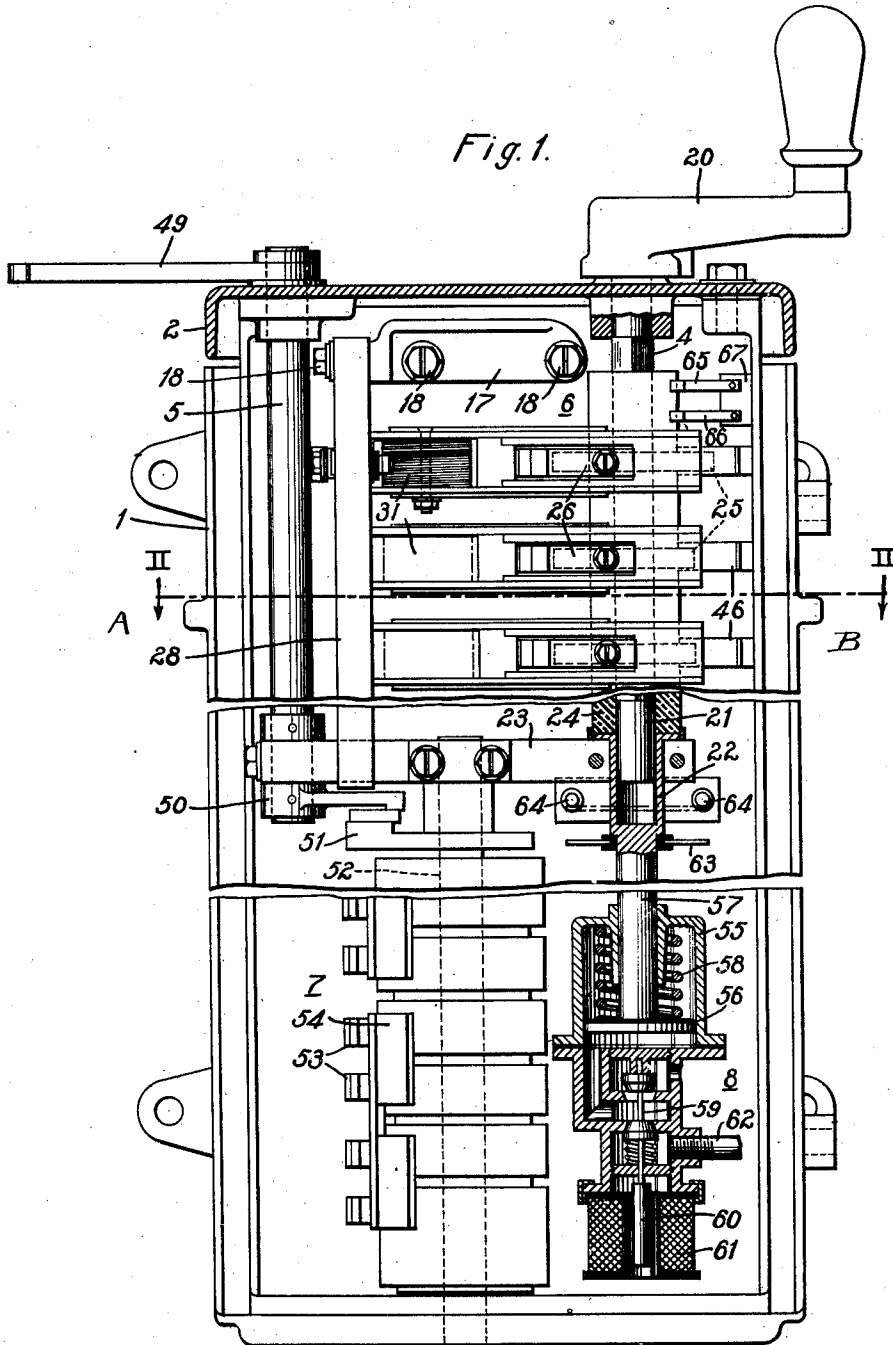


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CONTROL APPARATUS.
APPLICATION FILED FEB. 19, 1917.

1,343,232.

Patented June 15, 1920.

4 SHEETS—SHEET 1.



WITNESSES:

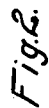
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4 SHEETS—SHEET 2.

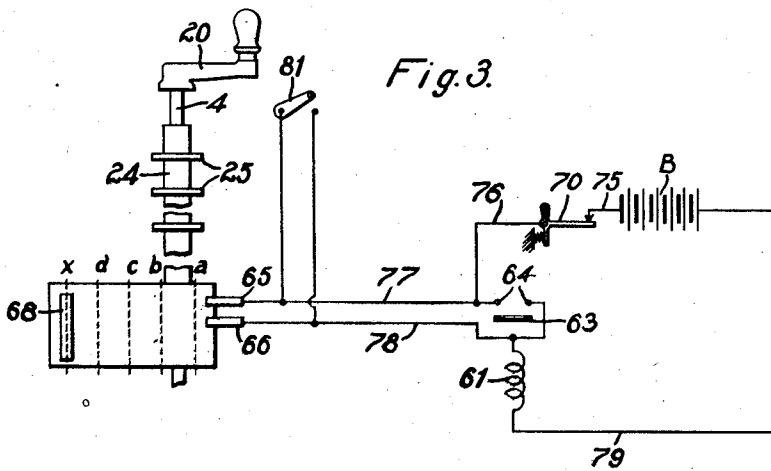
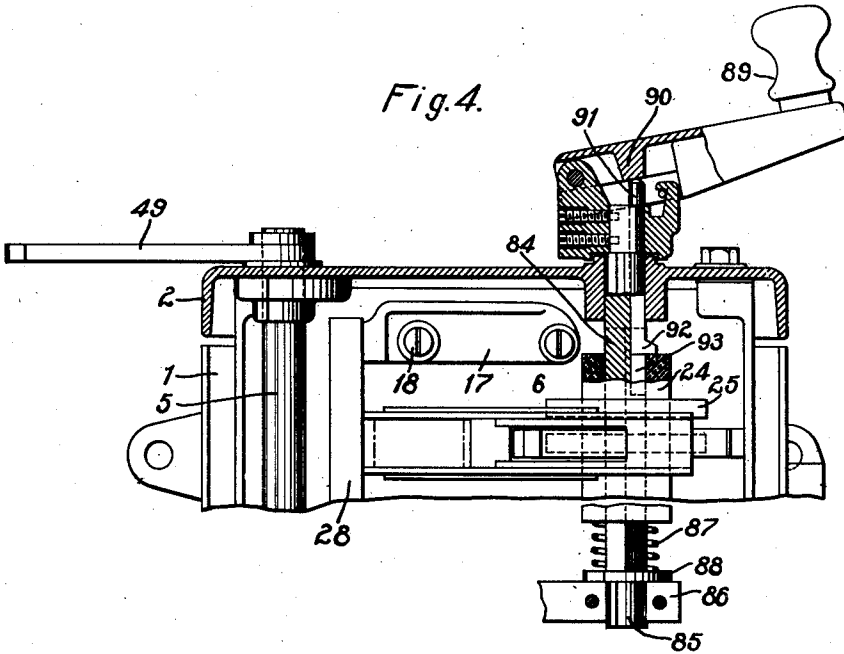


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4 SHEETS—SHEET 3.



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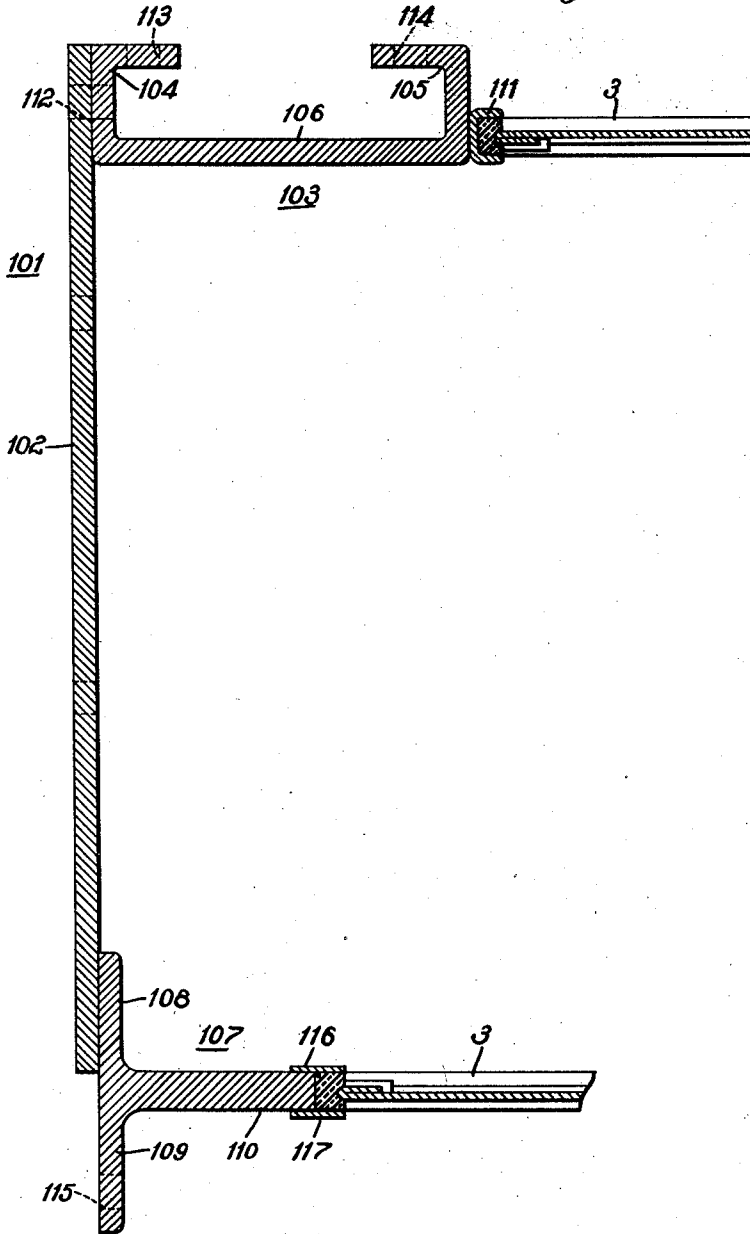
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Fig. 5.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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CONTROL APPARATUS.

1,343,232.

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To all whom it may concern:

Be it known that I, KARL A. SIMMON, a citizen of the United States, and a resident of Edgewood Park, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Control Apparatus, of which the following is a specification.

My invention relates to control apparatus and especially to certain structural features of that class of controllers known in the art as drum controllers.

One object of my invention is to provide a controller embodying a contact-carrying drum and coöperating stationary contact members, or preferably embodying a plurality of cam-operated switches, the controller being adapted to rotatively close the various sets of contact members in a predetermined sequence and to longitudinally effect the opening of all closed contacts at any time, either manually, or automatically through the agency of the well-known "dead man's release".

Still another object of my invention is to provide a controller having a plurality of operating shafts respectively corresponding to main-circuit and reverser-circuit connections and a longitudinally-extending readily removable partition member or insulating plate for isolating the reverser circuit shaft, and also the main-circuit cables, from the remainder of the controller and also for supporting a plurality of stationary contact members and of coöperating movable contact members that are adapted for engagement by a plurality of cams secured to the main-circuit shaft.

My invention may best be understood by reference to the accompanying drawings, wherein Figure 1 is a view, partially in front elevation and partially in longitudinal section, of a controller constructed in accordance with my present invention; Fig. 2 is a transverse sectional view taken on the line II—II of Fig. 1; Fig. 3 is a diagrammatic view of certain auxiliary circuits that are associated with the illustrated control apparatus; Fig. 4 is a fragmentary view, corresponding to Fig. 1, of a modified form of my invention; and Fig. 5 is a fragmentary sectional view of another modification thereof.

Referring to Fig. 1 and Fig. 2 of the

drawings, the structure shown comprises a base or incasing member 1; a top cover member 2; a removable front cover member 3 that is associated in the usual manner with the base 1; a plurality of operating shafts 4 and 5 that extend through the top cover member 2 and respectively correspond to main-circuit and reverser-circuit connections and are respectively adapted to effect connections between a plurality of sets of main-circuit contact members 6 and between the contact members of a reverser-circuit drum 7; and an electrically-controlled, fluid-pressure-operated auxiliary device 8 for longitudinally actuating the main-circuit shaft 4 under predetermined conditions to be described.

An operating handle 20, of any suitable type, is secured to the shaft 4. The greater portion of the main-circuit shaft 4 is of a square or other polygonal cross section for the purpose of readily effecting rotative movement of the mechanically connected parts, but the lower end 21 of the shaft is of circular cross section and is adapted to be slidably engaged by a combined sleeve and bearing member 22 which normally is supported by an appropriate stationary bracket member 23. A tubular member 24, of suitable insulating material, loosely fits over the square portion of the main-circuit shaft 4 and rests upon the upper flanged portion of the sleeve member 22.

The coöperating main-circuit contact members 6 comprise a plurality of appropriately shaped cam members 25 that are rigidly secured in the respective proper positions to the insulating tube 24 for the purpose of suitably engaging the corresponding movable contact member of each set to cause it to make electric contact with the allied stationary contact member, in accordance with a familiar practice.

The stationary contact members 26 and the coöperating movable contact members 27 are best shown in Fig. 2. The contact members 26 are severally supported upon a longitudinally-extending partition member or insulating plate 28 through the agency of a plurality of bolts or screws 29 that extend through flanges 30 of the stationary contact members 26. A blowout coil 31 of familiar construction, is connected between each contact member 26 and a corresponding ter-

minal member 32, which is positioned by the insulating plate 28. A plurality of suitable bracket members 17 and securing bolts 18 are provided for the purpose of conveniently and detachably mounting the insulating plate 28 upon the incasing member 1.

Each movable contact member 27 is mounted upon an auxiliary arm 35 which is pivotally secured at 36 to a main arm member 37, and a spring member 38 operates between the two arm members to bias the movable contact member 27 toward the corresponding stationary contact member 26. The main arm member 37 is pivotally mounted at 39 upon a stationary base or standard 40 which is secured to the partition member or insulating plate 28 by means of suitable screws 41. The main arm member 37 is provided with a suitable roller member 42 for engagement with the corresponding cam member 25 to thereby effect engagement of the corresponding stationary and movable contact members 26 and 27, in accordance with the peripheral shape of the cam member. A suitable spring 43 is located intermediate the roller 42 and the base member 40 to further bias the movable contact member in the desired direction. A flexible shunt or conductor 44 is electrically secured to the stationary base member 40 and the auxiliary arm 35, thereby serving to remove injurious currents from the pivotal points 36 and 39, as will be understood.

Each set of cooperating contact members 26 and 27 is inclosed on two sides by an appropriate arc-chute or box 45, of a familiar type, which, in the present case, is simply and readily positioned through the agency of a bent spring member 46 that engages a notch 47 in the arc-chute and has one end rigidly secured to the base or incasing member 1 by a bolt 48.

By the use of the partition member just described, the operating shaft 5, corresponding to the reverser circuits, is entirely isolated from the remainder of the controller and is wholly protected from any danger of coming in contact with arcs or conducting gases, and, furthermore, a simple, convenient, durable, and readily removable means is provided for appropriately positioning the various sets of cooperating stationary and movable main-circuit contact members.

Moreover, the various main-circuit cables (not shown) that are connected to the several terminal members 32 are also fully and conveniently protected from injury by being located in the virtually isolated chamber inclosing the operating shaft 5.

The operating shaft 5 is provided, above the cover member 2, with a manipulating lever 49, and its lower end is mounted in a suitable bearing member 50 for transmitting the desired movement through a linkage

mechanism 51 to the shaft 52 of the reverser drum 7, which is provided with cooperating control fingers 53 and contact segments 54 of a well-known type.

The auxiliary device 8 comprises an air-cylinder 55 within which a piston 56 is adapted to travel, the piston stem or rod 57 preferably constituting a continuation of the sleeve member 22. A coiled spring 58 is located within the cylinder 55 for the customary purpose of biasing the piston 56 to the illustrated normal position.

For the purpose of operating the piston 56, a suitable needle valve member 59, of a familiar form, is mechanically connected to a plunger or core member 60 of an actuating coil 61, whereby, upon energization of the actuating coil, fluid pressure is admitted from any suitable source (not shown) through a pipe or passage 62 to the operating cylinder 55. Inasmuch as the combined air cylinder and governing magnet just described are well known to those skilled in the art, no further description of the details thereof is believed to be necessary. It will be understood that, if desired, the device 8 may be of the solenoid type, or may comprise any other suitable power-operated means.

The piston rod 57 is provided with a suitably insulated disk contact member 63 for the purpose of bridging a pair of stationary contact members 64, as indicated by the dotted lines, when the piston 56 is actuated to its upper position, thereby completing an auxiliary circuit, as subsequently described in detail.

Further auxiliary control fingers 65 and 66 are mounted upon a suitable base or finger-block 67 to engage a contact member 68 (Fig. 3) under certain conditions, to be hereinafter set forth.

Assuming the various parts of the controller to occupy the respective illustrative positions, the mechanical operation thereof may be set forth as follows: Upon rotative movement of the main handle member 20, the various cam members 25 actuate the corresponding movable contact members 27, in accordance with the predetermined sequence, to thereby close any desired circuits. At the end of the accelerating period of a motor, for example, the actuating coil 61 of the auxiliary device 8 may be energized, whereupon fluid pressure is admitted to the operating cylinder 55 to lift the piston 56 to its upper position, in opposition to the action of the spring 58, and thereby correspondingly lift the insulating sleeve 24 and the cam members 25 mounted thereon. Thus, all of the contacts closed at the time that the actuating coil 61 is energized are immediately opened as the various cam members assume positions between the adjacent pairs of rollers 42 of the movable contact members.

It will be understood that such longitudinal-

nal movement of the cam members 25 may be effected under any desired condition by merely appropriately organizing the control circuit of the actuating coil 61.

5 One form of such control circuit is shown in Fig. 3, wherein the operating shaft 4 of the controller and the mechanical parts operated thereby, including the contact member 68, are diagrammatically shown, in addition to the disk contact member 63 and its
10 coöperating stationary contact members 64, a switch 70 biased to a closed position, and a suitable source of energy, such as a battery B, for energizing the actuating coil 61 of the auxiliary device 8.

15 In the assumed case, the controller is adapted to occupy a plurality of operative positions *a* to *d*, inclusive, for gradually completing the desired control of the motor to be governed, and an additional or extra
20 position *x*, wherein a circuit is completed from the positive terminal of the battery B through conductor 75, switch 70, conductors 76 and 77, auxiliary contact members 65 and 66—which are bridged by contact segment 68 of the controller in position *x*—conductor 78, the actuating coil 61 and conductor 79 to the negative battery terminal. Thus, the piston 56 is raised to its upper
30 position to effect the simultaneous opening of all of the cam operated switches that are closed at the time. The contact segment 68 is of sufficient length to maintain the circuit intact after the insulating sleeve 24 occupies its upper position.

35 To prevent the piston 56 and the cam members 25 from dropping toward their normal positions as the control handle 20 is moved backwardly toward its "off" position, the auxiliary disk member 63 bridges the stationary contact members 64 in the upper position of the piston 56, thus completing a holding circuit for the actuating coil 61, irrespective of the disengagement of the control fingers 65 and 66 from the contact segment 68 when the controller is moved away from its position *x*. In this manner, the energization of the actuating coil 61 is maintained and the cam members 25 are held in their positions between the respective
50 pairs of rollers 42 to permit free backward movement of the shaft 4 until the controller occupies its "off" position, whereupon the operator momentarily manipulates the switch 70 to thus interrupt the energizing circuit of the actuating coil 61 and allow the coiled spring 58 to return the piston 56 and the cam members 25 to the illustrated normal position.

60 If desired, mechanical means, located on the handle 20, for example, for automatically tripping the switch 70 as the controller approaches its "off" position may be readily supplied, as will be understood.

65 If deemed advisable, a manually-operated

switch 81 may be provided to enable the train operator to energize the actuating coil 61 at any time to thereby effect an interruption of the main circuits.

Reference may now be had to Fig. 4, 70 wherein the application of my present invention to the well-known "dead man's release" type of controller is illustrated. The apparatus shown, in addition to the base member 1, the top cover member 2, the reverser circuit operating shaft 5, and the insulating partition member 28, comprises a main-circuit operating square shaft 84, the lower end 85 of which is supported by a suitable stationary bracket member 86, and
75 a helical spring 87, which is positioned to act between the slidable insulating sleeve 24 and a collar 88 which rests upon the bracket member 86, whereby the sleeve 24 and the mechanically associated cam members 25 are normally biased to positions intermediate the respective pairs of rollers 42 (Fig. 2).

The operating handle 89 for the main-circuit shaft 84 is shown as provided with an internal boss 90 that rests upon the upper
80 end of a key or feather 91, the lower end 92 of which is enlarged and rests upon the upper face of the insulating sleeve 24. The key 91 is adapted to slide within a slot or groove 93 of the shaft 84, in accordance with the movements of the handle 89 and the sleeve 24.

If the operating handle 89 is rotated in its illustrated upper position, the square shaft 84 and the insulating sleeve member 24 are
100 rotated, but no engagement of the cam members with the rollers of the various movable contact member is effected, by reason of the above-described normal intermediate position of the various cam members. However, upon pressing the operating handle 89 to its lower or operating position, when the controller occupies its "off" position, the sleeve member 24 and the mechanically associated cam members 25 are likewise actuated
105 to their lower or operative positions, the spring 87 being compressed, and rotative movement of the operating handle 89 then effects the closure of the various sets of contact members in the predetermined sequence.

115 Upon the release of the operating handle 89, by reason of the incapacitation of the train-operator, or otherwise, the spring 87 immediately raises the sleeve 24 and the cam members 25 to the illustrated normal position, whereby simultaneous opening of all of the contacts closed at the time that the downward pressure on the operating handle was released, is effected.

125 It will be appreciated that the principles of my invention may be readily applied to any form of "dead man's release," other than that illustrated. Furthermore, the invention is not limited to the cam-operated type of control that is shown, but is easily applica- 130

ble to other forms of controllers, such as the usual drum type embodying contact segments and cooperating control fingers.

Consequently, I do not wish to be restricted to the specific structural details or arrangement of parts herein set forth, as various modifications thereof may be effected without departing from the spirit and scope of my invention. I desire, therefore, that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. In a controller, the combination with an incasing member and a plurality of operating shafts respectively corresponding to main circuits and reverser circuits, of a longitudinally-extending insulating plate located between said shafts and relatively close to the reverser-circuit shaft to isolate it from the remainder of the controller, a plurality of pairs of cooperating stationary and movable contact members mounted upon said plate, and a plurality of cam members secured to the main-circuit shaft for engaging the respective movable contact members under predetermined conditions.

2. In a controller, the combination with a plurality of cam-operated switches, and an operating member therefor, of means for longitudinally actuating said member to effect the substantially simultaneous opening of all said switches.

3. In a controller, the combination with a plurality of cam-operated switches, of means for closing said switches in a predetermined sequence, and means for effecting the simultaneous separation of all closed switches from their operating cams.

4. In a controller, the combination with a plurality of sets of cooperating stationary and movable contact members, of means for effecting engagement thereof in a predetermined sequence, and means for longitudinally actuating the first-named means to effect the substantially simultaneous opening of all of said contact members at any time.

5. In a controller, the combination with a plurality of longitudinally assembled sets of cooperating stationary and movable contact members, of means for rotatively effecting engagement thereof in a predetermined sequence, and means for longitudinally effecting the substantially simultaneous opening of all closed contacts.

6. In a controller, the combination with a plurality of longitudinally assembled sets of cooperating stationary and movable contact members, of means operable in a predetermined path for effecting engagement thereof in a predetermined sequence, and means acting in a materially different path to effect the substantially simultaneous opening of all closed contacts.

7. In a controller, the combination with a

plurality of cam-operated switches and an operating member for said switches, of means for effecting engagement thereof in a predetermined sequence and in a certain direction, and means acting at substantially right angles to said direction to effect the substantially simultaneous opening of all closed contacts.

8. In a controller, the combination with a plurality of longitudinally assembled sets of cooperating stationary and movable contact members, of means for manually effecting engagement thereof in a certain direction and in a predetermined sequence, and power-operated means acting in a transverse direction for effecting the simultaneous opening of all the contact members under predetermined conditions.

9. In a controller, the combination with a plurality of cooperating stationary and movable contact members, of means for manually effecting engagement thereof in a certain direction and in a predetermined sequence, and power-operated means inert during normal operation but acting in a transverse direction for effecting the simultaneous opening of the contact members under predetermined conditions.

10. In a controller, the combination with a plurality of cooperating stationary and movable contact members, of means for manually effecting engagement thereof in a rotative direction, and power-operated means inert during normal operation for longitudinally effecting disengagement of the contact members.

11. In a controller, the combination with a pair of contact members of the cam-operated type, of means operable in one plane for effecting relative movement of said contact members to effect their engagement and means operable in another plane for effecting relative movement of said contact members to effect their disengagement.

12. In a controller, the combination with a plurality of switch members, a rotatable shaft and cam members carried by said shaft for actuating said switch members, of means for actuating said shaft longitudinally to shift said cam members out of operative relation to said switch members.

13. In a controller, the combination with a plurality of switch members, a rotatable shaft and cam members carried by said shaft for actuating said switch members, of means for actuating said shaft longitudinally to shift said cam members out of operative relation to said switch members, said means comprising a manually controllable member and a spring tending to retain said shaft in one of its positions.

14. In a controller, the combination with a plurality of switch members, a rotatable member, and means carried thereby for actuating said switch members, of manually con-

trollable and automatic means for shifting said shaft into and out of a position in which said actuating members are not in operative relation to said switch members. 10

5 15. In a controller, the combination with a plurality of switch members of the cam-operated type and actuating means therefor comprising a rotatable cam shaft, of means for successively shifting said shaft longitudinally and rotating said shaft to actuate said switch members.

In testimony whereof, I have hereunto subscribed my name this 30th day of January, 1917.

KARL A. SIMMON.