Nov. 17, 1942. R. H. PARK 2,302,048

ELECTRIC STOVE OR THE LIKE

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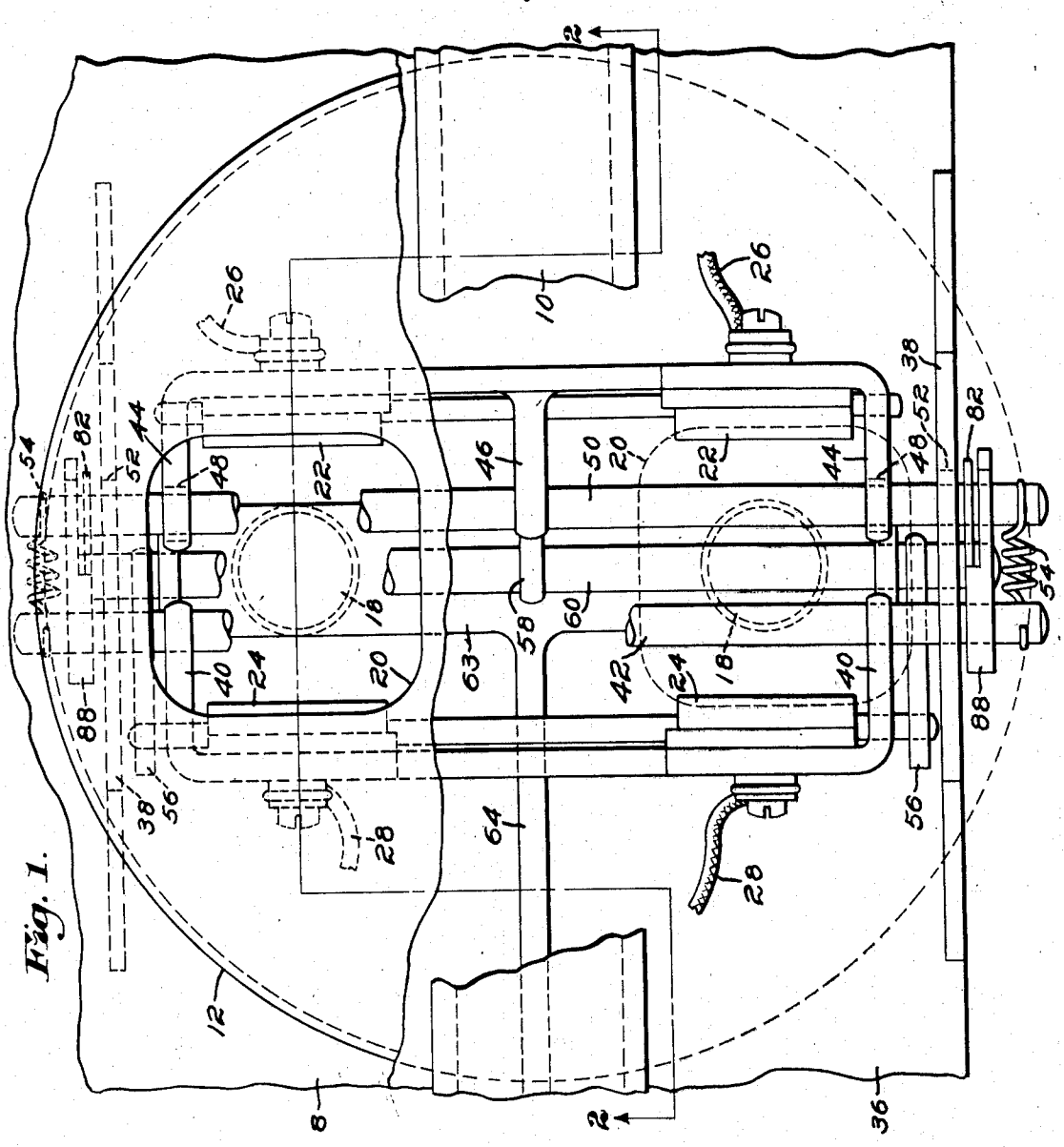


Fig. 1.

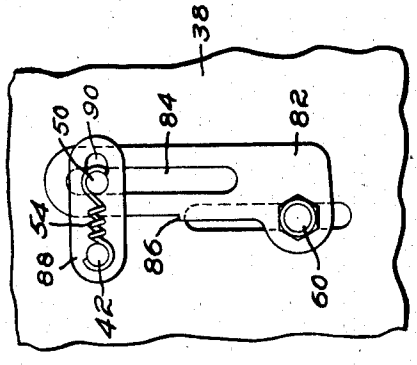


Fig. 5.

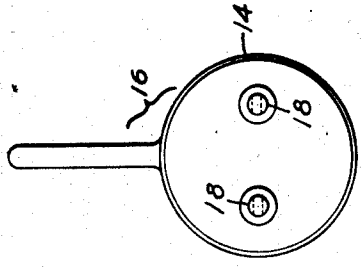


Fig. 6.

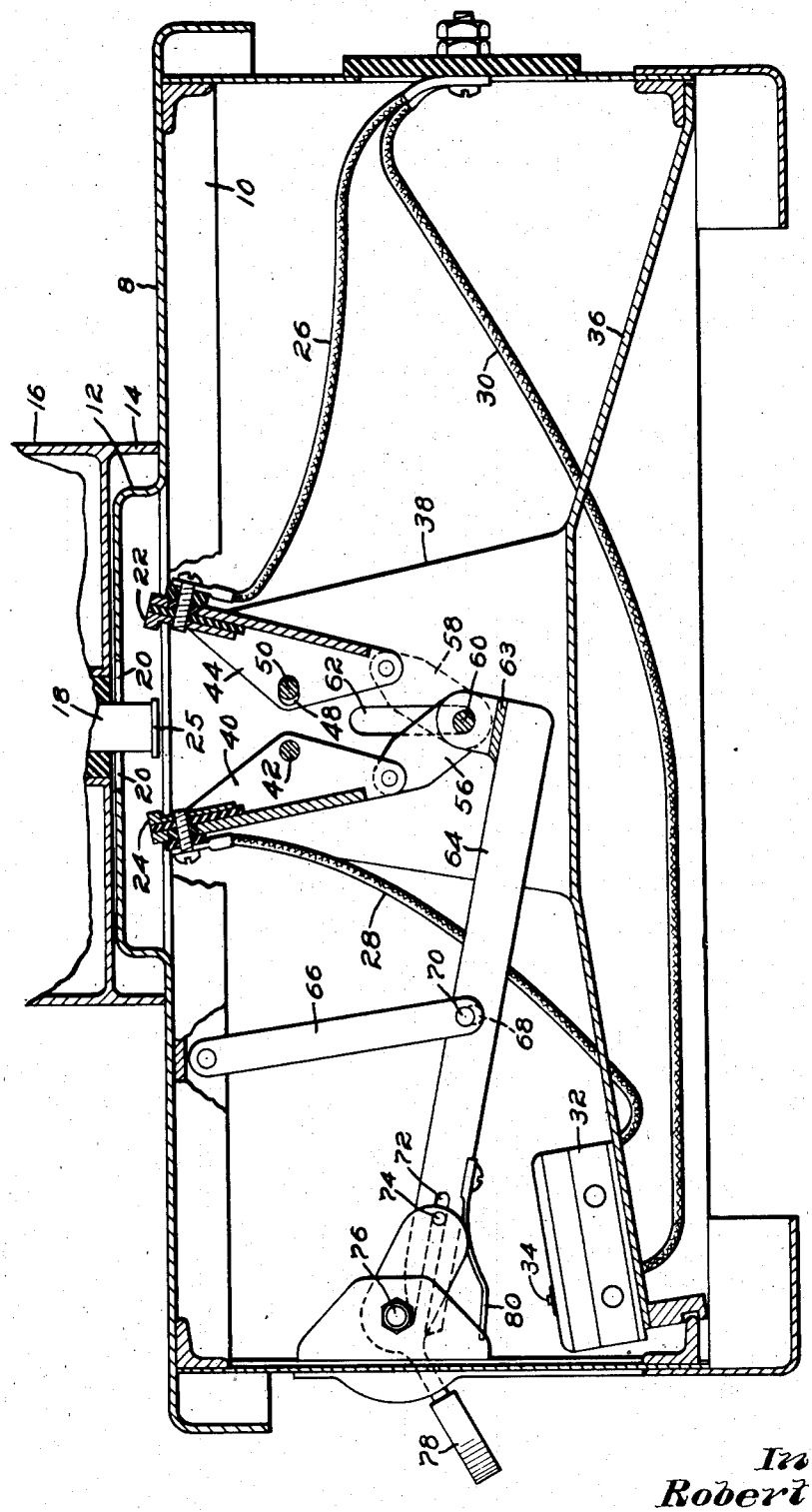
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ELECTRIC STOVE OR THE LIKE

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Fig. 2.



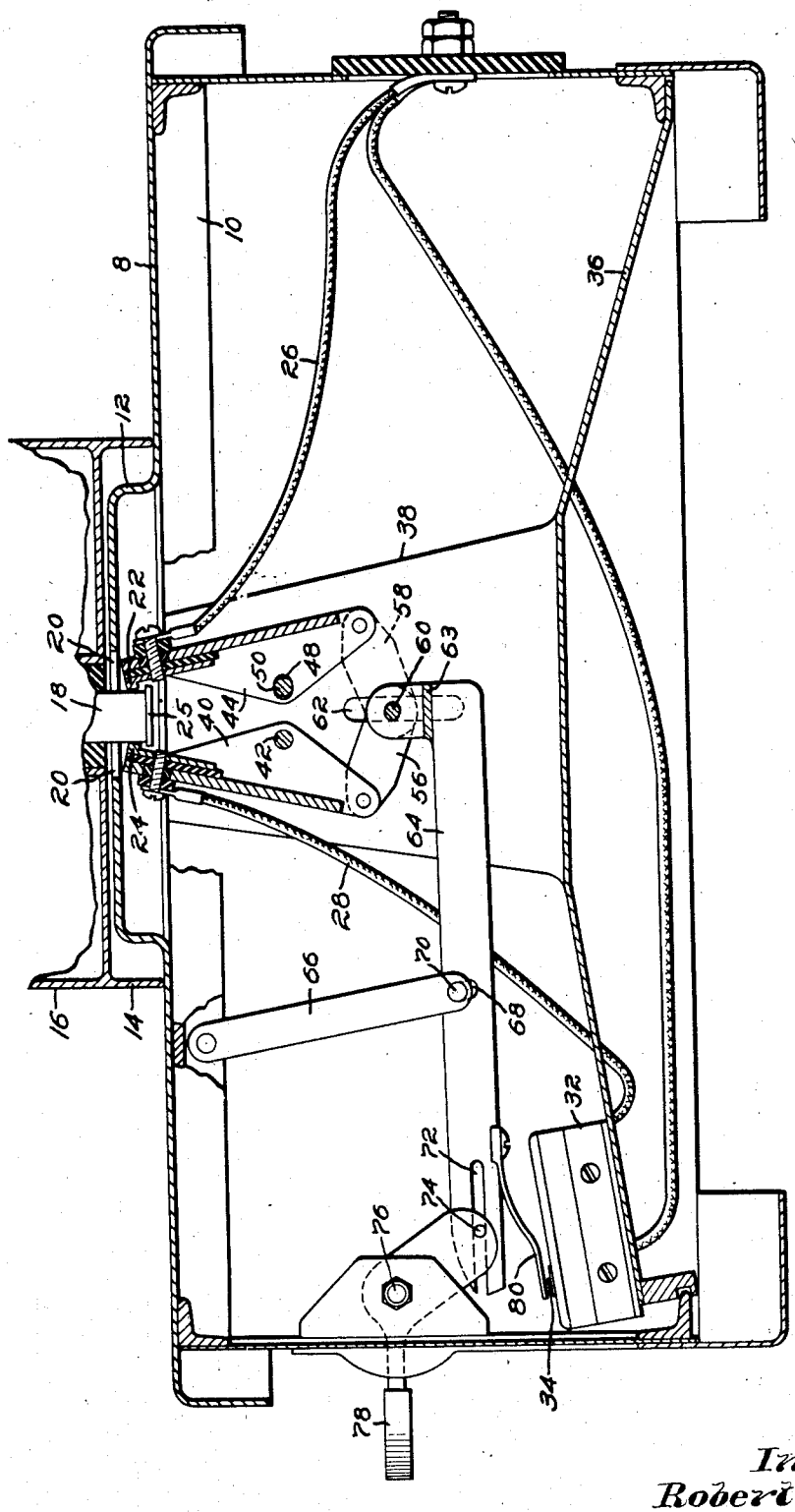
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Fig. 3.



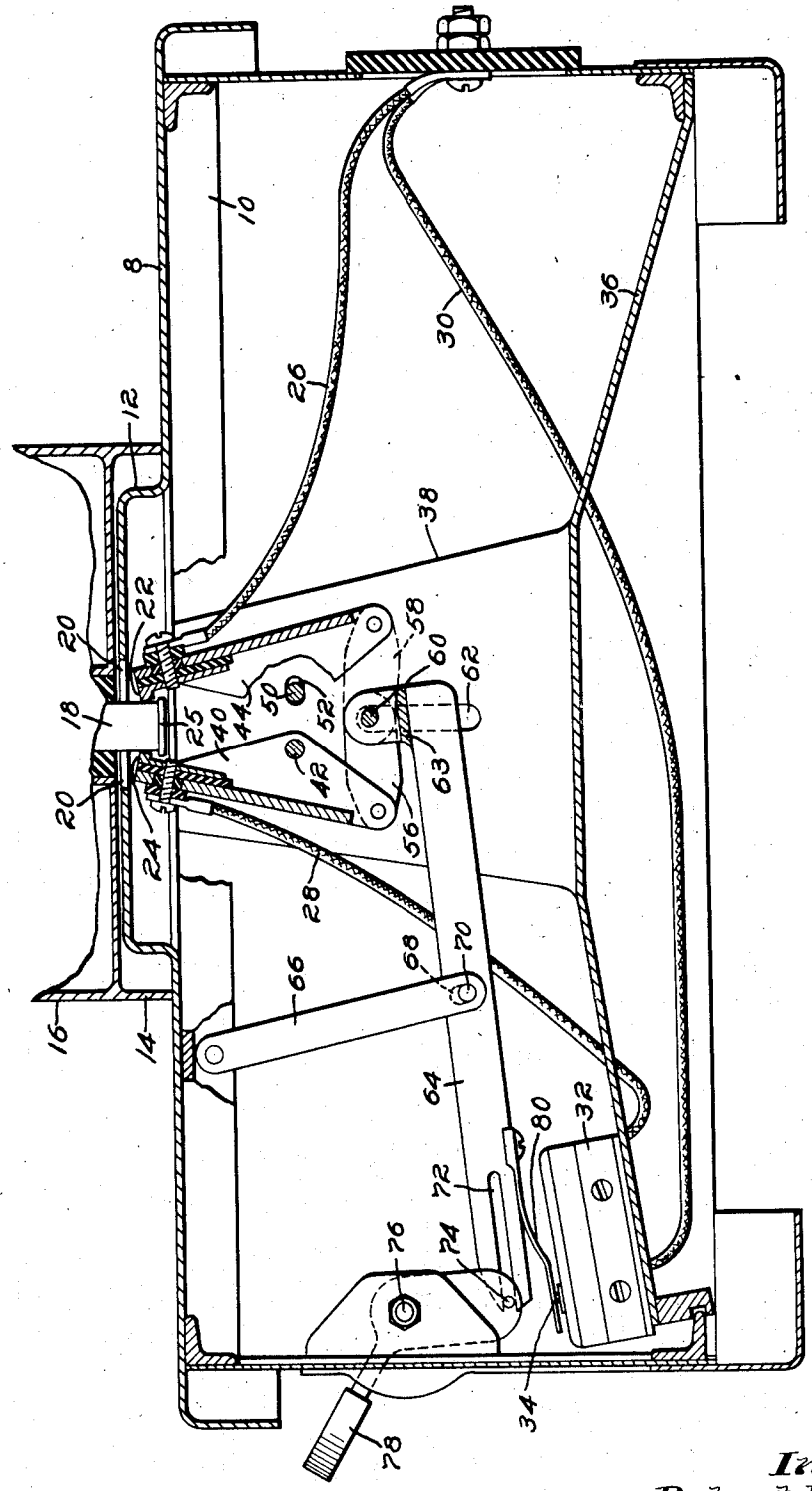
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Fig. 4.



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Patented Nov. 17, 1942 2,302,048

UNITED STATES PATENT OFFICE

2,302,048

ELECTRIC STOVE OR THE LIKE

Robert H. Park, Pluckemin, N. J.

Application May 17, 1941, Serial No. 393,963

16 Claims. (Cl. 219—43)

This invention relates to an electric device for use with portable, electrically energized mechanisms having contact studs projecting therefrom adapted to be grasped or clamped by contacts connected to a source of current to include the mechanism in an electric circuit, the object being to provide a construction providing for connecting such devices in the circuit under conditions of safety and convenience. The particular conditions which control the design herein disclosed are those arising in electric cooking by means of cooking vessels similar, for instance, to that disclosed in my Patent 2,233,485, March 4, 1941, wherein the heating effect of the electric current is exerted in the vessel itself, as by means of an inbuilt resistance element as disclosed in that patent. I herein refer to the device as a "stove" in that it takes the form of a suitable table-like or cabinet structure to receive cooking vessels. It differs from an ordinary stove in that it does not in itself embody a source of heat such as burning fuel from which heat is radiated or conducted to the vessel placed thereon, but it provides a support upon which cooking vessels are placed as upon a stove top and whereon they are supported during the heating operation. As will appear from the description, I provide means whereby the completion of the electric circuit can be effected only when the cooking vessel is placed upon the stove and the circuit is closed and interrupted only when there is firm mechanical engagement of the contact members of the stove with the contact studs of the portable vessel.

My invention will be well understood by reference to the following description of the illustrative embodiment thereof shown in the accompanying drawings, wherein—

Fig. 1 is a fragmentary plan view of the stove showing a station to receive a single cooking utensil (corresponding roughly to one of the openings in a coal range or a single burner of a gas cooking stove), parts being broken away to disclose the interior construction;

Fig. 2 is a section on the line 2—2 of Fig. 1 on a smaller scale showing the clamping contacts in open position;

Fig. 3 is a similar view showing the clamps closed on the contact of the cooking vessel but the circuit open;

Fig. 4 is a view showing the parts after further movement to operating or cooking positions;

Fig. 5 is a fragmentary side elevation as seen from the bottom of Fig. 1, but on a smaller scale than Fig. 1; and

Fig. 6 is a bottom plan view on a small scale of a cooking utensil.

I believe an understanding of the construction disclosed will be most readily attained if I first describe specifically the principal mechanical elements shown in the embodiment of the invention illustrated and thereafter explain the function and method of use subserved by such mechanical construction, after which further mechanical details will be described.

The "stove" herein shown takes the form of a suitable box-like or cabinet structure which, as best seen in Figs. 2, 3 and 4, has an extended table-like top 8 herein shown as of thin sheet metal supported by a relatively heavy channel iron 10 which crosses centrally beneath the station on which the vessel is placed for cooking, this station being defined by an upstruck portion 12 of the top adapted to enter within the depending marginal flange 14 on the bottom of the cooking vessel 16. The vessel, as best seen in Fig. 6, has a pair of studs 18 projecting from the bottom thereof which pass through the enlarged openings 20 (Fig. 1) in the raised portion 12 of the stove top to enter between electric contacts 22 and 24 disposed beneath the top which are arranged to close in clamping relation to the studs to include the vessel in an electric circuit, cooking being effected by heat generated within the walls of the vessel as, in the case of ordinary household current, by means of an inbuilt resistance element connected to the studs 18, as in my patent above referred to, or in the case of current of low voltage and high amperage as in my Patent 2,012,618, August 27, 1935. Beneath the top of the stove contacts 22 and 24 for each of the studs 18 connected at opposite sides of the line respectively have a normally widely separated position, as shown in Fig. 2, to permit the vessel to be placed on the stove by a free movement of superposition with the studs 18 extending through the openings 20 and entering freely between the separated contacts, and they are adapted to be moved together to clamp the studs 18 from opposite sides. Preferably, as shown, these contacts have overhanging flanges which in the closed position overlie flange 25 on the end of the stud 18 to prevent withdrawal of the vessel until the jaws are again separated.

As seen in Fig. 2, the contact 22 is connected by a flexible conductor 26 to one side of a suitable source of current while the contact 24 is connected by conductors 28 and 30 to the opposite side of a source of current through a suitable switch 32 which may be of the construction dis-

closed in the patent to McGall 1,960,020, May 22, 1934, and therefore unnecessary here to illustrate or describe in detail other than to note that it may provide a plunger **34** which, when depressed, closes the switch and which, when released, opens the same. The switch **32** is herein shown as mounted on a base plate **36** extending within the exterior structure of the stove at some distance below the top **8** and having a pair of uprights **38** extending to the top adjacent the sides of the cooking station to provide end frames for some of the mechanisms by means of which the contacts **22** and **24** are movably mounted to perform their functions, which mechanisms I will next describe.

The contacts **22** and **24** are herein mounted on the upper ends of generally vertical arms, mounted between their ends to swing on parallel, generally horizontal axes so that by spreading the lower ends of the arms the contacts are brought toward one another to clamp studs **18** between them. Referring to Figs. 2 and 1, the contacts **24** are here shown as mounted on, although insulated from, the upstanding web of a generally U-shaped member having terminal flanges **40** journalled on a rod or shaft **42**, the ends of which pass snugly through the uprights **38**, while the contacts **22** are mounted on a similar member having corresponding end flanges **44** and a central flange **46**, best seen in Fig. 1. As seen in Fig. 2, the end flanges **44** have elongated openings **48** through which passes the rod or shaft **50** parallel to the shaft **42**, thus permitting angular movement of the contact-supporting frame in the plane of the paper viewing Fig. 1 to permit equalization of pressure on the two studs **18** when the parts are closed, the shaft **50** fitting the central flange **46** closely but with sufficient play to permit such angular movement. The shaft **50**, as seen in Fig. 4, passes through substantially horizontal slots **52** in the uprights **38** and is normally maintained in the left-hand end of those slots, viewing Fig. 4, by means of the springs **54** (Fig. 1) connecting the ends of the shafts **42** and **50**.

Links **56** and a central link **58** (shown dotted in Figs. 2, 3 and 4 because it is in fact at the nearer side of the sectional plane) connect respectively the lower ends of flanges **40** and the lower end of flange **46** to a rod **60**, the ends of which are guided in the vertical slot **62** in the end members **38**, these links constituting a toggle which, when straightened from the position of Fig. 2, will serve to swing the contact-carrying arms pivotally about the shafts **42** and **50** respectively to cause the contacts to approach one another.

For straightening the toggle the rod **60** has pivoted thereto a yoke **63** (Fig. 1) forming one end of an operating lever **64**, the central portion of which is suspended, herein from the angle iron **10**, by a link **66**, the lever **64** having a vertically elongated slot **68** receiving the pivot pin **70** at the lower end of the link. The other end of the lever is slotted at **72** to receive a pin **74** on one arm of an operating lever which is pivoted to the side of the stove at **76** and has a portion **78** projecting at the outer side of the stove to provide an actuating handle. Carried by the lower side of the lever **64** is a spring **80** which, when the lever is fully depressed to the position of Fig. 4, makes contact with the plunger **34** of switch **32** to close the latter.

I will now trace the operation of the parts through the successive positions of Figs. 2, 3 and 4. Referring to Fig. 2, it will be noted that with the actuator handle **78** down, the contact-carrying arms under the weight of the actuating lever **64** and the associated parts are widely spread in the position of Fig. 2 and the vessel may be placed on the stove by a simple movement of superposition, the studs **18** passing through the large openings **20** and occupying a space between the widely spaced contacts **22** and **24**. Now if the actuator handle **78** is raised, lever **64** will be rocked counterclockwise about pivot **70**, straightening the toggle until the contacts close on the stud **18** in the position of Fig. 3.

It is to be noted, however, that in Fig. 3 the actuating lever has not yet reached its extreme of movement, the pin **74** has not reached the end of the slot **72** and the spring **80** is still spaced from the plunger **34**, so that the electric circuit is not closed. On continued movement of the actuator **78** the toggle tends still further to straighten to move apart the lower end of the jaw-carrying arms, and since contact **22** is in engagement with stud **18**, it will tend to turn about this point as a center, this action being permitted by movement of the shaft or rod **50** in the slots **52** (Fig. 4) against the action of the springs **54**, this permitting the parts to move to the position of Fig. 4 wherein the toggle has moved slightly past dead center and the clamps are therefore in a self-maintaining position in engagement with the stud **18** under the tension of the springs **54**. During the continued movement just described consequent on the lost motion of the shaft or rod **50** in the slots **52**, the spring **80** engages and depresses the plunger **34** of switch **32** to close the circuit, which thus occurs only after the contacts have been firmly engaged with the stud. As seen in Fig. 4, in this position of the parts the pin **74** which actuates the lever **64** lie substantially in the perpendicular from its pivot to the axis of slot **72**, and as a result the switch is held closed despite the fact that the spring **80** is depressed and hence is pushing upward the lever **64**.

The studs **18** are clamped under pressure of the springs and locked by engagement of their flanges **25** beneath the contacts. The yielding mounting of contacts **22** and the provision for angular displacement provided by slots **48** equalizes the pressure on the two studs, irrespective of whether the studs are of exactly equal size or whether there are other minor dimensional inequalities in the system.

The length of the elongated holes **48** and **52** is so limited that it is not possible to so wrack the vessel **16** with the clamps closed as to cause one of the studs to come in contact with portion **12** of the stove top. Thus short circuits due to contact of the studs with a grounded stove top are precluded.

When cooking is completed and it is desired to remove the cooking vessel, the actuator **78** is depressed. Since the links **56**—**58** are over dead center and tend to hold up the rod **60** on account of the tension of the springs **54**, the effect of this is to turn lever **64** on **60** as a center, an action permitted by the elongation of the slot **68** surrounding the pivot **70**, so that the spring **80** is lifted from switch plunger **34**, causing the circuit to be interrupted before there is any tendency of the clamps to open. When, however, the movement of lever **64** takes up the lost motion provided at the slot **68** so that the pivot contacts the upper end of the slot, the lever will turn about pivot **70** as a center to cause downward force to be exerted on the center **60** to move the

toggle over dead center. When 60 moves past dead center in a downward direction, the effect of the springs 54 is to aid in its downward motion and the result is that the rod 60 snaps downwardly while the contact-carrying arms snap to the open position.

If nothing more than what has already been described were embodied in the mechanism, it would be possible to close the jaws with no vessel in place. Under these conditions the jaws would be energized and there would be arcing and poor contact as well as danger of short circuits from clamp jaw to frame were an attempt made to set a vessel in place. Also there would be some danger of shock with the jaws closed and energized in this manner. Accordingly I herein disclose means which make it impossible to clamp or energize the jaws except when the cooking vessel is in place, this being herein effected in the sense that the jaws cannot be clamped unless they are closed on something of the same general dimensions as the studs 16.

The mechanism employed will be best understood from Figs. 1 and 5, and it will be recalled that Fig. 1 is on a larger scale than Fig. 5. Referring particularly to Fig. 5, I have shown pivoted on the ends of rod 60 plates 82 having vertical slots 84 in which the ends of the shaft 50 are received and they are provided with a projection or shoulder 86 on the left-hand side, viewing Fig. 5. A horizontal link or plate 88 extends between the ends of shafts 42 and 50, engagement with the latter being through a horizontally elongated slot 90 to permit the yielding movement of shaft 50 to the right in Fig. 1 against the action of the springs 54 during the latter portion of the clamping movement as already described. As seen in Fig. 1, this link overlies the upper end of plate 82 and is cut away or rabbeted to receive the same, and thus with the parts in the position of Fig. 5 the thicker portion of the link presents a stop in the path of shoulder 86 as the latter moves upwardly with the rod 60. If now an attempt were made to close the clamps without the contacts 18 of the cooking vessel being therebetween, the movement of the parts would not be checked by engagement of the contacts with the studs when the position of Fig. 3 is reached. Therefore, the right hand jaw would tend to continue to move about 50 as a center and there would be no tendency for shaft 50 to shift to the right against the action of the springs 54 and in consequence the shoulder 86 would make contact with the thick part of the link 88 and stop further motion. The stroke of lever 64 could not be completed and the switch plunger 34 would not be actuated to close the circuit. Also since the rod 60 would not have reached dead center, when the hand was removed from the actuator 78, the parts would return under gravity to the position of Fig. 2.

On the other hand, if the stud 18 were in position as shown in Fig. 3, shaft 50 would move to the right as already described, swinging plate 82 clockwise, viewing Fig. 5, and permitting the shoulder 86 to pass in the reduced portion of the link 88 and the clamping cycle as previously described to be completed.

I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive; reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

I claim:

1. In a device for use with a portable appliance having contacts projecting therefrom by means of which the appliance may be included in an electric circuit, a pair of opposed vertical arms, horizontal pivots on which the arms are swung between their ends, contacts carried by the upper ends of said arms adapted when the arms are swung to approximate the contacts to close them on the projecting contact inserted therebetween, a toggle extending between the lower ends of the arms, means for actuating the toggle, one at least of said pivots being free to yield laterally, and spring means opposing such yielding.

2. In a device for use with a portable appliance having contacts projecting therefrom by means of which the appliance may be included in an electric circuit, a pair of opposed vertical arms, horizontal pivots on which the arms are swung between their ends, contacts carried by the upper ends of said arms adapted when the arms are swung to approximate the contacts to close them on the projecting contact inserted therebetween, a toggle extending between the lower ends of the arms, means for actuating the toggle, one at least of said pivots being free to yield laterally, spring means opposing such yielding, and means to check the toggle before it reaches dead center connected to move to inoperative position on yielding movement of an arm.

3. In a device for use with a portable appliance having a pair of contacts projecting therefrom by means of which the appliance may be included in an electric circuit, a pair of opposed arms, each having at the sides thereof a contact to cooperate with an opposed contact on the other to engage when approximated a contact on said device inserted therebetween, pivots on which the arms are swung, the pivotal mounting of at least one of the arms being such as to permit angular motion of the sides of the arm to equalize pressure between the pairs of contacts, a toggle extending between the ends of the arms remote from said contacts, means for actuating the toggle, one at least of said pivots being free to yield laterally, and spring means opposing such yielding.

4. In a device for use with a portable appliance having contacts projecting therefrom by means of which the appliance may be included in an electric circuit, a pair of opposed vertical arms, horizontal pivots on which the arms are swung between their ends, contacts carried by the upper ends of said arms adapted when the arms are swung to approximate the contacts to close them on the projecting contact inserted therebetween, one at least of the pivots being free to yield laterally, and spring means opposing such yielding, means cooperating with the lower ends of the arms for spreading the same, normally tending to return to a position corresponding to approximated position of the lower ends and adapted to be retained in an extreme position under stress of said spring means when the pivot yields laterally.

5. In a device for use with a portable appliance having contacts projecting therefrom by means of which the appliance may be included in an electric circuit, a pair of opposed vertical arms, horizontal pivots on which the arms are swung between their ends, contacts carried by

the upper ends of said arms adapted when the arms are swung to approximate the contacts to close them on the projecting contact inserted therebetwen, one at least of the pivots being free to yield laterally, spring means opposing such yielding, means cooperating with the lower ends of the arms for spreading the same, normally tending to return to a position corresponding to approximated position of the lower ends and adapted to be retained in an extreme position under stress of said spring means when the pivot yields laterally, and a stop normally blocking movement of the spreading means to such extreme position but which is withdrawn to inoperative position by yielding of the pivot.

6. In a device for use with a portable appliance having contacts projecting therefrom by means of which the appliance may be included in an electric circuit, a pair of opposed vertical arms, horizontal pivots on which the arms are swung between their ends, contacts carried by the upper ends of said arms adapted when the arms are swung to approximate the contacts to close them on the projecting contact inserted therebetween, one at least of the pivots being arranged for slight and positively limited lateral yielding, and spring means opposing such yielding, means cooperating with the lower ends of the arms for spreading the same, normally tending to return to a position corresponding to approximated position of the lower ends and adapted to be retained in an extreme position under stress of said spring means when the pivot yields laterally.

7. In an electric heating device for use with a portable vessel having contacts projecting from a wall thereof by means of which the vessel may be included in a heating circuit, a pair of movable clamping jaws carrying contacts adapted to close on a contact carried by the vessel, means whereby a mechanical actuating force will move said jaws to bring the contacts to a position of approximation not further apart than the thickness of the vessel contact, said means in itself arranged to relapse and retract the jaws from said position when the force is discontinued but shiftable to a self-maintaining position under the conjoint action of such force and the mechanical resistance of the vessel contact when present and engaged by the jaws.

8. In combination with a pair of movably mounted clamps for closing in gripping relation to a contact inserted therebetween to include the device which carries the contact in an electric circuit, an actuating mechanism to impart closing movement to said clamps, one of the clamps being yieldably mounted to permit continued action of said mechanism after a grip on the contact is established, and a stop effective to stop such continued movement of said mechanism in the absence of yielding movement of the clamp resultant on engagement with such contact.

9. In combination with a pair of movably mounted clamps for closing in gripping relation to a contact inserted therebetween to include the device which carries the contact in an electric circuit, means for imparting closing and opening movement to the clamps, there being a lost-motion connection permitting continued movement of said means after a grip on the contact is established, a pivoted lever for actuating said means, and switch contacts for the circuit closed by said lever during such continued movement, the pivot of the lever having a lost-motion mounting permitting actuation of the lever to effect separation of the switch contacts prior to exertion of effective force on said clamp-moving means tending to release the clamps.

10. In combination with a pair of movably mounted clamps for closing in gripping relation to a contact inserted therebetween to include the device which carries the contact in an electric circuit, means for imparting closing and opening movement to the clamps, there being a lost-motion connection permitting continued movement of said means after a grip on the contact is established, a pivoted lever for actuating said means, switch contacts for the circuit closed by said lever during such continued movement, the pivot of the lever having a lost-motion mounting permitting actuation of the lever to effect separation of the switch contacts prior to exertion of effective force on said clamp-moving means tending to release the clamps, and a stop normally blocking such continued movement but movable to inoperative position when such lost motion occurs in the connection of the above recited means for imparting closing and opening movement to the clamps.

11. In combination with a pair of movably mounted clamps for closing in gripping relation to a contact inserted therebetween to include the device which carries the contact in an electric circuit, means for imparting closing and opening movement to the clamps, there being a lost-motion connection permitting continued movement of said means after a grip on the contact is established, a pivoted lever for actuating said means, switch contacts for the circuit closed by said lever during such continued movement, the pivot of the lever having a lost-motion mounting permitting actuation of the lever to effect separation of the switch contacts prior to exertion of effective force on said clamp-moving means tending to release the clamps, and a manually operable member for swinging said lever which moves substantially to a dead center position to maintain said switch contacts closed.

12. In combination with a pair of movably mounted clamps for closing in gripping relation to a contact inserted therebetween to include the device in an electric circuit, a switch at another point in the circuit, means for opening and closing the clamps capable of a continued movement after the clamps have engaged the contact, a pivoted lever connected at one side of its pivot to said means to actuate the clamp-closing means and having means at the other side of its pivot to operate the switch during said continued movement, said pivot being free for limited movement in one direction to permit the lever to turn about its point of connection to the closing means in the closed position of the clamp to retract said switch-operating means from the switch prior to releasing movement of the clamp-closing means.

13. In combination with a pair of movably mounted clamps for closing in gripping relation to a contact inserted therebetween to include the device in an electric circuit, a switch at another point in the circuit, means for opening and closing the clamps capable of a continued movement after the clamps have engaged the contact, a pivoted lever connected at one side of its pivot to said means to actuate the clamp-closing means and having means at the other side of its pivot to operate the switch during said continued movement, said pivot being free for limited

movement in one direction to permit the lever to turn about its point of connection to the closing means in the closed position of the clamp to retract said switch-operating means from the switch prior to releasing movement of the clamp-closing means, and a rotatably mounted, manually movable actuator for moving said other end of the lever toward switch-operating position and which is substantially on dead center when the switch has been closed thereby.

14. In combination with a pair of movably mounted clamps for closing in gripping relation to a contact inserted therebetween to include the device in an electric circuit, a switch at another point in the circuit, means for opening and closing the clamps capable of a continued movement after the clamps have engaged the contact, a manual actuator having simple non-recurrent strokes in opposite directions to close and open the circuit respectively, and parts driven thereby moving as a unit in the closing action first to close the clamps and thereafter to close the switch during the aforesaid continued movement of the clamp-operating means, but differentially movable on the opening action first to open the switch before affecting the clamp-operating means.

15. In combination with a pair of movably mounted clamps for closing in gripping relation to a contact inserted therebetween and which are normally biassed to open position wherein they are spaced one from another, an actuating device for moving said clamps toward one another, which device is constructed and arranged for continued motion to a self-maintaining position if the clamps engage a contact between the same but is free to relapse if nothing is between the clamps.

16. In combination with a pair of movably mounted clamps for closing in gripping relation to a contact inserted therebetween and normally biassed to open position, means for moving said clamps to a position wherein they would engage the contact if present and from which position they would recede if the actuating force were removed, such means responding to the mechanical resistance of such contact if present to permit the means additionally to move under said force to a self-maintaining position.

ROBERT H. PARK.