

Nov. 8, 1932.

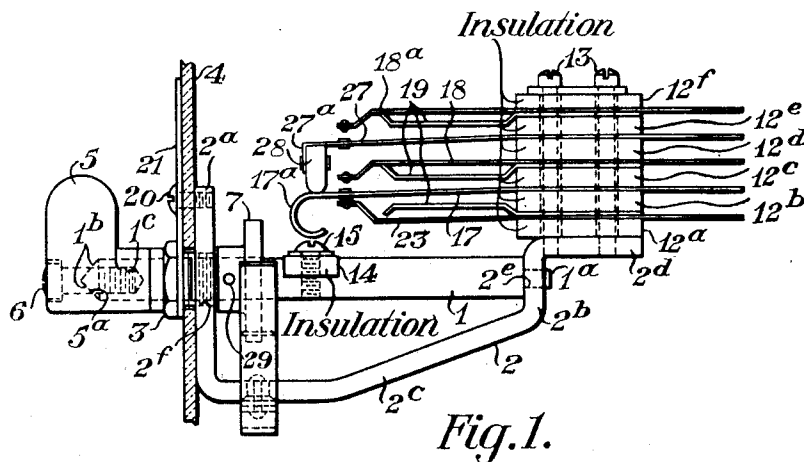
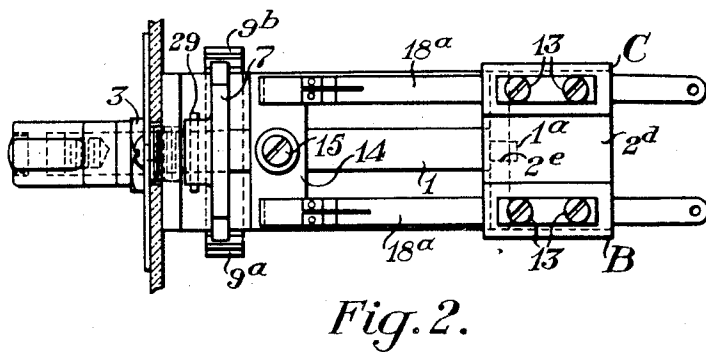
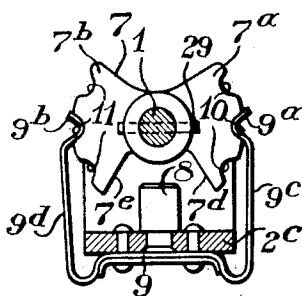
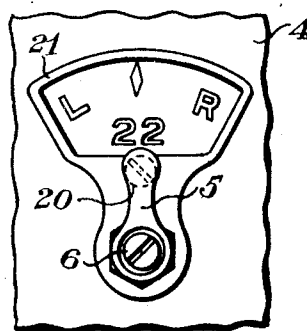
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1,887,273

CIRCUIT CONTROLLER

Filed Aug. 15, 1930

2 Sheets-Sheet 1



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CIRCUIT CONTROLLER

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2 Sheets-Sheet 2

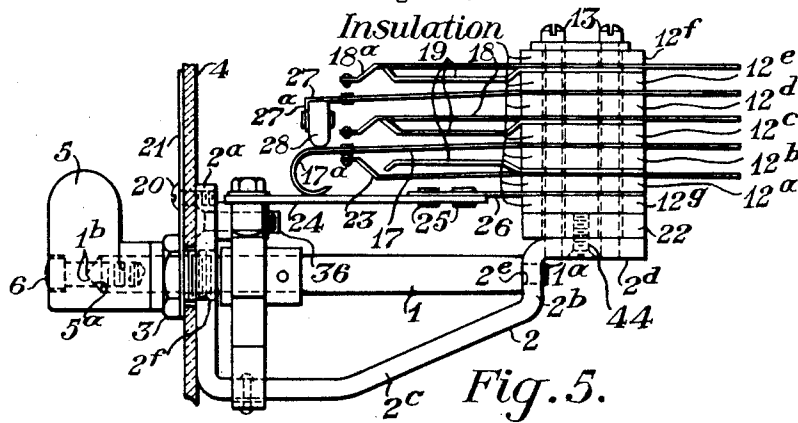
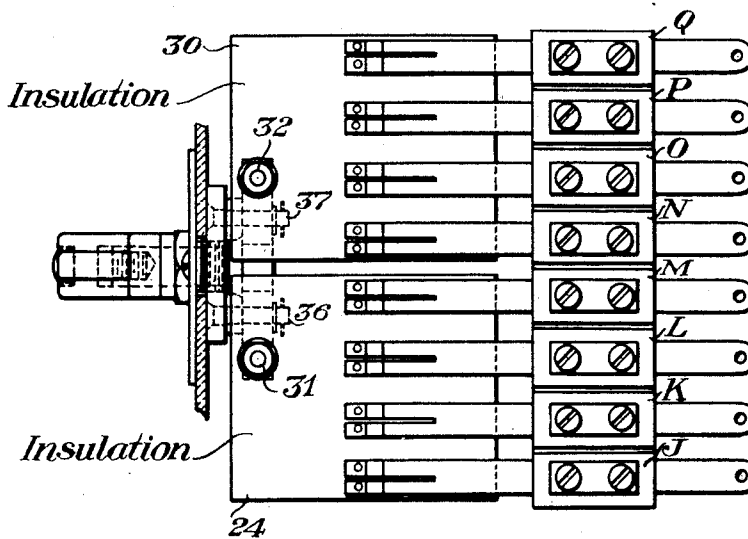
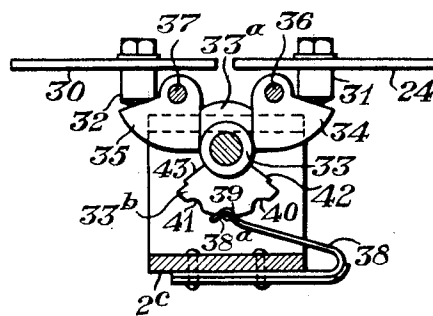


Fig. 7.

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CIRCUIT CONTROLLER

Application filed August 15, 1930. Serial No. 475,440.

My invention relates to circuit controllers, and particularly to circuit controllers adapted for assembly on a control panel as one of a compact group of similar units for controlling railway switches and signals or other apparatus.

One object of my invention is to provide a circuit controller of the type described having a comparatively large number of contacts, yet maintaining a compact, accessible and reliable type of construction.

Another object of my invention is to provide a circuit controller of the type described in which a single design of structure may be readily adapted to a large variety of contact combinations by the employment of a minimum number of variable elements.

I will describe two forms of circuit controllers embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawings, Fig. 1 is a view showing in side elevation one form of circuit controller embodying my invention. Fig. 2 is a top plan view of the circuit controller shown in Fig. 1. Fig. 3 is a detail view of the latching mechanism for the circuit controller shown in Figs. 1 and 2. Fig. 4 is a view of a portion of the circuit controller illustrated in Figs. 1 and 2 as it appears when viewed from the left in Fig. 1. Fig. 5 is a view showing in side elevation a modified form of the circuit controller illustrated in Figs. 1 and 2, and also embodying my invention. Fig. 6 is a top plan view of the circuit controller shown in Fig. 5. Fig. 7 is a detail view showing the contact operating mechanism for the circuit controller illustrated in Figs. 6 and 7.

Similar reference characters refer to similar parts in each of the several views.

Referring first to Figs. 1 and 2, the circuit controller comprises, in general, an operating shaft 1 mounted in a supporting bracket 2, and cooperating with contacts carried by the supporting bracket. The supporting bracket 2 may have any suitable form but, in the form here shown, this bracket comprises a single strip of steel or other suitable material bent to form two spaced vertical bear-

ing portions 2^a and 2^b, and an intermediate connecting portion 2^c. The vertical portion 2^b is provided with a hole 2^e which receives the reduced right-hand end 1^a of the shaft 1, and the vertical portion 2^a is provided with a threaded hole 2^f through which the left-hand end of the shaft extends with considerable clearance. A bushing 3 is screwed into the hole 2^f, and this bushing serves both as a bearing for the shaft, and as a means for fastening the circuit controller to a control panel indicated at 4 in the drawings. The left-hand end of the shaft is provided with a threaded axial opening 1^e and with tapered sides 1^b which form a chisel-shaped edge. An operating handle 5 having formed therein a socket 5^a of the same shape as the left-hand end of the shaft, fits over this end of the shaft, and is fastened to the shaft by means of a single screw 6 which draws the handle firmly onto the shaft, thereby insuring that the handle cannot turn with respect to the shaft.

Referring now also to Fig. 3, a latching member 7, comprising two oppositely disposed latching segments 7^a and 7^b, is secured to the shaft 1 adjacent the vertical portion 2^a of the bracket 2, by means of a pin 29. The latching segments 7^a and 7^b are provided with several diametrically opposite notches 10 and 11, respectively, which notches are adapted to receive the curved upper ends 9^a and 9^b of the arms 9^c and 9^d of a substantially U-shaped latching spring 9 which is fastened, as by riveting, to the connecting portion 2^c of the bracket 2 for latching the operating shaft in predetermined positions. The number and locations of the notches 10 and 11 will depend upon the number and locations of the positions in which it is desired to latch the operating shaft. For example, if it is desired to latch the shaft in an intermediate position and two extreme positions, the latching member may be provided with three pairs of diametrically opposite notches as illustrated in Fig. 3. If, however, it is desired to latch the shaft in only two extreme positions, the middle notch 10 in the segment 7^a and the middle notch 11 in the segment 7^b may be omitted. The angular

distance between the notches in each segment may be of any suitable value, but, as here shown, it is substantially 30°.

The circuit controller also comprises a stop pin 8, which is fastened to the connecting portion 2^c of the bracket 2 directly beneath the latching member 7, and which cooperates with the latching member for limiting the angular distance through which the operating shaft may be rotated by the operating handle 5. As here shown, the parts are so proportioned that if the operating handle 5 is rotated to the extreme position in which the curved ends 9^a and 9^b of the spring 9 enter the upper notch 10 in the latching segment 7^a and the lower notch 11 in the latching segment 7^b, respectively, the stop pin 8 will engage the shoulder 7^d formed on the lower side of the segment 7^a, but that, if the handle 5 is rotated to the extreme position in which the curved ends 9^a and 9^b of the spring 9 enter the lower notch 10 in the segment 7^a and the upper notch 11 in the segment 7^b, respectively, the stop pin 8 will engage the shoulder 7^e formed on the lower side of the segment 7^b. It will be noted that the latching segment 7 also prevents longitudinal displacement of the operating shaft.

A screw 20, extending through the control panel, and threaded into a suitable hole in the vertical portion 2^a of the bracket 2, serves to hold the bracket in proper alignment on the panel, and to fasten a suitable marker plate 21 (Fig. 4) for the circuit controller, to the panel.

For operating the contacts of the circuit controller, the shaft is provided with a suitable contact operating member, here shown as a strip 14 of insulating material. The strip 14 fits snugly in a transverse slot formed in the upper side of the operating shaft, and is fastened to the shaft by means of a screw 15.

The contacts are supported by a horizontal extension 2^d of the bracket 2, which projects rearwardly from the vertical portion 2^b of the bracket above the operating shaft. The extension 2^d carries a plurality of superposed blocks 12^a, 12^b, etc. of insulating material, and as shown in Fig. 2, there are two stacks B and C of such blocks located on opposite sides of the shaft, the blocks of each stack being attached to the extension 2^d by means of screws 13. Referring to the stack B, a first movable contact finger 17 is clamped between blocks 12^b and 12^c, and the outer or free end of this finger is provided with a downwardly projecting hook 17^a which cooperates with the lower end of the insulating piece 14 as viewed in Fig. 2. A fixed contact finger 18 is clamped between the blocks 12^a and 12^d and is retained in its normal position by a relatively stiff metal stop 19, which is also clamped between the same two blocks. A similar fixed contact finger 23 is clamped between the blocks 12^a and 12^b, together with

a metal stop 19 which is arranged to limit the upward movement of finger 23. A second movable contact finger 27 is clamped between the blocks 12^d and 12^e, and the free end of this finger is bent downwardly at right angles at 27^a. A small plate 28 of insulating material is attached to the bent end 27^a, and is arranged to engage with the free end of the movable finger 17. A third fixed contact finger 18^a is likewise clamped between the blocks 12^e and 12^f together with a stop 19. With the contact fingers of the stack B arranged in this manner, it will be seen that when the lower end of the insulating strip 14, as viewed in Fig. 2, is out of engagement with the hook 17^a of the finger 17, as is the case when the shaft occupies its middle position in which it is illustrated in the drawings, or the extreme position in which the shoulder 7^d engages the stop pin 8, the movable fingers 17 and 27 are out of engagement with the fixed fingers 18 and 18^a respectively, but the finger 17 then engages the finger 23 to close a contact 17—23. When the lever is moved to the opposite extreme position, however, so that the shoulder 7^e of the latching segment 7^b engages the stop pin 8, the insulating strip 14 then engages the hook 17^a of the finger 17 and moves this finger and, hence, finger 27 upwardly, thereby opening contact 17—23 and closing contacts 17—18 and 27—18^a. The contact fingers of the stack C may be arranged similar to the contact fingers of the stack B, and will be operated when the lever is swung to the position in which the shoulder 7^d on the segment 7^a of the member 7 engages the stop pin 8 as will be readily understood from an inspection of the drawings.

The height of the insulating plate 28 on finger 27 is such that insulating block 12^d beneath this finger is of the same height as the block 12^b below finger 17. It follows that contact 18 and its stop 19 may be inverted so as to provide a contact 18—27 which is closed when finger 27 occupies its normal position, instead of a contact 17—18 which becomes closed when finger 17 is moved upwardly. It also follows that a second insulated movable finger 27 and fixed finger 18 may be assembled above the movable finger 27 and fixed finger 18^a as shown to provide three contacts which become closed when the lever is operated to the proper extreme position. It is obvious that a large variety of contact assemblies and combinations may be built up by the employment of fixed finger 18 with two types of movable fingers 17 and 27.

If it is desired to provide the circuit controller with more than two stacks of contacts, the circuit controller may be constructed as illustrated in Figs. 5, 6 and 7. As here shown, the circuit controller is provided with eight stacks of contacts, designated by the reference characters J to Q, inclusive, but it will be readily understood that the circuit

controller may be provided with any other desired number of contacts within reasonable limits. These stacks are mounted on a metal plate 22 which is attached to the projection 2^a of the bracket 2 by means of screws 44, and the stacks are so arranged that four stacks are located on each side of the operating shaft 1. Each stack, as here shown, is exactly like the stack B previously described, with the exception that an additional block 12^s of insulating material is interposed between the plate 22 and the lower block 12^a of the stack.

Located directly beneath the free ends of the contact fingers of the stacks J, K, L and M, and cooperating with the hook 17^a of the flexible contact finger 17 of each of these stacks, is a plate 24 of insulating material. This plate is attached by means of eyelets 25 to two flexible strips 26 which, in turn, are mounted between the blocks 12^s and 12^a of the stacks J and M, respectively, only the strip 26 which is clamped between the blocks 12^s and 12^a of the stack J being visible in the drawings. A similar plate 30 of insulating material is located directly beneath the free ends of the contact finger of the stacks N, O, P and Q, for cooperation with the hook 17^a of each of the fingers 17 of these stacks, and is attached to two flexible strips which are not shown in the drawings, but which are exactly like the strip 26, and are clamped between the blocks 12^s and 12^a of the stacks N and O in the same manner as the strip 26 is clamped between the blocks 12^s and 12^a of the stack J.

Fixed to the operating shaft 1 adjacent the free ends of the insulating plates 24 and 30, is a cam 33 comprising a cam lobe 33^a and a latching segment 33^b. The cam lobe 33^a cooperates with two cam followers 34 and 35 which are pivotally supported on opposite sides of the cam lobe by means of studs 36 and 37 attached to the vertical portion 2^a of the bracket 2 above the top of the cam lobe. The cam followers, in turn, cooperate with the heads of two screws 31 and 32, respectively, which are attached to the insulating plates 24 and 30 directly above the cam followers for moving the plates upwardly when the cam followers are operated. The latching segment 33^b cooperates with a latching spring 38 attached to the connecting portion 2^c of the bracket 2 and is provided with three notches 39, 40 and 41 which receive the curved end 38^a of the spring 38 when the shaft occupies its normal position, its extreme right-hand position, or its extreme left-hand position, respectively.

The latching segment is also provided with two shoulders 42 and 43 which cooperate with the cam followers 34 and 35, respectively, to limit the stroke of the operating shaft. As here shown, the shoulders are so arranged that the shaft may be rotated through a total angle of 60°, that is to say, 30° in either direction

from the normal position in which it is illustrated in the drawings.

The operation of the circuit controller is as follows: When the operating shaft occupies its normal or intermediate position, the parts occupy the positions in which they are illustrated in the drawings. If the operating shaft is rotated from its normal position in a clockwise direction, however, the position in which the shoulder 43 engages the cam follower 35, the cam follower 34 is rotated in a counter-clockwise direction through its full stroke by the cam lobe 33^a and the plate 24 is forced upwardly so that the contacts of the stacks J, K, L and M are operated. In a similar manner, if the operating shaft is rotated from its normal position in a counter-clockwise direction to the position in which the shoulder 42 engages the cam follower 34, the cam follower 35 is rotated in a clockwise direction through its full stroke, and the plate 30 is then forced upwardly, thereby operating the contacts of the stacks N, O, P and Q. The parts are so proportioned that when either cam follower is in its operated position, the reaction of the cam follower on the cam lobe produced by the opposing force of the contacts operated thereby, is on a line intersecting the axis of the shaft. It will be apparent, therefore, that with the parts constructed in this manner, the opposing force of the contacts has no component tending to restore the operating shaft to its normal position.

It should be pointed out that the latching spring 38 is provided merely to give the proper "feel" to the circuit controller for the convenience of the operator, and is not necessary for the proper operation of the circuit controller. This spring, however, assists in giving a snap action to the circuit controller.

One advantage of a circuit controller embodying my invention, is that, due to the manner in which the contacts are mounted on the circuit controller, an unusually large number of contacts may be provided.

Another advantage of a circuit controller embodying my invention is that the rear ends of the contacts are readily accessible for making solder connections.

Still another advantage of a circuit controller embodying my invention is that, in spite of the large number of contacts which may be provided, the space required for mounting the circuit controller on a control panel is extremely small. This is especially advantageous in certain forms of railway traffic controlling systems in which it is desirable to mount a large number of such circuit controllers on a single control panel in a compact group for controlling railway switches and signals and the like from a remote point.

Although I have herein shown and described only two forms of circuit controllers embodying my invention, it is understood

that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. A circuit controller comprising a supporting bracket, a manually operable shaft journaled in said bracket, a cam secured to said shaft, a cam follower pivoted to rotate about an axis parallel to said shaft and cooperating with said cam in such manner that rotation of said shaft from a predetermined position actuates said cam follower, an extension on said bracket extending parallel to the axis of said shaft, a plurality of superposed blocks of insulating material secured to said extension, a flexible strip clamped between two of said blocks, a piece of insulating material attached to the free end of said strip and arranged to be engaged by said cam follower when said cam follower is actuated in such manner that said piece is moved from a first position to a second position, a movable contact finger clamped between said blocks and cooperating at its free end with said piece of insulating material, and a fixed contact finger clamped between two of said blocks and cooperating with said movable contact finger.

2. A circuit controller comprising a supporting bracket provided with two spaced vertical portions and an intermediate connecting portion, a threaded bushing screwed through one of said vertical portions for attaching said bracket to a control panel, an operating shaft journaled in said bushing and in said second vertical portion, an operating handle attached to said shaft, a cam attached to said shaft and comprising a cam lobe and a latching segment, said latching segment being provided with a plurality of notches, two cam followers pivotally supported on opposite sides of said cam lobe by means of studs parallel to said shaft attached to said one vertical portion, a latching spring secured to the connecting portion of said bracket and provided with a curved portion adapted to enter a different one of the notches in said latching segment when said shaft occupies a middle position or is rotated to either of two extreme positions, a rearward extension on said second vertical portion above said shaft, a metal plate attached to said extension and extending transversely of said bracket, a plurality of stacks of contact fingers mounted on said plate on each side of said shaft but insulated therefrom, said contact fingers extending parallel to the axis of said shaft, four resilient strips two attached to said plate on each side of said shaft, two plates of insulating material one located on each side of said shaft and attached to the resilient strips on the same side of the shaft and each cooperating with one of said cam

followers and certain ones of said contact fingers for operating contacts in response to operation of said cam followers, said latching segment being provided with shoulders which cooperate with said cam followers to limit the stroke of said shaft.

3. A circuit controller comprising, in combination, a bracket detachably fastened to the rear of a panel, a marker plate attached to the front of said panel for designating a plurality of operating positions of the circuit controller, a threaded bushing and a screw screwed into said bracket from the front of the panel to fasten the marker plate and bracket to the panel and to align the marker plate with the bracket, an operating shaft having a rear bearing in said bracket and a front bearing in said bushing and having a front end tapered to form a chisel-shaped edge and provided with a threaded axial opening, an operating handle provided with a socket of the same shape as the outer end of the shaft and aligned so that the handle will register with the marker plate, a screw extending through said handle and screwed into the threaded portion of the shaft for attaching the handle to the shaft, contacts attached to said bracket, and means attached to the shaft for operating said contacts in response to rotation of the handle.

4. A detachable panel-mounted circuit controller comprising, in combination, a bracket detachably fastened to the rear of a panel, a threaded bushing screwed into the bracket from the front of the panel to fasten the bracket to the panel, an operating shaft having a rear bearing in the bracket and a front bearing in the bushing, and a front portion over which the bushing may be passed projecting through said panel, an operating handle detachably mounted on and keyed to the front end of said shaft, a latching cam on said shaft having a plurality of notches, a latch spring on said bracket cooperating with said cam to hold the shaft in the position to which it is operated, a stop cooperating with said cam to positively limit the movement of the shaft, an insulated contact operating member on said shaft, and contacts mounted on said bracket and adapted to be closed when the handle is turned to a predetermined position.

5. A three-position circuit controller comprising, in combination, a bracket detachably fastened to the rear of a panel, a threaded bushing screwed into the bracket from the front of the panel to fasten the bracket to the panel, an operating shaft having a rear bearing in the bracket and a front bearing in the bushing and a front portion over which the bushing may be passed projecting through said panel, an operating handle detachably mounted on and keyed to the front end of said shaft, two sets of contact springs mounted on said bracket parallel to the shaft,

each of the springs being arranged for a wire connection at its rear end and provided with contact tips at its front end, an insulated contact operating member on said shaft cooperating with the front ends of the springs and adapted to close the contacts of one set or the other when the handle is turned to a left-hand or a right-hand position from a middle position, a latching cam on said shaft having three notches, a latch spring on said bracket cooperating with said cam to hold the shaft in the position to which it is operated, and means cooperating with said cam to positively prevent movement of the shaft beyond said left-hand or right-hand positions.

6. A three-position circuit controller comprising, in combination, a bracket detachably fastened to the rear of a panel, a marker plate attached to the front of said panel for designating three operating positions of the circuit controller, a threaded bushing and a screw screwed into the bracket from the front of the panel to fasten the marker plate and bracket to the panel and to align the marker plate with the bracket, an operating shaft having a rear bearing in the bracket and a front portion passing through the bushing to the front of the panel, an operating handle mounted on the front end of the shaft and keyed thereto to register the handle with the marker plate, two sets of contact springs mounted on the bracket parallel with the shaft, an insulated operating member attached to said shaft and adapted to close the contacts of one set or the other of said springs when the handle is turned to one extreme position or the other, latching means for holding the shaft in a middle position or either extreme position, and means for preventing rotation of the shaft beyond either extreme operating position.

7. A circuit controller comprising a supporting bracket, a manually operable shaft journaled in the bracket, a cam secured to the shaft, a cam follower cooperating with the cam in such manner that rotation of the shaft from a predetermined position actuates the cam follower, a contact support attached to the bracket having a plane surface extending parallel to the shaft, a plurality of stacks of contact springs mounted side-by-side on the support, the springs of each stack being parallel to the shaft, each of said springs being arranged for a wire connection at its rear end and provided with contact tips at its front end, a plate of insulating material hinged to said support and arranged to be moved by the cam follower when said cam follower is actuated, said plate cooperating with the front end of one contact of each stack in such manner that when the plate is moved corresponding contacts of each stack are closed or opened simultaneously.

8. A circuit controller comprising a sup-

porting bracket, a manually operable shaft journaled in the bracket, a cam secured to the shaft, two cam followers pivotally supported on the bracket on opposite sides of the shaft on studs parallel to said shaft and cooperating with the cam in such manner that rotation of the shaft from a middle position to a left-hand or to a right-hand position actuates one cam follower or the other, a contact support attached to the bracket having a plane surface extending parallel to the shaft, two plates of insulating material hinged to the support, each arranged to be moved by one of said cam followers when the shaft is rotated, a plurality of stacks of contact springs mounted side-by-side on the plane surface of said support in two groups, said springs being parallel to the shaft, and so located that corresponding springs of each stack of one group or the other are simultaneously actuated when one or the other of said plates is moved.

In testimony whereof I affix my signature.

LLOYD V. LEWIS.