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W. E. PALMER

2,231,218

SWITCH

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Fig. 1

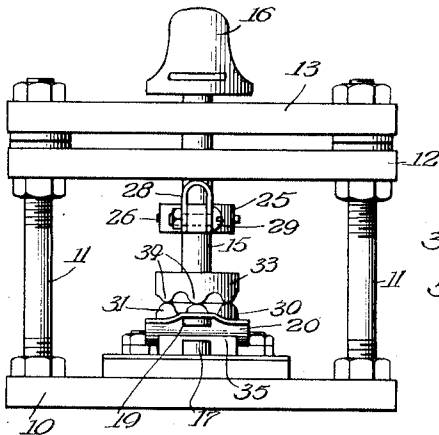


Fig. 2

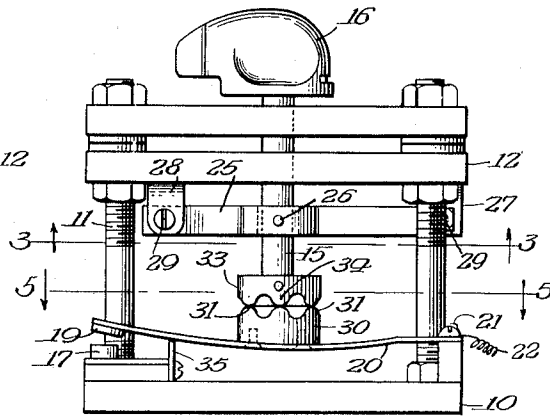


Fig. 3

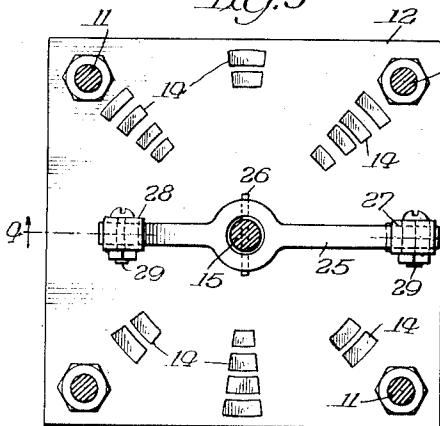


Fig. 5

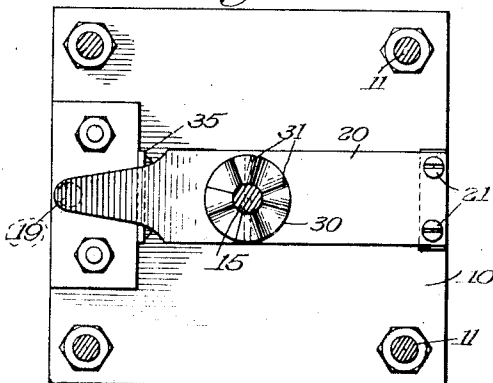


Fig. 4

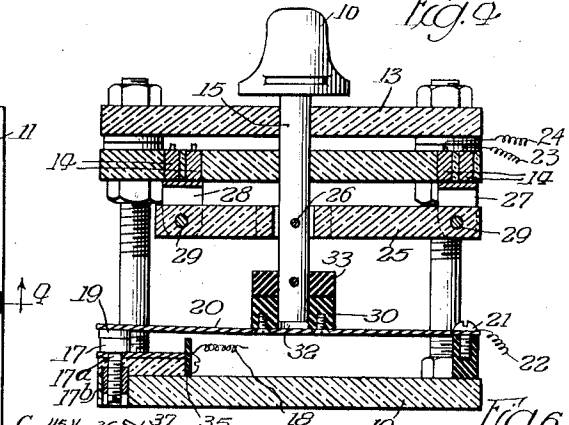
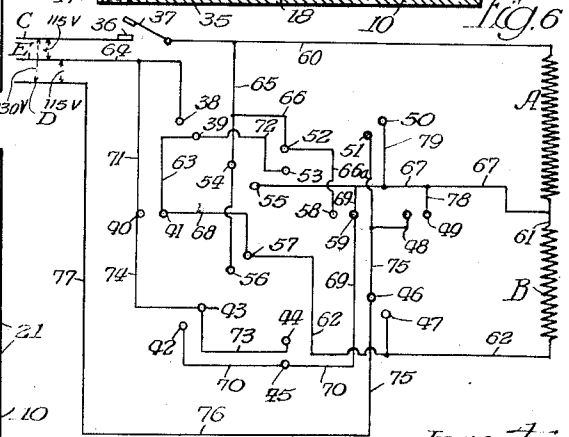


Fig. 6



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2,231,218

SWITCH

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5 Claims. (Cl. 200—7)

This invention relates to improvements in switch devices for controlling electric circuits, particularly adapted, though not necessarily limited in use for controlling the operation of electric heating appliances, such for example as heating units of electric stoves, and one of the objects of the invention is to provide an improved switch of this character for selectively controlling several circuits.

Heretofore it has been customary in switches of this general character to provide individual make and break devices embodying a plurality of relatively expensive contact points for the respective circuits, and since it is necessary to make the closing of the circuits positive by means of individual spring pressure it is also necessary to provide a number of relatively expensive springs for that purpose.

In order to overcome these difficulties and objections it is another object of the present invention to provide an improved switch in which a plurality of circuits may be selectively controlled by a common make and break device, and in which switch the number of contact points and springs are materially reduced, and to a minimum.

A further object is to provide an improved switch device of this character in which a single spring is employed to create the necessary pressure at the various contact points, and which spring will also serve the purpose of assisting in completing the movement of the switch device after the operator has started to move the same.

A further object is to provide in an improved switch of this character means whereby all of the connections except the necessary one to complete a predetermined circuit will be made while the switch handle or button is being turned to a predetermined position, the final connection or completion of the circuit being made by the make and break device as it is being forced into its final position with respect to the circuit contacts.

The switch also operates that in turning off or interrupting the circuit, this final connection will be broken or opened first, and is followed by interruption of the other connections, and as the said final connection will be the only one carrying current while it is being opened and closed, it is the only one where contacts must be constructed of any special material, thereby materially reducing the cost of manufacture.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the fea-

tures of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawing illustrating this invention, and in which—

Figure 1 is a left hand end elevation of Figure 2 of a switch of this character constructed in accordance with the principles of this invention.

Figure 2 is a view in elevation taken from the right hand side of Figure 1.

Figure 3 is a horizontal sectional view taken on line 3—3 Figure 2, looking in the direction of the arrows.

Figure 4 is a vertical sectional view taken on line 4—4 Figure 3.

Figure 5 is a horizontal sectional view taken on line 5—5 Figure 2.

Figure 6 is a wiring diagram.

Referring more particularly to the drawing, the numeral 10 designates a supporting base projecting above which are uprights 11 constructed of any suitable material and these uprights support a contact bearing member 12 and if desired, an upper member 13 may also be supported by the uprights in close proximity to the member 12.

These members 12 and 13 may be formed of any suitable material either separately or may be formed as an integral structure.

The member 12 carries a plurality of series of contacts designated generally by the reference numeral 14 arranged in any suitable manner in the member 13 to project therethrough, and also extending through the member 12 is a shaft 15 to which an operating handle 16 is connected and by means of which handle the shaft 15 may be rotated.

Supported by the base 10 is a contact or terminal 17 which may be held in position by means of a screw 17—A passing through a bushing 17—B in the base 10. This terminal is connected or included in one side of a circuit 18, and co-operating with this contact is another contact 19 supported by a spring arm or member 20 which is anchored at one end, as at 21. To this spring contact 20 is connected one side of a supply line 22. The other side 23 of the supply line is connected with one of the sets of contacts 14, and the contacts 14 are connected to the other side of the line circuit 18.

The line 24 constitutes the other side of the line 18.

A breaker member 25 is pivotally supported intermediate its ends as at 26 by the shaft 15, and carried by the respective ends of the breaker

member 25 are contacts 27—28 pivotally supported by the breaker member, as at 29, so as to permit the contacts 27 to rock with respect to the breaker member and thereby insure a proper positioning of these elements 27—28 with relation to the respective contacts 14 to insure a good connection.

The contacts 14 are preferably arranged in pairs and the contact members 27—28 are adapted to stand astride of the contacts of each pair, as the breaker member 25 is rotated by the shaft 15.

Carried by the spring or breaker member 20 is an element 30 secured in position in any suitable manner and the upper face thereof is undulated, as at 31, the element 30 being preferably provided with an opening 32 therein to receive the end of the shaft 15.

A member 33 is also secured to the shaft 15 for rotation therewith and the lower face of this member 33 is undulated, as at 34. The undulated faces of the members 30 and 33 are disposed in proximity to each other so that when the shaft 15 is rotated the undulated surfaces 31 and 34 of the respective members 30 and 33 will cause the members 30 and 33 to be separated temporarily and during such separation, the spring contact or breaker member 20 will be flexed causing a portion thereof to be moved into engagement with a fulcrum 35 that is supported by the base 10 and disposed in proximity to the contact 17.

Normally the contact or breaker member 20, when the contacts 17 and 19 are closed or in engagement with each other, will be out of engagement with the fulcrum 35 but when the shaft 15 is rotated to cause the parts to assume the position shown in Figure 2 a portion of the breaker member 20 will be moved into engagement with and will be moved about the fulcrum 35 to cause the contact members 17 and 19 to be separated.

The normal tendency of the spring contact 20 is to move the breaker member 25 toward the contact supporting member 12 to force the contacts 27—28 into engagement with the respective contacts or terminals 14 and hold them in engagement under spring pressure.

When the shaft 15 is first rotated or in the position shown in Figure 4 the undulated surfaces 31 and 34 of the elements 30 and 33 will be caused to move in the position shown in Figure 2 and the contact 19 will be moved out of engagement with the contact 17. The parts will remain in this position during a portion of the rotation of the shaft 15 or until the parts assume the position shown in Figure 2.

Upon further rotation of the shaft 15 in the same direction the spring breaker member 20 will assist in turning the shaft 15 and in properly positioning the breaker member 25 by reason of the fact that the resiliency of the breaker member 20 forcing the inclined portions of the undulated surfaces together thereby assisting in rotating the shaft 15. This movement will be in the nature of a "snap" movement.

As soon as the members 30 and 33 assume the position shown in Figure 4 the breaker member 20 will move out of contact with the fulcrum 35.

This movement of the breaker member 20 out of engagement with the fulcrum 35 and the movement of the contact 19 in engagement with the contact 17 will not be effected until after the breaker member 25 has assumed a predeter-

mined position to complete the respective circuits through the contacts 14.

The breaker member 20 will not be moved into engagement with the fulcrum 35 upon rotation of the shaft 15 until after the contacts 27—28 have broken or interrupted the circuit through the contacts 14.

It will therefore be manifest that there will be no arcing at the contacts 14 as the final connection will be made by the contacts 19 and 17 and these contacts will be the only contacts carrying a current while the breaker member 25 is being positioned to complete or interrupt the predetermined circuits through the contacts 14.

The elements 30 and 33 as well as the fulcrum 35 may be constructed of any suitable insulating material and the breaker member 25 may also be constructed of any suitable insulating material.

Obviously any suitable indicating means (not shown) may be provided to co-operate with the handle 16 to indicate the position of the breaker member 25 and the circuits through the contacts 14 which are to be completed.

With this improved construction it will be manifest that the breaker member 20 serves two functions, one of which is to complete the main circuit to supply current to the device, and the other is as a spring for holding the contacts 27—28 against the contacts 14 under spring pressure, and also to assist in rotating the breaker member 25, as well as to hold the contacts 19 and 17 in engagement.

The wiring diagram illustrates the method of using one form of the switch to control a heating unit embodying two resistances A and B, so that the unit will produce heat at different rates. The different rates of heat are obtained by impressing potentials of either 115 volts or 230 volts from the power supply lines across either one of the resistances, both of the resistances in series, or both of the resistances in parallel.

For example, if the resistance of the element A is 39.92 ohms, and the resistance of the element B is 78.43 ohms, the unit will produce heat at the rate of 112 watts.

It is well understood that electric power for heating purposes is generally supplied over three wires or lines, two of which (C and D in the diagram) are at a relative difference of 230 volts with respect to each other, and each of which is at a relative difference of potentials of 115 volts with respect to the third wire E in the diagram.

The pairs of contacts 14 are respectively indicated in the wiring diagram by the numerals 38—39, 40—41, 42—43, 44—45, 46—47, 48—49, 50—51, 52—53, 54—55, 56—57 and 58—59.

To impress a potential of 115 volts across the resistances A and B in series at a rate of 112 watts, the contacts 36—37 as well as the contacts 38—39 are closed.

The closed circuit may then be traced from the line C through the contacts 36—37, through conductor 60, through the heating element A, conductor 61, through the heating element B, conductor 62, through the contact 57, conductor 68, through the contact 41, conductor 63, contact 39, contact 38, conductor 64 back to the line E.

Other examples of the use of the switch are as follows: To impress a potential of 115 volts on the element B at a rate of 169 watts, contacts 40 and 41 are closed and also contacts 58 and 59 as well as the contacts 36—37.

The circuit when the parts are in this position may be traced from the line C through the contacts 36—37, conductor 60, conductor 65, conductor 66, contact 52, conductor 66—A, contact 58, contact 59, conductor 67, conductor 61, through the element B, to conductor 62, contact 57, conductor 68, contact 41, contact 40, conductor 71, conductor 64 and back to the line E.

To impress 115 volts on the element A at the rate of 331 watts, contacts 36—37 and contacts 42—43 are closed.

The circuit may then be traced as follows: from the line C, contacts 36—37, conductor 60, element A, conductor 67, conductor 69, through contact 45, conductor 70, contact 42, contact 43, conductor 74, contact 40, conductor 71, conductor 64, back to the line E.

To impress a potential of 115 volts on the elements A and B in parallel at the rate of 500 watts, contacts 36—37, 44—45 and 52—53 are closed.

The circuit may then be traced from the line C through the contacts 36—37, line 60, element A, conductor 67, conductor 69, conductor 70, contact 45, contact 44, conductor 73, contact 43, conductor 74, contact 40, conductor 71, conductor 64 back to the line E.

With the elements A and B in parallel the circuit may also be traced from the line C, contacts 36—37, conductor 60, conductor 65, conductor 66, contact 52, contact 53, conductor 72, contact 39, conductor 63, contact 41, conductor 68, contact 57, conductor 62, through the element B, conductor 61, to the conductor 67, through conductor 69, to conductor 70, contact 45, contact 44, conductor 73, contact 43, conductor 74, contact 40, conductor 71, conductor 64, back to the line E.

To impress a potential of 230 volts on the element B at the rate of 675 watts the contacts 36—37, 46—47 and 54—55 are closed.

The circuit may then be traced from the line C, contacts 36—37, conductor 60, conductor 65, contact 54, contact 55, conductor 67, conductor 61, through the element B, conductor 62, contact 47, contact 46, conductor 75, conductor 76, conductor 77, to line D.

To impress a potential of 230 volts on the element A at a rate of 1325 watts, the contacts 36—37, and 48—49 are closed.

The circuit may then be traced from the line C, contacts 36—37, conductor 60, element A, conductor 67, conductor 78, contact 49, contact 48, conductor 75, through contact 46, conductor 76, conductor 77, back to the line D.

To impress a potential of 230 volts on the elements A and B in parallel at the rate of 2,000 watts, the contacts 36—37, 50—51 and 56—57 are closed.

The circuits may then be traced from the line C, contacts 36—37, conductor 60, element A, conductor 67, conductor 79, contact 50, contact 51, conductor 75, conductor 76, conductor 77 back to the line D; and in parallel from the line C through the contacts 36—37, conductor 60, conductor 65, contacts 56, contact 57, conductor 62, through the element B, conductor 61, conductor 67, conductor 79, contact 50, contact 51, conductor 75, conductor 76, conductor 77, back to the line D.

It will therefore be manifest from the circuits which have been thus traced, the switch may be set to any predetermined position so as to impress a voltage upon either of the elements A and B separately; in parallel; or in series, and that

in each instance the breaker member 25 will be set with respect to the predetermined contacts (generally referred to as the contacts 14) before the contacts 17 and 19 are brought together to complete the circuit.

Similarly before the breaker member 25 is moved to interrupt the circuit through the respective pairs of contacts 14, the contacts 17 and 19 will be separated to interrupt the main line supply.

It will also be manifest that with this improved construction only one spring is employed and this spring serves several functions, that is, as one of the breaker members, and also as a means for not only assisting in positioning the breaker member 25 after the operator has started to move the latter, but also serves the function of exerting the necessary spring pressure upon the breaker member 25 and the contacts 28—29 carried thereby to insure the proper spring pressure to hold them against the respective pairs of contacts 14.

While the preferred form of the invention has been herein shown and described, it is to be understood that various changes may be made in the details of construction, and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:

1. A switch device embodying a flexible breaker member for a main supply circuit having inherent resiliency, a plurality of contact terminals separate from said circuit for a plurality of circuits to be controlled, a breaker member for connecting terminals of predetermined circuits, means embodying a shaft for selectively positioning the last said breaker member with respect to said contact terminals, means connecting the last said breaker member to the shaft for pivotal movement with respect thereto on an axis transverse to the axis of the shaft, contact members adapted to engage said terminals, means mounting the contact members upon the last said breaker member for pivotal movement with respect thereto, and means connected with said shaft and operating to flex the first said breaker member to interrupt the main circuit, the said breaker member also supplying pressure to the contact members against their terminals.

2. A switch device embodying a flexible breaker member for a main supply circuit, a plurality of contact terminals separate from said circuit for a plurality of circuits to be controlled, a breaker member for connecting terminals of predetermined circuits, means embodying a shaft for selectively positioning the last said breaker member with respect to said contact terminals, means connecting the last said breaker member to the shaft for pivotal movement with respect thereto on an axis transverse to the axis of the shaft, contact members adapted to engage said terminals, means mounting the contact members upon the last said breaker member for pivotal movement with respect thereto, a fixed fulcrum engaged by a portion of the first recited breaker member, and means connected with said shaft and operating upon the first recited breaker member to flex and cause the latter to move about said fulcrum to interrupt the main supply circuit and to supply pressure at all times to said contact members against their terminals.

3. A switch embodying a resilient breaker member for a main line, a fulcrum to be engaged by said member intermediate the ends of the lat-

ter, a selector breaker member, a cam device connected with said selector breaker member, operable upon said resilient breaker member, and co-operating with said fulcrum to cause the last said breaker member to move upon and about the fulcrum in opening and closing the main line circuit, and means mounting the selector breaker member for pivotal movement in a plane transverse to the plane of its selective positioning movement, the said resilient breaker member also operating to supply pressure at all times to the selector member against its contact terminals.

4. A switch embodying a plurality of pairs of contact terminals to be included in a plurality of circuits to be controlled, a breaker member for connecting terminals of predetermined circuits, a shaft to which said breaker member is pivotally mounted intermediate the ends of the latter, means for rotating the shaft to selectively position said breaker member with respect to said terminals, a resilient breaker member for a main line, and co-operating formations on said shaft and the last recited breaker member, whereby upon rotation of said shaft the main line circuit will be opened in advance of the opening of the respective said circuits to be controlled, and will also be closed subsequent to the closing of the respective said circuits to be controlled, said resilient

breaker member also operating to supply pressure at all times to the first said breaker member against its contacts.

5. A switch embodying a plurality of pairs of contact terminals to be included in a plurality of circuits to be controlled, a breaker member for connecting terminals of predetermined circuits, a shaft to which said breaker member is pivotally mounted intermediate the ends of the latter, means for rotating the shaft to selectively position said breaker member with respect to said terminals, a resilient breaker member for a main line, a fulcrum to be engaged by the last recited breaker intermediate the ends of the latter, and co-operating formations on said shaft and the last recited breaker member whereby upon rotation of said shaft the last said breaker member will be placed under tension and be caused to moved upon and about said fulcrum to open the main line circuit in advance of the closing of the respective circuit to be controlled, and to close the main line circuit subsequent to the closing of the respective said controlled circuit, said resilient breaker member also operating to supply pressure at all times to the said breaker member and against its contacts.

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