47 of the clip member 41. The trim ring 40 has a centrally located divider strap member 48 which divides the opening 16 into two substantially equal rectangular areas for reception of the cover plates 24 and 25 and is adapted to close and seal the gap or clearance 53 between the longitudinal opposed edges of the cover plate. In the preferred form each end of the central transverse divider strip 48 has its ends fixedly attached to the sealing ring 40 such as by spot welding and is shaped in a similar T-shaped fashion having a flat head portion 49 and a depending stem portion 50 as best illustrated in FIG. 4.

As seen in FIG. 2 the clips 41 are dispersed at spaced intervals around the cover plates to engage underside of the range collar 14 by seating circular bead head portion 34 of the clips in the radially formed area formed by the depending flange 18 of the opening wherein the clip pressure screws 42 are taken up to retain the plates 24 and 25 in the heating assemblies in the opening 16. Additional clips 41 are positioned at the ends of heating assemblies sheet metal housings 26 and 26' for engagement with the underside of the walls 32, 33 and 32', 33'. The result is the housings 26, 26' together with their associated cover plates 24 and 25 are anchored to the range collar 14 to hold the heating units in pressure contact with the undersurface of the cover plates.

As seen in FIGS. 2 and 9, the divider strip member 48 is secured by means of a plurality of plate retaining clip members 54 mounted in a longitudinal direction with respect to the divider strip member 48. The clip members 54 are crossed or folded down into generally U-shaped configuration each having a side turned flange 55 extending from the upper portion of the clip member. The outermost edge of this side flange 55 has an upwardly directed flange 56 for engaging the underside of the plate member 24, as viewed in FIG. 9, after which suitable sealing compound 57 is placed to seal the clip to the plates. Additional clip members 54 grip the stem portion 50 but are turned end for end in an opposite direction whereby alternate clips 54 engage the underside of the adjacent plate 25. As described in the above-mentioned patent application Ser. No. 55,815 appropriate sealing material is also located between the inner and outer strips of the trim head 43 and the underlaying peripheral borders of the cover plates 24, 25 and collar 14 to provide a liquid type seal therebetween.

It will be noted that the heating assemblies 22, 23 are secured to the range collar 14 and cover plates 24, 25 by housing flange walls 32, 33 only along the transverse edges 51 of the cover plates. As seen in FIG. 3, the borders adjacent the longitudinal outer edges 52 of the cover plates retain to the range collar 14 by means of the trim and clip assembly described. Washer 58, used on the pressure screws 42 lower the longitudinal plate edges 52, have resilient plate cushioning pads 59 on their upper surfaces formed from suitable material such as heat-resistant silicone rubber.

In the illustrated form of the invention each housing 26, 26' provides a box-like receptacle defined by its side, end and bottom walls for receiving resilient mat 60 preferably formed of a suitable inorganic fiber insulation material such as rock wool or the like. The mat 60 extends throughout the bottom of the housing conforming to the shape of the bottom wall 27. As seen in FIG. 2 the insulation mat 60 has located thereon a pair of heating units indicated at 61 and 62. Each of the units 61, 62 comprise a heater support block 63 and a heater element disposed therein. The heater element is located within the convolute grooves 64 formed in the upper surface of the heating block. The heating unit 61 provides an annular heating area approximately 8 inches in diameter while the heating unit 62 provides a heating area of approximately 6 inches in diameter.

Considering now the instant fracture detection circuit each of the cover plates 24, 25 (FIG. 2) have a conductive stripe or path 82 and 84, respectively, suitably applied in mirror op-
passage therethrough of the lower tongue 132 having its extremity thereof bent to provide a trough 134 adapted for engagement with the bottom edge of the aperture 133. To insert the clip 130 the tongues 131, 132 are pinched together sufficiently to permit the lower tongue 132 to pass through the aperture 133 after which the arms of the U are permitted to spring apart so that the arched portion 135 of upper tongue 131 engages the base 100. The tongues of the clip 130 are permitted to spring apart to take the approximate shape shown in FIG. 4 such that under conditions of operation the tongue 131 always has an outward biasing force at portion 135 against the bottom face of the base 100.

The forward end edges of the base 100 are partially cut to define notches 142 and 144 to form shoulders insuring thereof with said notches being of such size as to receive the thickness of the adjacent stem 126 of strip member 48 whereby the notches fit in interconnection relation with the opposite adjacent stem portions to lock the base 100 in its longitudinal position.

As seen in FIGS. 4 and 6 the spring clip 130 exerts its upward line contact pressure at arched portion 135 within the triangular formation defined by conical fixed spherical rivet head contacts 106, 108 and 114 and indicated by centerlines 139 to provide a three point positive contact with their respective contact points 106, 107 and 108 on the cover plates 24, 25. The three point support of the base 100 provided by the three spherical rivet head contacts is such that the pressure exerted by the C-shaped clip spring means 130 is equally distributed so that each gets approximately one-third pressure to insure positive mating contact with their respective plate contact pads. It will be appreciated that the four contact pads could be out-of-plane because of the language of the cover plates, heating and cooling effects on the cooking as well as a buildup of manufacturing tolerances. Applicant's terminal board provides floating or resilient contact 112 to accommodate for these out-of-flat situations by seeking its vertically aligned mating pad contact 89 no matter where such out-of-flat condition exists. The open ended slot 116 referred to earlier allows the resilient arm 110 freedom of movement to be moved below the plane of terminal board 100 and thereby extend its range of travel to follow the contact pad 89 on plate 24. Also a portion of the base 100 at the lower right hand corner as viewed in FIG. 6 is removed to further insure freedom of movement of contact arm 110.

As described in application Ser. No. 90,948 the electrically conductive strips 82, 84 are resistant to a predetermined break in either of theifiable plates 24, 25 for energizing suitable control means such as AC switching means in the form of a symmetrical controlled rectifier thereby opening the power circuit to the range and deenergizing all the resistance elements (not shown) located in the heater blocks 63 of units 61 and 62. Reference should be made to the above referenced patent application for a description of the electrical circuit.

Although only one form of this invention has been shown and described, other forms will be readily apparent to those skilled in the art. Therefore, it is not intended to limit the scope of this invention by the embodiment selected for the purpose of this disclosure but only to the claims which follow.

What is claimed is:

1. In a cooking assembly, the combination of a pair of utensil supporting cover plates of frangible material each having a predetermined planar extent, means for retaining said plates in said cooking assembly whereby said plates are arranged in spaced edge to edge relation, a heater block supporting at least one of said resistance elements within each of said cover plates, said resistance elements adapted to be energized by a circuit including a pair of lines from an AC power source, each said cover plate having an electrically conductive stripe mounted in an open pattern on the underside thereof such that the paired free terminal ends defined by the open regions of said stripes are located adjacent said spaced edges, said conductive stripe paired free terminal ends being electrically connected in the circuit by means of a terminal board bridging the space between said plates, said terminal board having four contacts thereon defining substantially a rectangle such that each adjacent pair of said contacts are aligned respectively with the paired free terminal ends of said stripes, three of said contacts being in fixed coplanar relation and said fourth contact being a resilient contact, divider strip means extending between the edges of said plates and spanning the space between them, spring biasing means connected between said divider strip means and the undersurface of said terminal board to bias said terminal board upwardly against said pair of plates, said biasing means operative to exert pressure within the triangular area defined by said three fixed contacts whereby three point positive contact is maintained with three of said stripe free terminal ends, said resilient contact being biased upwardly to maintain positive engagement with its aligned free terminal end to compensate for out-of-plane conditions existing between said pair of plates and thereby insuring electrical continuity between said electrically conductive stripes in the circuit during normal operation of said cooking assembly.

2. In a cooking assembly, the combination of a pair of utensil supporting cover plates of frangible material each having a predetermined planar extent, means for retaining said plates in said cooking assembly whereby said plates are arranged in spaced edge to edge relation, a heater block supporting at least one of said resistance elements within each of said cover plates, said resistance elements adapted to be energized by a circuit including a pair of lines from an AC power source, each said cover plate having an electrically conductive stripe mounted in an open pattern on the underside thereof such that the paired free terminal ends defined by the open regions of said stripes are located adjacent said spaced edges, said conductive stripe paired free terminal ends being electrically connected in the circuit by means of a terminal board bridging the space between said plates, said terminal board having four contacts thereon defining substantially a rectangle such that each adjacent pair of said contacts are aligned respectively with the paired free terminal ends of said stripes, three of said contacts being in fixed coplanar relation and said fourth contact being a resilient contact, divider strip means extending between the edges of said plates and spanning the space between them, spring biasing means connected between said divider strip means and the undersurface of said terminal board to bias said terminal board upwardly against said pair of plates, said biasing means operative to exert pressure within the triangular area defined by said three fixed contacts whereby three point positive contact is maintained with three of said stripe free terminal ends, said resilient contact being biased upwardly to maintain positive engagement with its aligned free terminal end to compensate for out-of-plane conditions existing between said pair of plates and thereby insuring electrical continuity between said electrically conductive stripes in the circuit during normal operation of said cooking assembly.

3. In an infrared radiant cooking assembly, the combination of a pair of utensil supporting cover plates of frangible material each having a predetermined planar extent, means for retaining said plates in said cooking assembly whereby said plates are arranged in spaced edge to edge relation, a heater block supporting at least one of said resistance elements within each of said cover plates, said resistance elements adapted to be energized by a circuit including a pair of lines from an AC power source, each said cover plate having an electrically conductive stripe mounted in an open pattern on the underside thereof such that the paired free terminal ends defined by the open regions of said stripes are located adjacent said spaced edges, said conductive stripe paired free terminal ends being electrically connected in the circuit by means of a terminal board bridging the space between said plates, said terminal board having four contacts thereon defining substantially a rectangle such that each adjacent pair of said contacts are aligned respectively with the paired free terminal ends of said stripes, three of said contacts being in fixed coplanar relation and said fourth contact being a resilient contact, divider strip means extending between the edges of said plates and spanning the space between them, spring biasing means connected between said divider strip means and the undersurface of said terminal board to bias said terminal board upwardly against said pair of plates, said biasing means operative to exert pressure within the triangular area defined by said three fixed contacts whereby three point positive contact is maintained with three of said stripe free terminal ends, said resilient contact being biased upwardly to maintain positive engagement with its aligned free terminal end to compensate for out-of-plane conditions existing between said pair of plates and thereby insuring electrical continuity between said electrically conductive stripes in the circuit during normal operation of said cooking assembly.
free terminal ends defined by the open regions of said stripe are located in mirror opposite relation adjacent said spaced edges, said conductive stripe paired terminal ends being electrically connected in said circuit by means of a terminal board bridging the space between said plates, said terminal board having four contacts thereof defining substantially a rectangle such that each adjacent pair of said contacts are vertically aligned respectively with the paired terminal ends of said stripes, three of said contacts being in fixed coplanar relation and said fourth contact being a resilient contact in the form of an upwardly bowed leaf spring contact arm, said terminal board having an elongated open end clearance slot extending transversely of the plate spaced edges so as to underlie said contact arm throughout the major portion of its free end whereby said contact arm is free to move below the plane of said terminal board, a T-shaped in cross section sealing and locking divider strip extending along and between the edges of said plates, said divider strip head portion spanning the space between said plates and the stem portion thereof protruding downwardly through the space between said plates, said T-shaped strip having a pair of cutout openings forming an intermediate shank portion therebetween, said terminal board having a longitudinal aperture receiving said shank portion, spring biasing means in the form of a C-shaped resilient clip connected between an opening in said shank and said terminal board to bias said terminal board upwardly against said pair of plates, a portion of said C-shaped clip operative to exert pressure on said terminal board within the triangular area defined by said three fixed contacts whereby three point positive contact is maintained with three of said free terminal ends, said resilient contact arm being biased upwardly to maintain positive engagement with its aligned conductive stripe free terminal end to compensate for any out-of-plane condition existing between said pair of plates and thereby insuring electrical continuity between said conductive stripes in said circuit during normal operation of said cooking assembly, said conductive stripe being responsive to a predetermined break in either of said frangible plates for energizing control means thereby opening the circuit to deenergize the resistance elements.
On the first page, the name of the inventor should be corrected to read -- Donald L. Upp --;

Signed and sealed this 6th day of March 1973.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents
UNIVERS STATES PATENT OFFICE
CERTIFICATE OF CORRECTION


Inventor(s) Donald L. Upp

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the first page, the name of the inventor should be corrected to read -- Donald L. Upp --;

Signed and sealed this 6th day of March 1973.

(SEAL)
Attest:
EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents