June 5, 1934. L. REICHOLD 1,962,033

ELECTROMAGNETIC CIRCUIT CLOSER

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Fig. 1.

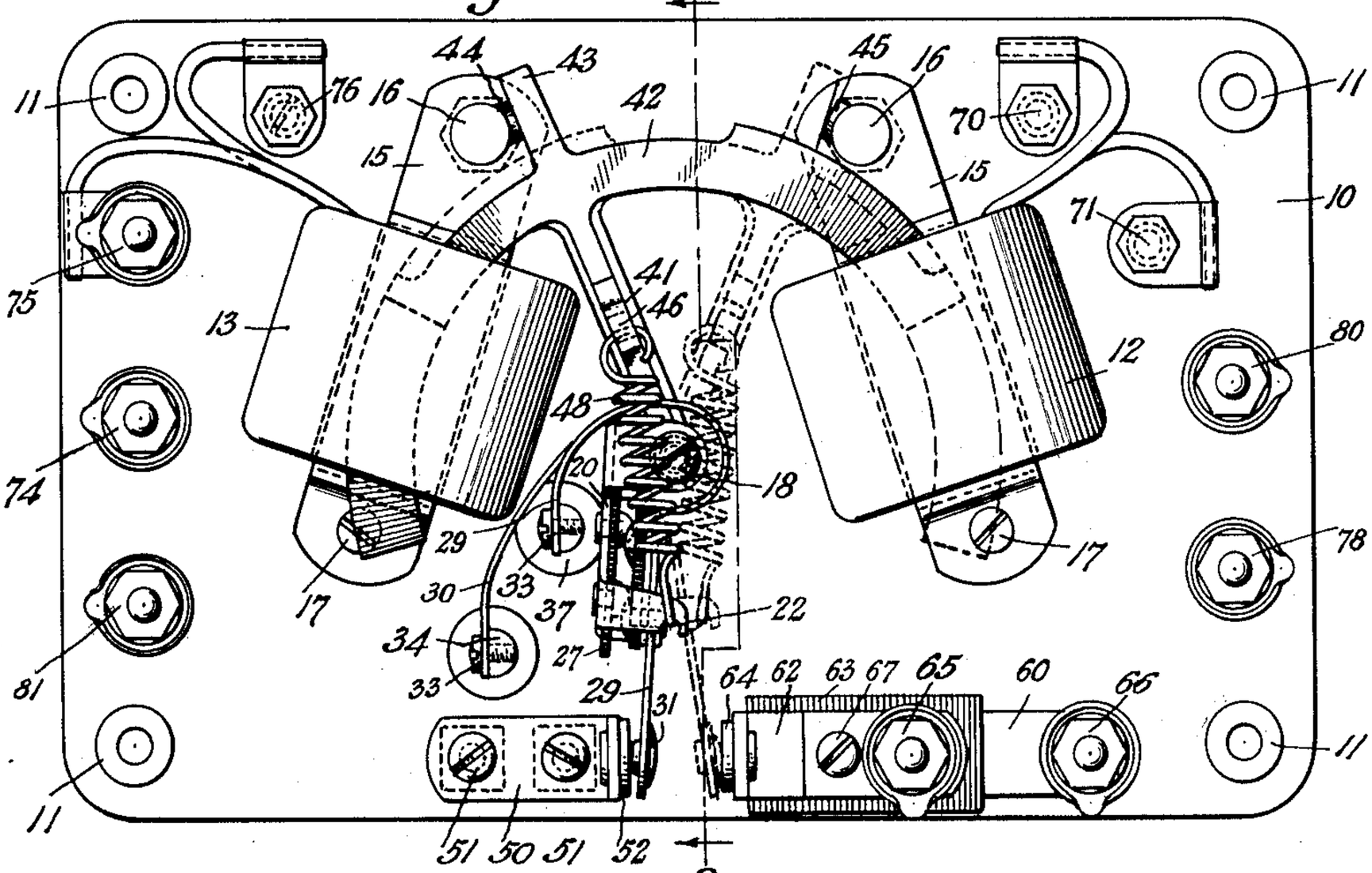

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Fig. 2.

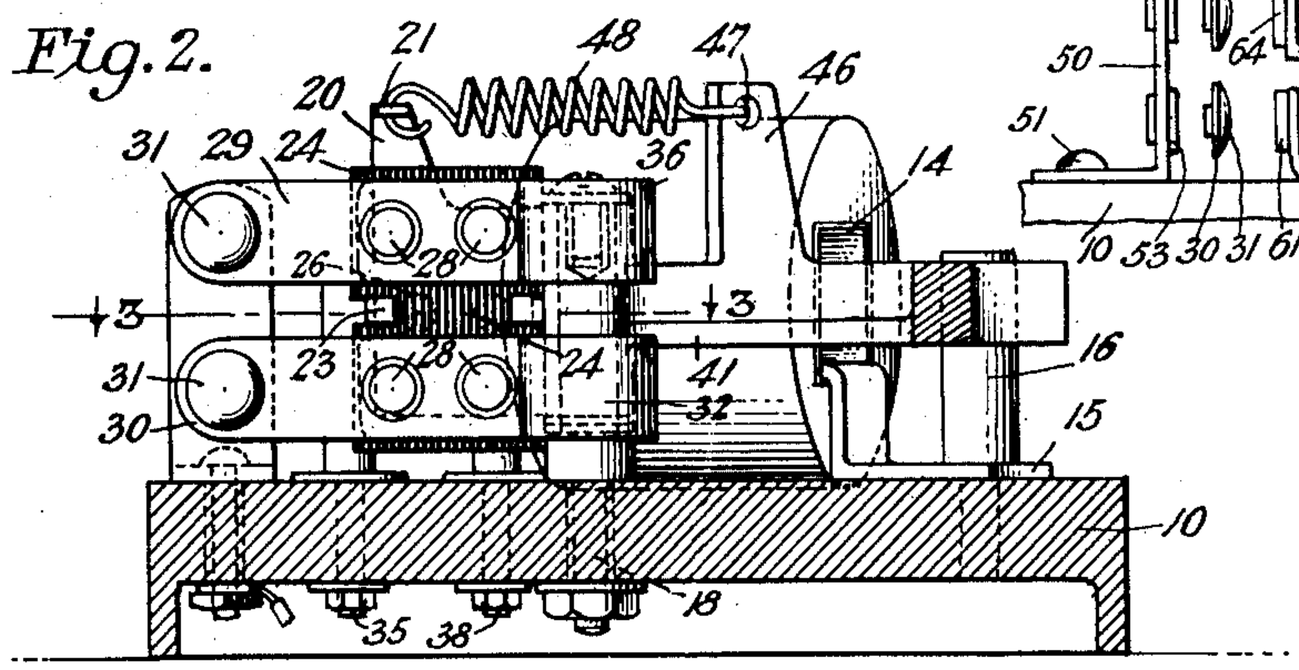


Fig. 2a.

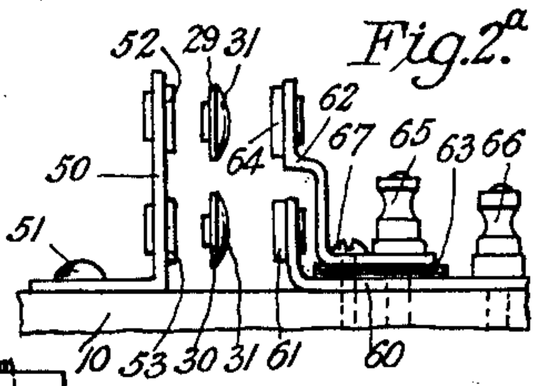


Fig. 3.

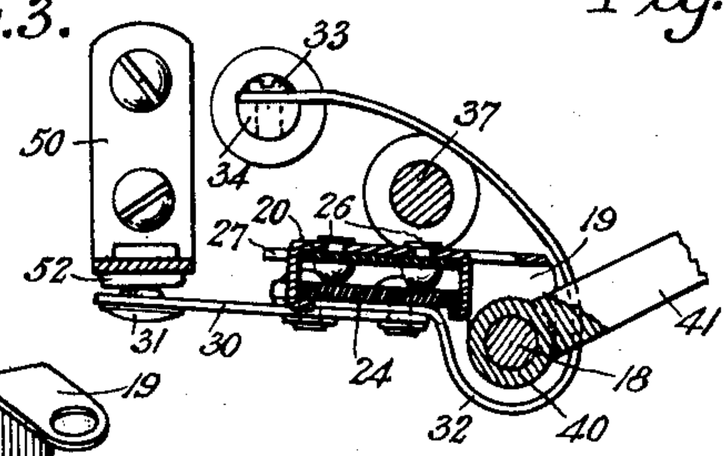


Fig. 4.

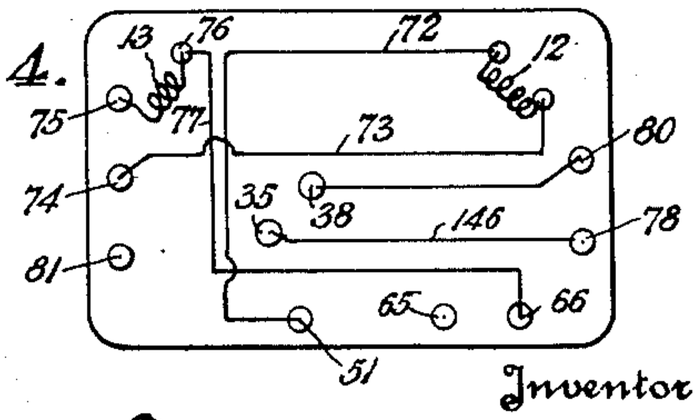
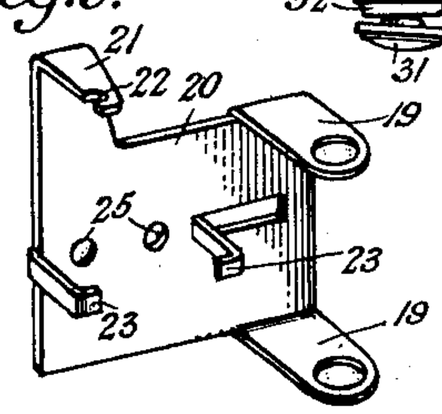


Fig. 5.



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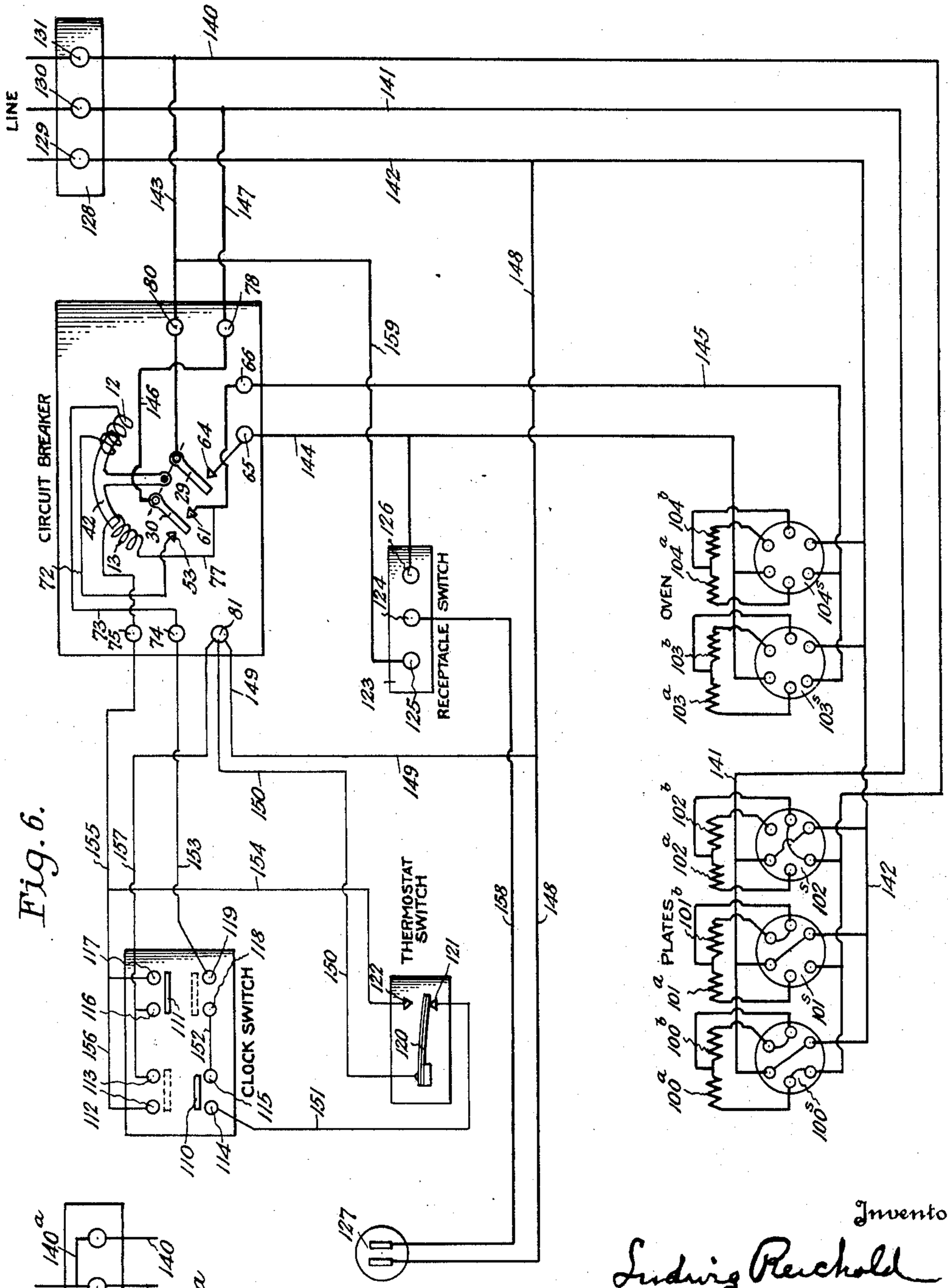

Fig. 6.

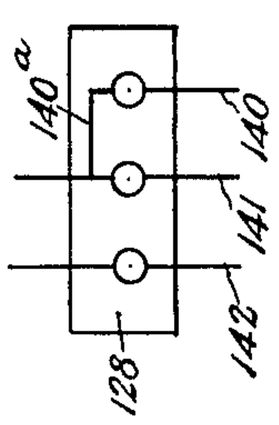

Fig. 6.a

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UNITED STATES PATENT OFFICE

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ELECTROMAGNETIC CIRCUIT CLOSER

Ludwig Reichold, Winsted, Conn., assignor to The Fitzgerald Manufacturing Company, Torrington, Conn., a corporation of Connecticut

Application January 5, 1931, Serial No. 506,770

2 Claims. (Cl. 200—101)

This invention relates to improvements in electric ranges, and more particularly concerns means for controlling the supply of current to the heater plates and auxiliary devices.

One object of the invention is to provide an electric range having a timing clock for controlling the energization of the heating units thereof, and means whereby this same timing clock may be employed for controlling the energization of an auxiliary device.

Another feature of the invention is the provision of an electric range having a timing and thermostatic control of the oven elements thereof, together with means whereby the timing control may be employed with an auxiliary electric device even though the oven elements are not in operation.

A further feature of the invention is the provision in an electric range of a circuit breaker which is controlled by a timing clock and a thermostat, and which may be employed in conjunction with the oven heating elements, and also with auxiliary electrical apparatus.

Other features of the invention appear in the course of the following specification and drawings.

An illustrative form of construction of the device according to the present invention is set forth on the accompanying drawings, in which:

Fig. 1 is a plan view of an electro-magnetic circuit breaker according to the invention.

Fig. 2 is a transverse sectional view of the same, substantially on line 2—2 of Fig. 1.

Fig. 2[a] is a detailed elevation of the contact structure of the same.

Fig. 3 is a horizontal sectional view of a portion of the contact structure, substantially on line 3—3 of Fig. 2.

Fig. 4 is a wiring diagram of the circuit breaker parts.

Fig. 5 is a perspective view of the rocker plate which supports the movable contact structure.

Fig. 6 is a circuit diagram of the connections of the device.

Fig. 6[a] is a fragmentary view showing the modified form of connecting the power main wires to a network having two conductors only.

In these drawings, the circuit breaker is shown as comprising an insulating base block 10 having bushings 11 at its corners, by which it may be fastened to the frame work of the entire device. The electro-magnetic operating coils 12, 13 are preferably wound on square tubes 14 (Fig. 2) which provide an air core for the respective electro-magnets. The clamping plates 15 are of stirrup shape and pass through the core tubes 14 and are secured at their ends by the posts 16 and the screws 17 which engage the base plate 10.

A vertical central pivot 18 is likewise mounted in the base member 10 and passes through the horizontally bent ears 19 (Fig. 5) of a contact supporting plate 20, which has a horizontally bent upper projection 21, with a notch 22 therein, and the lugs 23 for clamping and supporting an insulating sheet 24.

The supporting member 20 also has openings 25 to receive the rivets 26, which hold a stiffening plate 27 in position. Mounted on the insulating sheet 25 by pairs of rivets 28, are upper and lower contact blades 29, 30, having the contact points 31 thereon, these contact blades being held apart in insulated relation to one another by the sheet 24. Located between the contact blade 30 and the sheet 24 is the straight end of a pig-tail connection 32 of thin flexible sheet metal which is curved around the vertical pivot post 18 so that it is free of contact therewith, and having its other end connected by a screw 33 to the post 34 which has a conductive screw 35 extending through the base plate 10 and holding it in position. Similarly, the end of a curved pig-tail connection 36 is secured between the contact blade 29 and the plate 24 and extends around the pivot 18 and is held by a screw 33 to the post 37 which likewise has a conductive screw support 38 passing through the base plate 10.

A rocker is mounted on the vertical post 18 between the inturned ears 19 of the plates 20 and comprises a sleeve 40 surrounding the post 18 and having a radially extending arm 41 provided with the arcuately positioned arms 42 (Fig. 1) which may rock into and out of positions in the air cores of the electro-magnets 12, 13, as shown by full and dotted lines in Fig. 1. The end 43 of the radial arm 41 is adapted to engage the stop lugs 44, 45 of the columns 16. Upstanding from the radial arm 41 is a bracket 46, having an aperture 47 therein. The toggle spring 48 is connected at its ends in the aperture 47 and in the notch 22 of the plate 20.

On the base plate 10 is secured an L-shaped fixed contact 50, by screws 51, which on its vertical portion has an upper fiber member 52 and a lower conductive contact 53, the members 52 and 53 being located opposite the contact points 31 of the contact arms 29, 30.

The base plate 10 also has an L-shaped fixed contact member 60 with a contact point 61 on its vertical end. A further fixed contact support 62 has a horizontal portion which is parallel to

the horizontal portion of the L-shaped fixed contact 60 and is spaced therefrom by an insulating member 63. This L-shaped member 62 also has a vertical portion substantially aligned above the vertical portion of the fixed contact 60 and provided with a contact point 64. The contact points 61 and 64 are likewise located opposite the movable contact points 31. The binding posts 65, 66, pass through the fixed contact supports 60, 62 and the insulation 63 to hold these parts in position, in conjunction with a securing screw 67.

The circuit breaker thus described is wired so that the terminals of the electro-magnetic coil 12 pass to contact posts 70, 71, which are connected within the base plate 10, by a conductor 72 which passes to one of the securing screws 51, and by a conductor 73 to a binding post 74. The terminals of the electro-magnetic coil 13 are connected respectively to the binding post 75 and to a terminal post 76 from which a conductor 77 leads to the binding post 66 and thus to the fixed contact 61. The conductive supporting screw 35 of the post 34 is connected by a conductor 77, to a binding post 78, while the conductor screw 33 of the post 37 is connected by a conductor 79 to a binding post 80.

The binding post 81 has no electrical connection within the circuit breaker in the form illustrated.

In the circuit diagram of Fig. 6, there is shown an electric range having the three oven heating units 100^a—100^b, 101^a—101^b, 102^a—102^b, on the top, commonly known as "top plate units": and the heating units 103^a—103^b, 104^a—104^b in the oven. Each of these units is divided as shown, and is connected to a control switch 100^s, 101^s, 102^s, 103^s, 104^s, of a suitable type for connecting the units in proper relationship to the electric means whereby the heating of the respective plates may be controlled as desired. Thus, in the figures, the switch 100^s is shown in position to connect the heating units for the highest temperature: the switch 101^s for a medium temperature, and the switch 102^s for a low temperature.

A timing clock of any desired type is provided, which operates the "on" contact 110 to close a timing circuit and the "off" contact 111 to open a timing circuit as will be described more in detail hereinafter. Since the construction of such a timing switch is not a part of the present invention, no detailed showing of the mechanism is set forth. The "on" switch contact 110 selectively engages the contacts 112, 113 or the contacts 114, 115, to connect the same together. Similarly, the "off" contact member 111, selectively connects the fixed contacts 116, 117 or the fixed contacts 118, 119.

A thermostat switch comprising in the conventional showing a bimetallic bar 120, is adapted selectively to engage the contact 121 when the thermostat has been heated.

A single pole receptacle switch 123 has the central terminal 124 and the end terminals 125, 126.

A plug-in receptacle 127 of suitable type is provided on the range.

In operation, the range is connected to a terminal block 128 having the connections 129, 130, 131, to the three wires of a 220 volt supply system. The conductor 140 leads from the connection 131 to the contacts of the switches 100^s, 101^s and 102^s for the top plates. The conductors 141 and 142 likewise lead directly to the contacts of these same switches. A conductor 143 extends from conductor 140 to the binding post 80 and thence to the upper moving contact blade 29, as conventionally shown in Fig. 6, so that in one position of the toggle switch, a current may flow to the fixed contact 64, binding post 65, by conductor 144 to the switches 103^s, 104^s, through the heating plates of the oven, and back by the conductor 142 to the line, and from fixed contact 61, by binding post 66, and conductor 145; so that all three conductors 140, 141, 142 are connected to the heating plate switches.

In the opposite position of the circuit breaker parts, a circuit is established from conductor 142 by conductor 148, conductor 149, binding post 81, conductor 150, the thermostat blade 122, contact 121 (when the temperature of the oven is below a pre-determined maximum), conductor 151 to contact 114, through the "on" contact member 110, contact 115, conductor 152, contact 118, through the "off" switch member 111, (when in the lower position), contact 119, conductor 153, binding post 74, conductor 73, electro-magnetic coil 12, conductor 72, coil 12, fixed contact 53, movable contact blade 30, conductor 146, binding post 78, conductor 147, back to the main conductor 141, whereby the coil 12 is energized and the sector arm 42 is moved in a clockwise direction in the figures, until ultimately, the toggle spring 43 operates to move the contact blades 29, 30, quickly from the full line position in Fig. 1, into the dotted line position of that figure.

If the contacts are in the dotted line position of Fig. 1 and the thermostat switch is moved by the action of a maximum pre-determined heat in the oven until it engages the thermostat contact 122, then a circuit is closed which passes from conductor 142 by conductors 148, 149, 150 to the thermostat blade 120, contact 122, conductor 154, conductor 155, binding post 75, electro-magnetic coil 13, conductor 77, fixed contact 61, movable switch blade 30, conductors 146 and 147, back to the main conductor 141. The coil 13 is thus energized and the rocking sector 42 is moved in a counter-clockwise direction in the figures until the toggle spring 48 again operates to snap the contact blades 29, 30 from the position shown in dotted lines to the position shown in full lines. This opens the circuit extended by conductors 144, 145 to the oven switches and units, and deenergizes these oven units so that the oven tends to cool.

The contacts 112 and 117 of the clock switch are connected by a conductor 156 and the conductor 155 to the binding post 75. Similarly, the contacts 113 and 116 are connected by conductor 157 to the binding post 81 and thus to the conductors 149, 150.

It will be understood that the contact member 110 is normally constructed for closing at a predetermined time as the result of the operation of the clock movement, its closed position being the lower position as indicated. The contact member 111 is constructed so that it will operate quickly to instantaneously break the time controlling circuit by moving from the dotted lower position in Fig. 6, into the full line upper position. When both contacts 110 and 111 are in the lower position, the circuit is closed from conductors 151 to conductor 153 as described above, but when one or the other, or both of the contact members 110, 111 are in the upper position in Fig. 6, this circuit is opened, and the conductors 155 and 157 are connected directly together. Current thus may flow from conductor 142 by conductors 148, 149, 147, to conductor 155 and thus to binding

post 75, electro-magnetic coils 13, conductor 77, fixed contact 61, movable contact blade 30, conductors 146 and 147, back to the main conductor 141: whereby the circuit breaker is moved into the open position and the oven is disconnected from the circuit, as for example, at the end of the prescribed time.

It will be noted that the receptacle 127 is connected by conductor 148 to the main line conductor 142 and by a conductor 158 to the central terminal of the receptacle switch 124. If the switch is thrown to the left hand position, the receptacle 127 is then connected by the conductors 157, 159 to the main conductor 140. If the receptacle switch is thrown to the right hand position, a circuit is established from the main conductor 142 by conductor 148 to the receptacle 147, with a return by the conductor 158 to the central terminal 124 through the switch blade to the terminal 126, by conductor 144 to binding post 65, thence to the fixed contact 64, and by the movable switch blade 29 and conductor 142 back to the main conductor 140. The time clock, therefore, by the successive energization of the electro-magnetic coils 12 and 13 of the circuit breaker will at the prescribed times, first close the circuit through the receptacle and then open it again. Thus, the single time clock on the range serves to control the times of heating and disconnection of the oven, and also the times of connection and disconnection through the receptacle. Further, the receptacle may be operated directly from the mains without any control by the clock: or the clock circuits may be so connected that both the receptacle and the oven heating elements may be controlled by the same circuit breaker.

It is obvious that the invention is not limited to the form of construction shown, but that it may be employed in many ways within the scope of the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a circuit closer, a frame, a pair of electro-magnet coils, stirrups for mounting said coils on said frame, securing means for holding said stirrups to said frame including an upstanding post for each of said stirrups, a pivot mounting on said frame, an oscillatable armature journaled on said pivot mounting and including a sector adapted to be selectively attracted by said electro-magnet coils when energized whereby to rock said core on said pivot mounting, and a stop carried by said armature and adapted to engage selectively one of said posts whereby to limit the rocking movement of said armature.

2. In a circuit closer, a frame, a pair of electro-magnet coils, stirrups for mounting said coils on said frame, securing means for holding said stirrups to said frame including an upstanding post for each of said stirrups, a pivot mounting on said frame, an oscillatable armature journaled on said pivot mounting and including a sector adapted to be selectively attracted by electro-magnets when energized whereby to rock said core on said mounting, and a stop carried by said armature and adapted to engage selectively one of said posts whereby to limit the rocking movement of said armature, a switch blade support journaled on said pivot mounting and a toggle spring connecting said switch support to said armature, a switch blade insulatedly mounted on said switch support and a fixed contact on said frame for engagement by said switch blade.

LUDWIG REICHOLD.