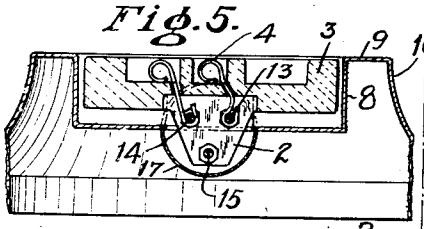
Feb. 4, 1941. F. E. OWEN ET AL 2,230,260

DEVICE FOR CONTROLLING ELECTRIC CIRCUITS

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Fig. 5.



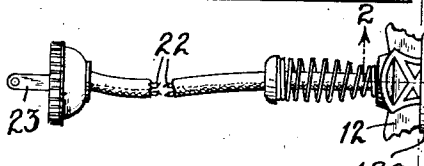


Fig. 1.

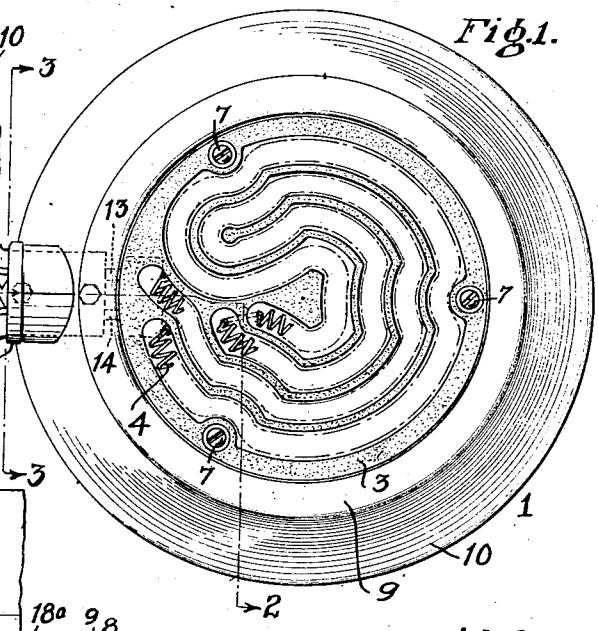


Fig. 3.

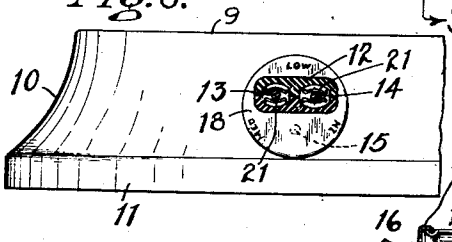


Fig. 2.

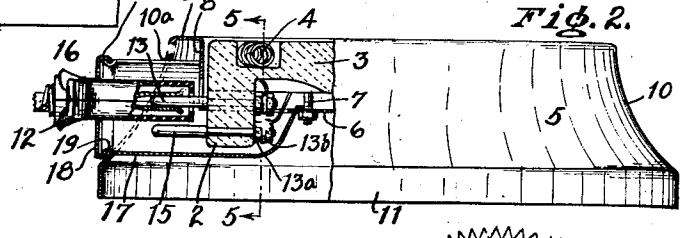


Fig. 4.

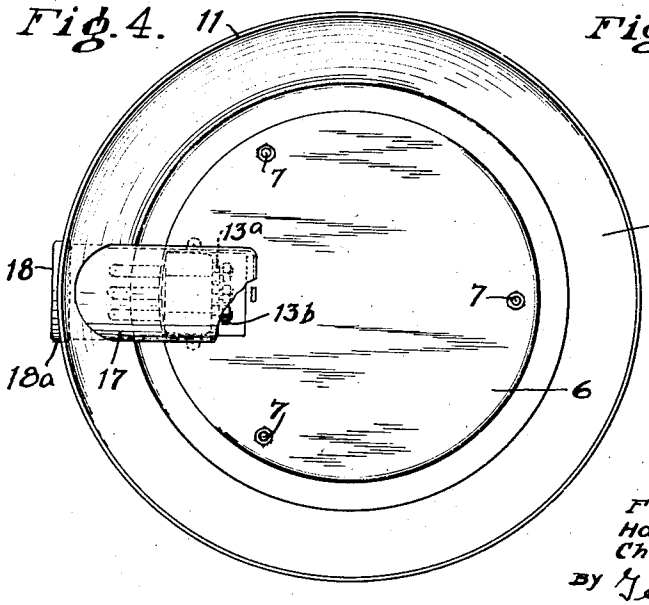
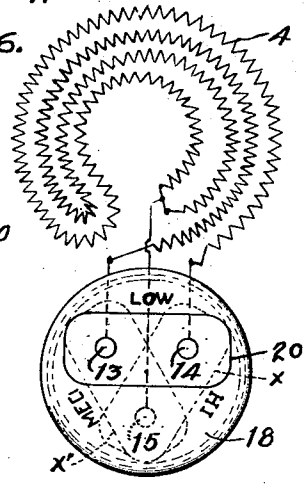


Fig. 6.



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Fig. 7.

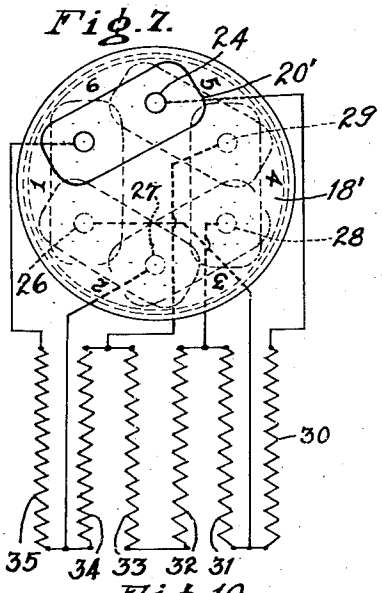


Fig. 8.

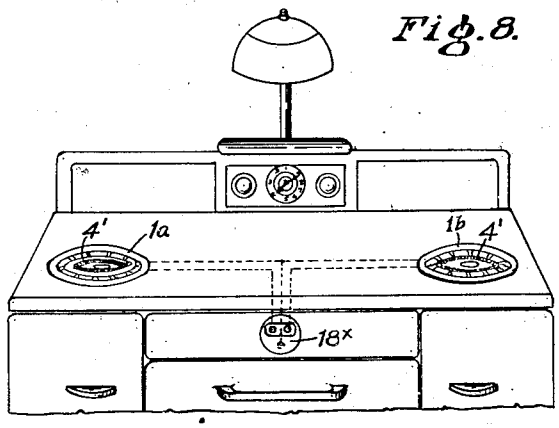


Fig. 10.

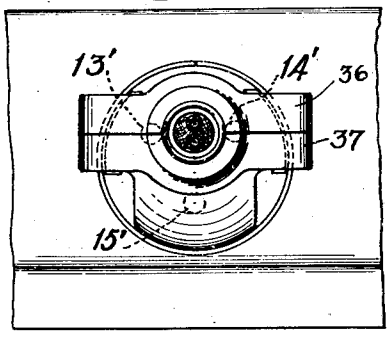


Fig. 9.

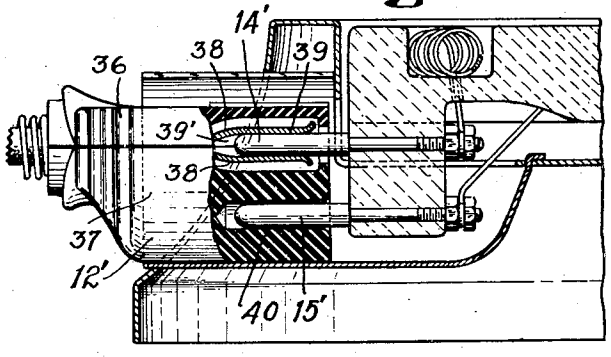


Fig. 11.

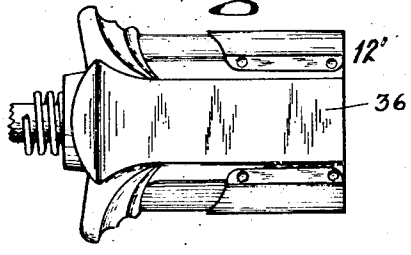
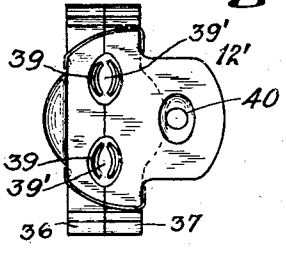


Fig. 12.



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UNITED STATES PATENT OFFICE

2,230,260

DEVICE FOR CONTROLLING ELECTRIC CIRCUITS

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Application November 16, 1938, Serial No. 240,686

5 Claims. (Cl. 219—20)

This invention relates to electrical apparatus having a plurality of circuits, one or more of which may be connected to the source of current supply, being particularly adapted for electrical appliances of the domestic type, (*a*) such as broilers, grills, ovens, hot plates and the like, wherein it is desirable to use varying degrees of heat for cooking purposes, or (*b*) where one or more heating devices may be connected to the source of current supply. More specifically the invention relates to a multi-circuit appliance having a plurality of contacts or terminals and guard means arranged to permit the plugging-in of any two related contacts or terminals while protecting the non-used contacts or terminals as a safeguard against accidents or other abnormal conditions.

One object of the invention is to provide an improved combination mounting and guard for a plurality of contacts for electrical circuits arranged to permit any two related contacts or terminals to be plugged-in or connected to the current supply, whereby any one or more of the circuits may be utilized, without exposing the non-used contacts or terminals.

Another object of the invention is to provide an improved combination mounting and safety guard for the contacts of any electrical appliance adapted to receive a standard plug and arranged to permit connection of the plug with any two related contacts or terminals and close off all non-used contacts or terminals.

Another object of the invention is to provide an improved contact or terminal mounting having a plurality of contacts, or terminals disposed in annular spaced relation about a common center or axis and to combine therewith a guard having a rotatable member arranged to expose any desired two related contacts or terminals for engagement by a plug, whereby all of the remaining contacts or terminals are protected and made inaccessible to eliminate danger of accident.

A further object of the invention is to provide an improved plug for connecting to the supply mains one or more electric units, constructed to make electrical connection with any two related contacts for the units and automatically close off any non-used contact.

Other objects of the invention will be apparent to those skilled in the art to which our invention relates from the following description taken in connection with the accompanying drawings, wherein

Fig. 1 is a plan view of an electrical appliance having a combination mounting and guard embodying our invention and showing a standard type of plug inserted in the mounting.

Fig. 2 is a view partly in side elevation and partly in section on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary section on the line 3—3 of Fig. 1.

Fig. 4 is a bottom plan view of the parts shown in Fig. 1, the plug being omitted.

Fig. 5 is a section on the line 5—5 of Fig. 6.

Fig. 6 is a diagrammatic view.

Fig. 7 is a diagrammatic view showing a modification.

Fig. 8 is a view showing a modification; that is, the application of the improved mounting to an electric range.

Fig. 9 is a fragmentary view (enlarged) showing a modification.

Fig. 10 is an elevation of the parts shown in Fig. 9.

Fig. 11 is a plan view of the plug shown in Figs. 9 and 10.

Fig. 12 is an end elevation of the plug shown in Figs. 9, 10 and 11.

In the drawings, 1 indicates as an entirety an electrical appliance having a wall 2 which forms the support for a plurality of contacts or terminals (later referred to) and a plate 3 for a plurality of resistances 4 disposed in annular spaced relation about a common center. In the form of construction shown for illustrative purposes in Figs. 1 to 5, inclusive, the wall 2 is preferably formed integral with and depends from the plate 3 in which the resistance or heating coils 4 are mounted, but said wall may be otherwise mounted either in close relation to the plate 3 or at a remote position, as shown in Fig. 8. The appliance 1 as illustrated in Figs. 1 to 6, inclusive, and Figs. 9 and 10, comprises "hot plate," the plate 3 thereof being mounted in a frame 5 preferably formed of sheet metal and having a bottom wall 6, to which the plate 3 is suitably secured, for example, by bolts 7, an annular enclosing wall 8 and a surrounding ledge 9 connected to an outwardly flaring skirt 10, the latter terminating in an annulus 11 adapted to rest on a suitable support. In the construction of the electrical appliance any desired number of resistances 4 may be employed and connected to contacts or terminals in any desired manner to utilize their heating capacities in any predetermined manner. In the example shown in Figs. 1 to 6, inclusive, we provide two resistances 4, 4, one end of each being connected to separate contacts and their opposite ends being connected

together and to another contact, so that by using resistances of predetermined capacities a relatively high heating effect may be obtained, when one resistance is connected to the supply mains (not shown) by means of a suitable plug, indicated as an entirety at 12, a lower heating effect may be obtained when the other resistance is connected to the supply mains and a relatively low heating effect may be obtained when both resistances are connected in series to the supply mains.

In the arrangement above referred to we provide three contacts or terminals 13, 14, 15 disposed equal distances from an imaginary center and equally spaced from each other, the spacing being equal to that of the sockets 12a provided in the plug 12, whereby the latter may engage any two selected contacts. In manufacture the contacts are spaced to accommodate standardized plugs 12. Each contact 13, 14, 15, has a reduced inner portion which extends through an opening formed in the wall 2, the resulting shoulder being in engagement with the outer face of the wall 2 and clamped thereagainst by a nut 13a threaded on the inner end of the contact and tightened against the inner face of the wall 2 and the lead from the adjacent end or ends of the resistances 4 is electrically connected to the contact by a nut 13b also threaded on the contact and tightened to secure the lead between it and the nut 13a. 16 indicates as an entirety a guard associated with the wall 2 and surrounding the contacts 13, 14 and 15 and projecting beyond the outer ends of the latter for reasons which will later appear. The guard 16 comprises a shell 17 formed of sheet metal, the outer end portion of which is preferably circular and extends through an opening 10a formed in the skirt 10. The inner end portion of the shell 17 is cut-away along its upper portion to accommodate the wall 2, the bottom and sides of such end portion being bent inwardly rearwardly and at opposite sides of the wall 2 so as to engage the bottom 6 of the frame 5 and enclose the rear ends of the contacts 13, 14, 15 and the leads connected thereto. The rear end portion of the shell 17 is secured to the bottom 6 in any suitable manner; for example, by means of integral lugs 17b extending through slots formed in the bottom 6 and bent laterally into engagement therewith. The outer end of the shell 17 supports a cover device 18. The cover device 18 is formed with an opening (later referred to) which may be positioned so that any terminal and an adjacent terminal may be exposed and a plug projected through the opening for engagement with these terminals. By preference the cover device is formed of a single section of metal and has rotatable connection with the shell 17. To provide for this rotatable connection between the cover device and the shell, the marginal end portion of the latter is preferably embossed throughout its circumference to form a groove 19 and the cover device is formed with an inwardly extending flange 18a the periphery of which is bent inwardly so as to fit the groove 19, the resilience of the metal forming the shell 17 permitting its outer end portion to be contracted and the flange 18a of the cover device to be slipped over the end of the shell and the inturned periphery of the flange inserted in the groove 19. When the cover device is assembled in this manner it may be readily rotated to the desired positions as later set forth. The cover device 18 is formed with an opening 20 the wall of which preferably has a contour complementary to the outer contour of the plug 12 and is arranged to expose either contact 13, 14, 15 and an adjacent contact when the cover device is in any predetermined position, so that the plug 12 may be connected to the selected contacts. In this preferred form the opening 20 is elongated, its major axis is tangential to an imaginary circle struck from the center common to the contacts 13, 14, 15 and such axis cuts the axes of the contacts to be connected by the plug 12. In the position shown in Fig. 6, contacts 13 and 14 are exposed by the cover device 18 and contact 15 is made inaccessible, so that when the plug 12 is inserted through the opening 20, as shown in Fig. 2, the resistances 4 are connected in series to the supply mains and therefore provide a relatively low heating effect, the word "Low" being at the top of the cover device and indicating to the user the correct position of the device for this quantity of heat. By rotating the cover device 18 to expose contacts 14, 15 (see dotted line x), one resistance only may be connected to the supply mains and the abbreviation "Med" will appear at the top to indicate the setting of the cover device. By rotating the cover device 18 to expose contacts 13, 15 (see dotted line x'), the other resistance only may be connected to the supply mains and the abbreviation "Hi" will appear at the top to indicate this setting of the device. The flange 18a may be provided with arrows (one being shown at a, Fig. 1), one for each position of the cover device, arranged to aline with a mark on the shell (for example the seam a') to indicate the predetermined positions of the cover device, whereby the insertion of the plug 12 is facilitated. It will thus be seen that the walls of the opening 20 may serve as a guide for the plug 12 and co-operate with the contacts to securely support it in position and when the plug 12 is in position it co-operates with the cover device to close the chamber formed by the shell and cover, so that danger of fire or burns due to short circuiting or arcing within the plug caused by erosion of its parts or other abnormal conditions is minimized.

The plug 12 consists of a sectional body member having interior recesses in which are mounted related conductor elements 21 arranged to frictionally engage the contacts 13, 14, 15, and electrically connected to leads 22, which in turn are connected to terminals 23, whereby the latter may be connected to the supply mains.

Fig. 7 illustrates a modification having six contacts or terminals 24, 25, 26, 27, 28, 29, and connected to six resistances 30, 31, 32, 33, 34, 35, which are connected in series with the end resistances (30, 35) and connected to two related contacts 24, 25, thereby providing six different settings, whereby the supplied heat may be variously regulated, as later set forth. It will be noted that the contacts are disposed in annular spaced relation about a common center and equally spaced therefrom and each other, such spacing being similar to that of the sockets provided in the standard plug 12 and that the rotatable cover device, indicated at 18', is formed with a plug receiving opening 20', whereby only two related contacts only may be made accessible. In the illustrated wired connections between the resistances and contacts, engagement of the plug with contacts 24, 25, connects in all the resistances; engagement of the plug with contacts 25, 26, connects in all the resistances except resistance 30; engagement of the plug with

contacts 26, 27, connects in resistances 31, 32, 33, 34; engagement of the plug with contacts 27, 28, connects in resistances 32, 33, 34; engagement of the plug with contacts 28, 29, connects in resistances 32, 33; and engagement of the plug with contacts 29, 24, connects in resistances 30, 31, 32, 33. By a different system of wiring or by changing the resistance value of one or more resistances any desired variation in heating effect may be obtained.

Fig. 8 illustrates a modification consisting of an electric range having two hot plates 1a, 1b, the resistances of which are shown controlled by three contacts or terminals, as shown in Figs. 1 to 6, inclusive. If each hot plate is provided with two resistances, as shown in Figs. 1 and 6, and connected in the same manner to the contacts, both hot plates would be operated simultaneously and provide equal heating effects. In the arrangement shown, each plate is provided with one resistance 4' and so connected to the contacts that in one position of the cover device 18x one resistance is connected to the supply mains, in another position of the cover device 18x the other resistance is connected to the supply mains and in the other position of the cover device 18x both resistances are connected to the supply mains, this latter position being shown in Fig. 8.

Figs. 9, 10, 11, and 12 illustrate a different embodiment of the invention whereby any two related contacts may be engaged to connect one or more resistances in the circuit and all other contacts closed off and protected. In the arrangement shown, I provide three contacts 13', 14', 15', mounted and arranged as shown in Figs. 1 to 6, inclusive. 12' indicates as an entirety the plug comprising two sections 36, 37, formed of suitable insulation material, the opposed walls of the sections being formed with related recesses to accommodate in each conductor elements 38, 38, electrically connected to one of the leads 39 and forming sockets 39' to receive and frictionally engage one of the contacts in a well known manner, as shown in Fig. 9. The section 37 is thickened or enlarged and formed with a recess or opening 40 which extends inwardly from the inner end of the plug section. As will be understood from Fig. 12, the sockets 39' and opening 40 have the same spaced relation to each other as the contacts 13', 14', 15', so that when the plug 12' is positioned as shown in Fig. 9, the circuit is connected to the contacts 13', 14' and the contact 15' is enclosed by the walls of the opening 40. Likewise, when the plug is inserted so as to connect the circuit to contacts 14', 15', contact 13' is enclosed by the walls of the opening 40 and when the plug is inserted so as to connect the circuit to the contacts 13', 15', contact 14' is enclosed by the walls of the opening 40. It will thus be seen that the operation of positioning the plug 12' to engage any two of the contacts serves to simultaneously close off and protect the other contact from exterior engagement therewith.

The plug sections may be removably connected together in any desired manner, for example by spring clips 41. The contacts 13', 14', 15', may be surrounded by a shell 17' extending beyond the free ends thereof and serving as a guard therefor. The shell may be of a size to form a guide for the plug 12' as well as assist in supporting it in position.

To those skilled in the art to which our invention relates many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. Our disclosures and the description herein are purely illustrative and are not intended to be any sense limiting.

What we claim is:

1. In an electrical apparatus, the combination with a support and means thereon adapted to be connected to a source of current supply, of a series of contacts carried by said support and connected to said means and positioned in annular equi-spaced relation, each said contact and one of the adjacent contacts being adapted to be engaged by a plug, a wall surrounding said contacts and a cover device formed with a rectilinear opening and rotatable to predetermined positions, said opening being substantially equal in length to the annular spacing between said contacts and so spaced from the axis about which said contacts are positioned that upon movement of said device to each predetermined position said opening is disposed in the plane cutting two adjacent contacts to expose the latter for engagement by the plug and close off the remaining contacts.

2. An electrical apparatus as claimed in claim 1 wherein the contour of said opening being complementary to the outer wall of the plug.

3. In an electrical apparatus, the combination with a support and means thereon adapted to be connected to a source of current supply, of a series of contacts connected to said means, said contacts being mounted in said support and having extended ends disposed about a common center equal distances therefrom and in uniform spaced relation, each said contact end and one of the adjacent contact ends being adapted to be engaged by a plug, enclosure means forming a chamber for the extended ends of said contacts, carried by said support, said enclosure means comprising a wall surrounding said contacts and projecting outwardly therebeyond and a cover device formed with a rectilinear opening and rotatable to predetermined positions, said opening being substantially equal in length to the annular spacing between said contact ends and so spaced from the axis about which said contact ends are positioned that upon movement of said device to each predetermined position said opening is disposed in the plane cutting two adjacent contact ends to expose the latter to engagement by the plug and close off the remaining contact ends.

4. An electrical apparatus as claimed in claim 3 wherein the contour of said opening is complementary to the outer walls of the plug, whereby the plug when engaged with said exposed contacts co-operates with said cover device to close the chamber for said contacts.

5. In an electrical apparatus, the combination with a support and means thereon adapted to be connected to a source of current supply, of a series of contacts connected at their inner ends to said means, said contacts being mounted in said support and having extended ends disposed about a common center equal distances therefrom and in uniform spaced relation, each said contact end and one of the adjacent contact ends being adapted to be engaged by a plug, enclosure means forming a chamber for the extended ends of said contacts, carried by said support, said enclosure means comprising a wall

and a cover device, said wall having a forward portion surrounding the extended ends of said contacts and projecting outwardly therebeyond and a rearward portion enclosing the inner ends of said contacts and that portion of said support in which the contacts are mounted and said cover device being formed with a rectilinear opening and rotatable to predetermined positions, said opening being substantially equal in length to the annular spacing between said contact ends and so spaced from the axis about which said contact ends are positioned that upon movement of said device to each predetermined position said opening is disposed in the plane cutting two adjacent contact ends to expose the latter for engagement by the plug and close off the remaining contact ends.

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