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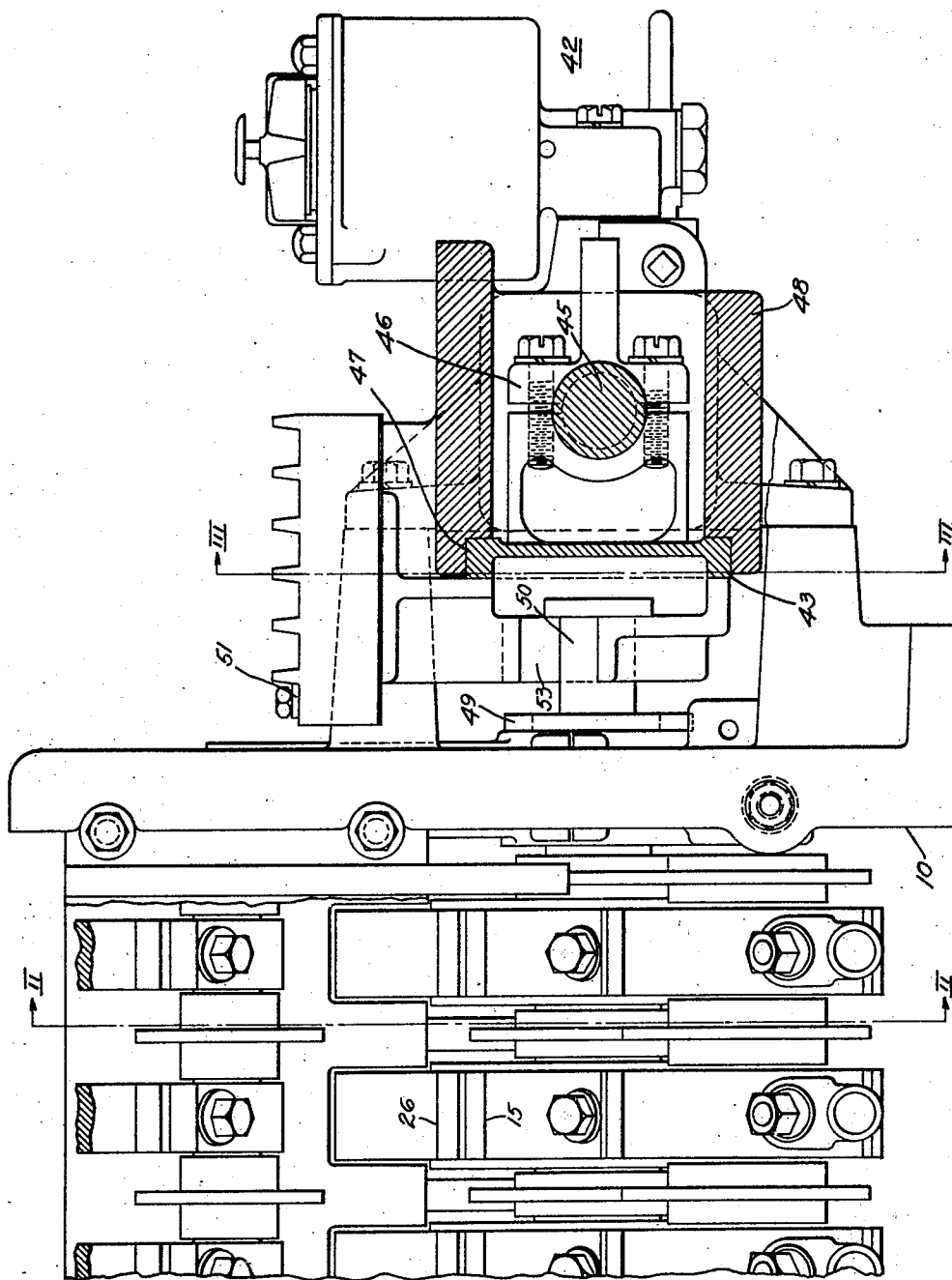
1,680,393

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PNEUMATIC REVERSING SWITCH

Filed May 4, 1925

3 Sheets-Sheet 1



WITNESSES:

S. H. Walker
E. W. Savage Fig. 1.

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Aug. 14, 1928.

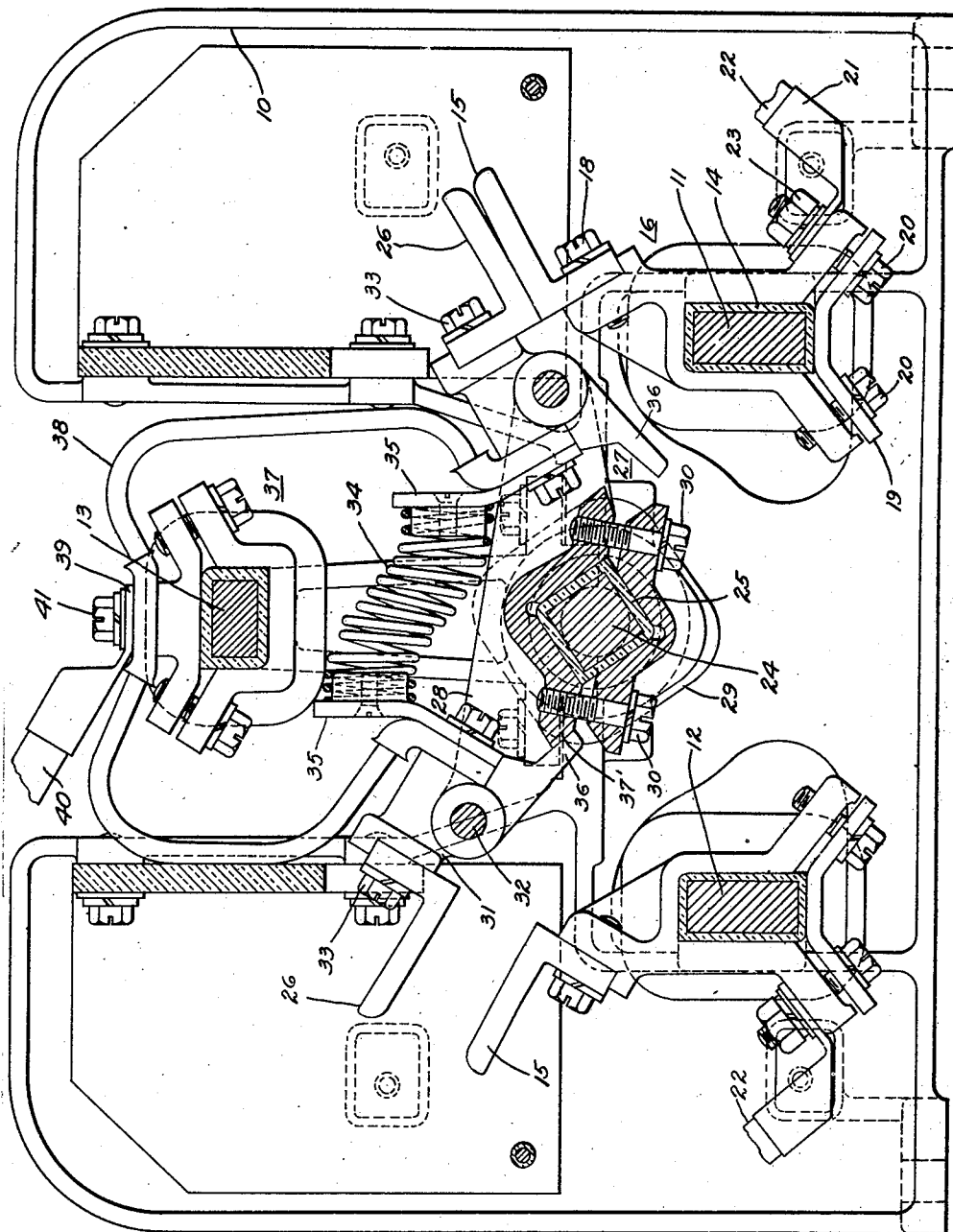
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3 Sheets-Sheet 2



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Fig. 2.

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3 Sheets-Sheet 3

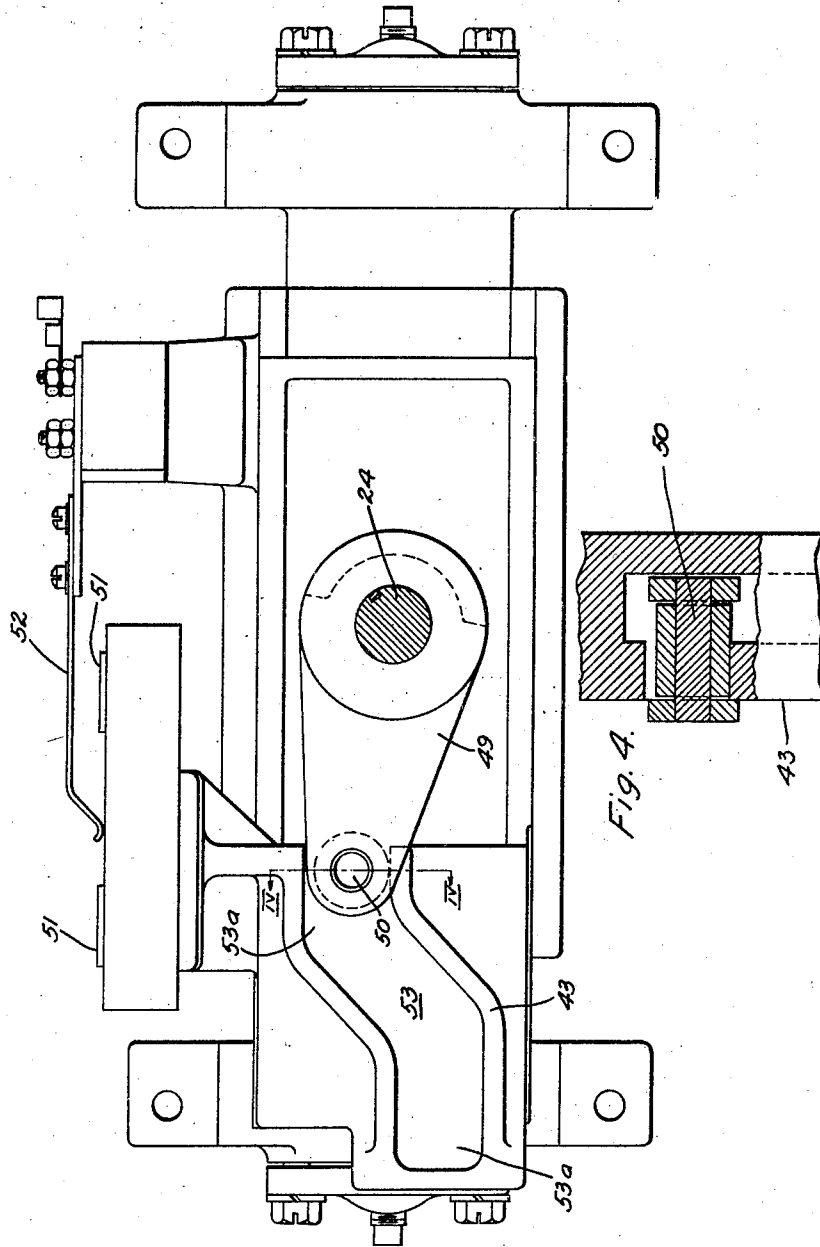


Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

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PNEUMATIC REVERSING SWITCH.

Application filed May 4, 1925. Serial No. 27,937.

This invention relates to control apparatus and more particularly to power-actuated reversers for electric motors.

The object of the invention, generally stated, is the provision of a reverser that shall be simple and efficient in operation and readily and economically manufactured.

A more specific object of the invention is to provide for effecting a predetermined limited movement of the contact members of a reverser without restricting the movement of the actuating member.

Another object of the invention is to provide for a movement of the actuating means independently of the contact members and the locking of the contact members in predetermined positions, during the independent movement of the actuating means.

Other objects of the invention will in part be obvious and in part appear hereinafter.

The invention, accordingly, is disclosed in the embodiment thereof shown in the accompanying drawing and comprises the combination of elements and arrangement of parts that will be exemplified in the construction hereinafter set forth and the scope of which will be indicated in the claims.

For a full understanding of the nature and objects of the invention, reference should be had to the following detailed description, taken in connection with the accompanying drawing, in which

Figure 1 is a view, partially in side elevation and partially in section, of a reverser constructed in accordance with this invention;

Fig. 2 is a horizontal sectional view, taken along the line II—II of Fig. 1, showing the contact members;

Fig. 3 is a horizontal sectional view, taken along the line III—III of Fig. 1;

Fig. 4 is a sectional view taken along the line IV—IV of Fig. 3, showing details of the structure.

Referring now to the drawing, the reverser comprises a frame, shown generally at 10, which is provided with a plurality of vertical posts or rods 11, 12 and 13 that are retained in position in any suitable manner. As will be observed, each post is enclosed by an insulating member 14.

The posts 11 and 12 are disposed for supporting a plurality of stationary contact members 15. In this particular construction,

clamping brackets 16 are provided for attaching the contact members 15 in any desired position on the posts 11 and 12.

As shown, the contact members 15 are attached to the brackets in any suitable manner, such as by the use of screw bolts 18. The brackets 16 are shaped to seat on the insulating members 14 and may be clamped in any predetermined position thereon by means of plates 19 and screw bolts 20.

In this particular construction, one of the screw bolts 20 is extended to provide a binding post for the reception of a terminal member 21 of a suitable conductor 22. The terminal member 21 may be retained in position on the bolt by means of a nut 23.

In order to mount a plurality of movable contact members 26 in alinement with the contact members 15, a shaft 24, which is angular in cross-section, is rotatably mounted in the frame 10. As shown, an insulating member 25 is mounted on the shaft 24 to insulate it from the contact members 26.

The contact members 26 are supported on the shaft 24 by means of brackets shown generally at 27. As will be noted, each bracket includes a cross-member 28 that is shaped to seat on the insulating member 25 and a clamping plate 29, which may be connected to the cross-member 28 to retain it in position in any suitable manner, such as by the use of screw bolts 30.

As shown in Fig. 2, the movable contact members 26 are arranged in pairs and are angularly spaced about the shaft 24. A number of brackets may be spaced along the shaft 24, as illustrated in Fig. 1, to mount as many pairs of movable contact members as desired. Further, it will be readily understood that by proper angular spacing of the contact members 26, any predetermined oscillatory movement of them between the contact members 15 may be permitted.

In this particular construction, in order to effect a wiping action between the contact members 15 and 26, when brought into engagement, the movable contact members are disposed for movement relative to plate 28. As shown, a contact-carrying block 31 is pivotally mounted on vertical pins 32 which are provided on opposite ends of each plate 28. The outer ends of the blocks are shaped to receive the contact members 26 and the latter are attached thereto by means of screw bolts 33.

A compressed spring 34 is interposed between arms 35, which are attached to the blocks 31 to retain the contact members 26 inclined to the outer faces of the contact members 15. As shown, the angular movement of the blocks 31, by reason of the pressure of the spring 34, is limited by means of arms 36 that are formed integral with the blocks 31 and projections 37 that are provided on the bracket 27.

In order to electrically connect the contact members 26 with a cable or conductor, such as shown at 40, flexible leads or conductors 38 are provided. As shown, the conductors 38 are attached to the blocks 31 and to a bracket 37' that is mounted on the post 13. The bracket 37 is provided with a binding post 41 for receiving the terminal 39 of the conductor 40.

The frame, comprising the shaft 24 and brackets 27 for carrying the movable contact members 26, may be oscillated by any suitable motor and, in this particular construction, an air-engine 42 of any well-known type, such as shown in Patent No. 1,401,647, granted to E. E. Rose et al., December 27th, 1921, may be used.

A cross-head 43 having a cam slot 53 formed therein is slidably mounted in guides 47 that are provided in the engine casing 48. As shown in Fig. 1, the casting is rigidly attached to the piston rod 45 of the air-engine by means of a clamp 46.

In order to effect the oscillation of the movable contact members 26 by the reciprocatory movement imparted to the cross-head 43 by the air-engine 42, an arm 49 is keyed to the lower end of the shaft 24 and has attached to its opposite end a pin 50 that is disposed to ride in the cam slot 53. As will be readily understood, the cam slot 53 may be shaped to give any predetermined angular movement of the arm 49.

In some constructions, in order to effect the making and breaking of the motor circuits before the reverser contact members are moved into or out of engagement, auxiliary contact members, such as shown at 51, are mounted on the cross-head 43 and disposed to engage contact fingers 52. As will be readily understood, the contact members 51 and contact fingers 52 may be used to control the energization of actuating coils of line switches connected in the main circuits of the motor or motors governed by the reverser.

With a view to providing for the establishment of such switch-actuating circuits, after the movable contact members 26 have been actuated to engage certain of the stationary contact members 15, and the breaking of these circuits before the separation of the contact members, offset extensions 53a are provided at the opposite ends of the cam slot 53 to permit movement of the cross-

head 43 independently of the contact members 26. Thus, the contact members 51 may be moved into and out of engagement with the contact fingers 52 that are disposed to receive them, at a predetermined time relative to the engagement and separation of the contact members 26 and 15.

The arrangement of the circuits required in conjunction with the reverser described above to control any dynamo-electric machine, are preferably of a well-known type and further description of them is thought to be unnecessary. However, as a basis for further description, it might be pointed out that in the operation of reversers of this type, the oscillation of the movable contact members 26 in opposite directions into engagement with the stationary contact members 15 effects a reversal in direction of flow of the current energizing the device that it is desired to control.

Assume that the air-engine 42 has been operated to project the cross-head 43 to the position shown in Fig. 3, oscillating the contact-carrying frame clockwise as viewed in Fig. 2, thereby projecting the movable contact members 26, which are spaced along the shaft 24, into engagement with the stationary contact members 15, and that the contact plates 51 have been moved into engagement with the contact fingers 52. Under such conditions, predetermined circuits are established and current flows in a predetermined direction in the circuit that it is desired to control.

In order to reverse the direction of flow of current in the circuit, the air-engine is operated to move the cross-head 43 to the right, as viewed in Fig. 3. It will be readily understood that as the cross-head moves to the right, the contact plate 51 will be moved out of engagement with the contact fingers 52, thereby de-energizing the actuating coils of the main line switches and permitting the latter to open. While it is desirable to provide some means for opening the main line switches before the contact members are separated, it is to be understood that the reverser may be used without such a protective system.

As the cross-head continues to move to the right, the pin 50 travels in the cam slot 53. In this manner, the arm 49 is oscillated counter-clockwise, thus withdrawing the movable contact members 26 that are located at the right of the brackets 27, from the corresponding stationary contact members 15. When the contact-carrying frame reaches the limit of its oscillatory movement in a counter-clockwise direction, the movable contact members 26 that are disposed at the left are projected into engagement with the corresponding stationary contact members 15.

As the contact members 26 are withdrawn from the contact members 15, the springs 34

rotate them clock-wise about their pivot points. In this manner, the corresponding engaging contact members 26 and 15, when separated, are set with their faces inclined to one another. Accordingly, when the movable contact members 26 that are located on the left, as viewed in Fig. 2, are projected into engagement with the corresponding stationary contact members 15, a wiping action is effected. Since the springs 34 normally retain the contact members 26 inclined at an angle to the contact members 15, the outer ends of the former engage the stationary members first as they are moved into engagement.

Finally, as the contact members are forced together, the contact members 26 are rotated about the posts 32, effecting a wiping action between the stationary and movable contact members.

Continued movement of the cross-head 43 to the right causes the pin 50 to slide in the extension 53a of the cam slot 53, which extension is provided to permit movement of the cross-head independently of the contact members 26. Thus by providing such a lost-motion connection the contact plates 51 may be projected into engagement with the contact fingers 52 to energize the actuating coils of line switches that are provided for closing the main circuits after the establishment of engagement between the contact members 15 and 26.

Further, when the pin 50 slides in the extensions 53a of the cam slot 53, the movable contact members 26 are locked in engagement with the stationary contact members by the walls defining the slot.

Since various changes may be made in the above-described construction and arrangement of parts and different embodiments of the invention may be made without departing from the scope thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. In a reverser, in combination, a plurality of contact members disposed for oscillatory movement, stationary contact members disposed to receive the movable contact members, and means for oscillating the movable contact members comprising a cross-head disposed for reciprocatory movement and means co-operative to oscillate the contact members when the cross-head is actuated, said contact-oscillating means being adapted to permit movement of the cross-head independently of the contact members.

2. In a reverser, in combination, a plurality of contact members disposed for oscillatory movement, stationary contact members disposed to receive the movable contact

members, and means for oscillating the contact members comprising a cross-head disposed for reciprocatory movement, means co-operative to oscillate the contact members when the cross-head is actuated, said contact-oscillating means being adapted to permit movement of the cross-head independently of the contact members and to lock the contact members in predetermined positions during said independent movement.

3. In a reverser, in combination, a plurality of stationary contact members, a plurality of contact members disposed for oscillatory movement to engage the stationary contact members, means for oscillating the contact members comprising a cross-head disposed for reciprocatory movement and means co-operative to oscillate the contact members when the cross-head is actuated, said contact-oscillating means being adapted to permit movement of the cross-head independently of the contact members, and means carried by the cross-head co-operative to establish circuits independently of said contact members.

4. In a reverser, in combination, a plurality of stationary contact members, a plurality of contact members disposed for oscillatory movement to engage the stationary contact members, means for oscillating the contact members comprising a cross-head disposed for reciprocatory movement, said cross-head having a cam slot formed therein, and means connected to the contact members disposed to travel in the cam slot as the cross-head is actuated thereby to oscillate the contact members.

5. In a reverser, in combination, a plurality of stationary contact members, a plurality of contact members disposed for oscillatory movement to engage the stationary contact members, means for oscillating the contact members comprising a cross-head disposed for reciprocatory movement, said cross-head having a cam slot formed therein, and means connected to the contact members disposed to travel in the cam slot as the cross-head is actuated thereby to oscillate the contact members, said cam slot having extensions adapted to permit movement of the cross-head independently of the contact members.

6. In a reverser, in combination, a plurality of stationary contact members, a plurality of contact members disposed for oscillatory movement to engage the stationary contact members, means for oscillating the contact members comprising a cross-head disposed for reciprocatory movement, said cross-head having a cam slot formed therein, and means connected to the contact members disposed to travel in the cam slot as the cross-head is actuated thereby to oscillate the contact members, the walls defining the

cam slot serving to lock the contact members in predetermined positions during the independent movement of the cross-head.

7. In a reverser, in combination, a plurality of contact members disposed for oscillatory movement, a plurality of stationary contact members disposed to receive the movable contact members, an arm connected to the contact members, a cross-head disposed for reciprocatory movement, said cross-head having a cam slot in which said arm slides, and a motor for actuating the cross-head.

8. In a reverser, in combination, a plurality of contact members disposed for oscillatory movement, a plurality of stationary contact members disposed to receive the movable contact members, an arm connected to the contact members, a cross-head disposed for reciprocatory movement, said cross-head having a cam slot in which said arm slides, and a motor for actuating the cross-head, said cam slot having extensions adapted to permit the movement of the cross-head independently of the contact members.

9. In a reverser, in combination, a plurality of contact members disposed for oscillatory movement, a plurality of stationary contact members disposed to receive the

movable contact members, an arm connected to the contact members, a cross-head disposed for reciprocatory movement, said cross-head having a cam slot in which said arm slides, a motor for actuating the cross-head, said cam slot having extensions adapted to permit the movement of the cross-head independently of the contact members, and means actuated by the cross-head co-operative to establish electric circuits at a predetermined time relative to the establishment of circuits by said contact members.

10. A reverser comprising, in combination, a frame disposed for oscillatory movement, a plurality of movable contact members pivotally mounted on the frame, said contact members being annularly spaced, stationary contact members disposed to receive the movable contact members when the frame is oscillated in opposite directions, an arm connected with the contact members, a cross-head disposed for reciprocatory movement, said cross-head being provided with a cam slot in which said arm slides, thereby to effect the oscillation of said contact members, and a motor for actuating the cross-head.

In testimony whereof, I have hereunto subscribed my name this 29th day of April, 1925.

LYNN G. RILEY.