Jan. 16, 1923. 1,442,288.

W. C. NEAHR.

ELECTRIC SIGNALING SYSTEM.

FILED DEC. 17, 1918. 3 SHEETS—SHEET 1.

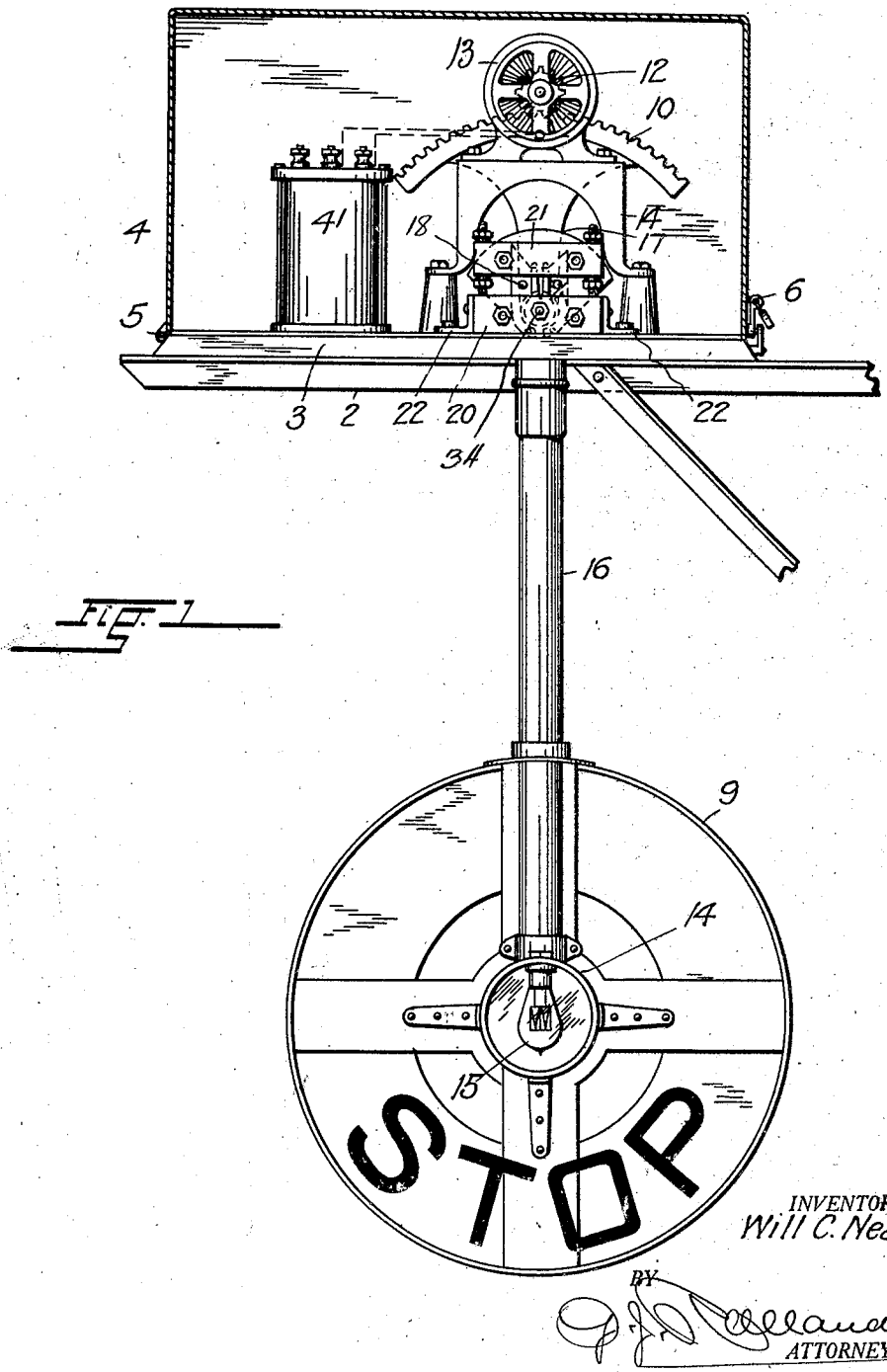


Fig. 1

INVENTOR.
Will C. Neahr.

BY

ATTORNEY.

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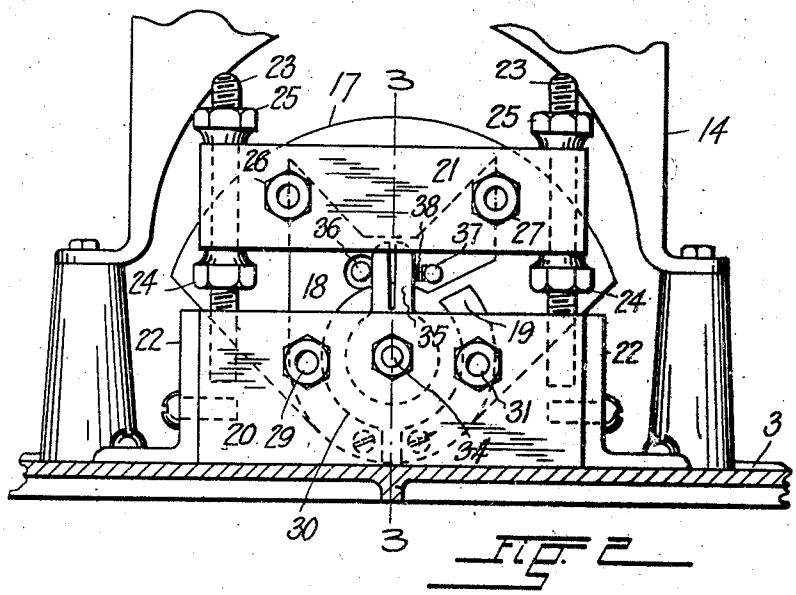


FIG. 2

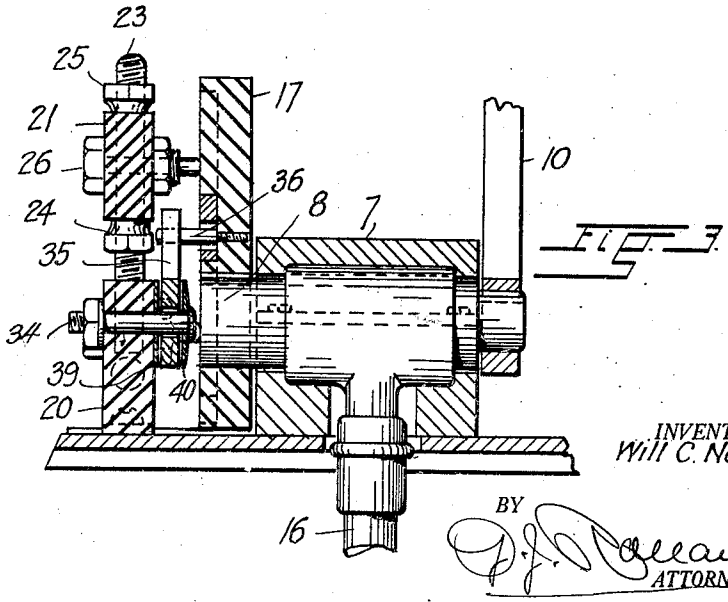


FIG. 3

INVENTOR.
Will C. Neahr.

BY

ATTORNEY

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W. C. NEAHR.

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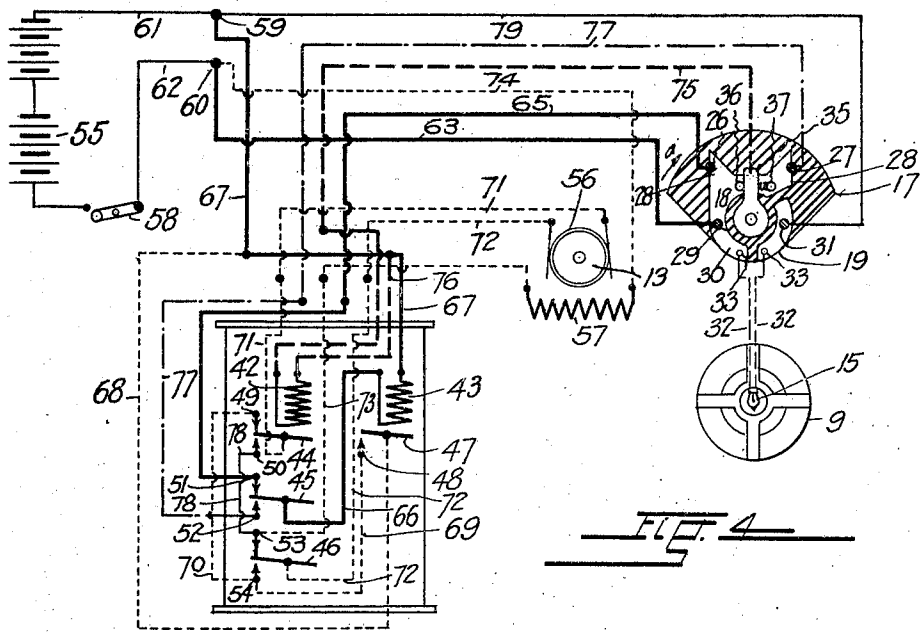


FIG. 4

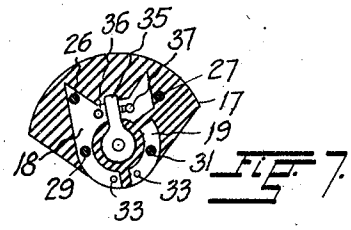


FIG. 7.

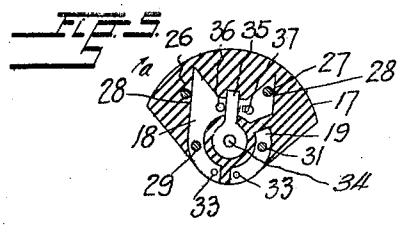


FIG. 5.

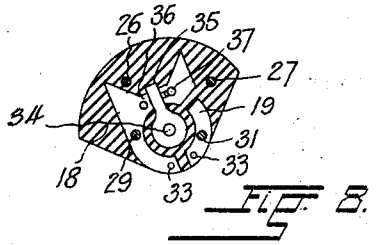


FIG. 8.

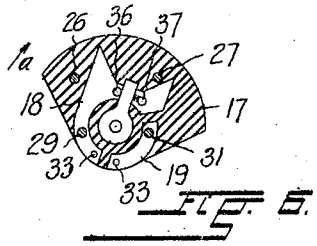


FIG. 6.

INVENTOR.
Will C. Neahr.

BY

ATTORNEY

Patented Jan. 16, 1923. 1,442,288

UNITED STATES PATENT OFFICE.

WILL C. NEAHR, OF DENVER, COLORADO.

ELECTRIC SIGNALING SYSTEM.

Application filed December 17, 1918. Serial No. 267,172.

To all whom it may concern:

Be it known that I, WILL C. NEAHR, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Electric Signaling Systems, of which the following is a specification.

This invention relates to electric signaling instruments of the type commonly used at railroad crossings to indicate the approach of trains by the oscillating movement of a target or semaphore.

My invention relates more particularly to a system of the character shown and described in my application for Patent No. 218,515, filed February 21, 1918, and its primary object is to provide a combination of electrical devices and connections which with fewer parts and simpler circuits performs every function of the prior system at a considerably reduced expenditure of mechanical and electrical energy.

With this and other objects in view, all of which will fully appear in the course of the following description, my invention consists of the constructions and combinations of parts shown in the accompanying drawings in the various views of which like parts are similarly designated, and in which

Figure 1 represents a sectional front elevation of the signaling instrument with its operating mechanism in a condition of rest,

Figure 2, an enlarged view of the automatic switch connected with the oscillating semaphore of the instrument,

Figure 3, a section taken on the line 3—3, Figure 2,

Figure 4, a diagrammatic view of the circuits and electrical devices comprised in the improved system, and

Figures 5 to 8, views of the moving member of the electric switch shown in Figure 2, showing the different positions it occupies in each cycle of operations of the instrument.

Referring first to Figures 1 to 3 of the drawings, the signaling instrument in its preferred form comprises a water and dust-proof housing which in practice is placed upon a bracket 2 projecting from a pole or other elevated support.

The housing consists of a base 3 and a cover 4 which is hinged as at 5 and secured by a hasp 6 or other suitable fastening means.

The operating mechanisms which in its entirety is enclosed by the housing, consists of a bearing 7 which is mounted upon the base and adapted for the support of a rocker-shaft 8 from which the target 9 is suspended.

The rocker-shaft carries at one of its ends a segment-gear 10 which meshes with a pinion 12 on the rotating element of an electric motor 13 mounted upon a pedestal 14 which straddles the bearing.

The target of the instrument consists of a circular disk usually painted in conspicuous colors and bearing a cautionary legend, as for example, the word—"Stop". A lens-tube projecting at opposite sides of the target in the line of its axis, houses an incandescent lamp 15 which serves to illuminate the target at night.

The target is suspended from the rocker-shaft by a hollow rod 16 through which extend the conductors of electricity needed for the supply of current to the lamp.

The rocker-shaft carries at its end opposite to that at which the segment-gear is mounted, a cam 17 of fibre or other non-conducting material which has embedded in its outer face a contact-plate 18 which controls the circuits of the electric operating system, and a contact-plate 19 included in the circuit of the incandescent lamp carried by the semaphore.

The brushes or contacts which cooperate with the contact plates on the cam during its oscillating motion with the shaft are mounted upon a support of insulating material composed of two relatively adjustable blocks 20 and 21.

The lower block, 20, of the support is rigidly fastened upon the base of the housing between two angle pieces 22 and has two upwardly projecting threaded posts 23 for the adjustable support of the upper block.

The last-mentioned block has to this end two bores through which the posts loosely extend and the posts are equipped with a pair of nuts 24 upon which the block rests and a second pair of nuts 25 which engage the upper edge of the block to hold it against upward displacement.

The upper block of the support carries two contacts 26 and 27 which when the cam is in its central position of rest engage two upwardly extending pointed branches 28 of the contact-plate 18 as shown in Figures 2 and 4 of the drawings.

The lower block of the support carries a contact 29 which engages the lower or tail-end 30 of the contact-plate 18 which extends in an arc concentric with the axis of rotation of the cam, and a contact 31 which engages the contact-plate 19 which likewise lies in an arc concentric with the axis of the shaft.

The conductors of electricity 32 which extend through the hollow rod 16 in connection with the terminals of the lamp 15 are fastened to binding posts 33 on the lower ends of the two contact-plates.

A bolt 34 extending through a transverse bore of the lower block 20 serves to support a contact-finger 35 which extends upwardly between two stops 36 and 37 on the cam 17.

The stop 36 is insulated from the inlaid contact plates of the cam and the other stop 37 is in electrical connection with the contact-plate 18.

The last-mentioned stop and the finger 35 are provided with platinum contact-pieces 38, and the finger 35 which is mounted to move upon the bolt 34 is held against undue displacement between two washers 39 and 40 which by frictional engagement with its opposite sides maintain it in its adjusted positions.

The finger is preferably split longitudinally to permit of an accurate adjustment of the distances between its opposite edges and the stops 36 and 37, when in a medial position, by either separating its parts by the insertion of a tool in the slit between them or by closing them together with the aid of pliers or other suitable implement.

The electrical devices which control the movement of the semaphore and in turn are controlled by the movement thereof, are contained in a water- and dust-proof casing 41 of suitable construction mounted upon the base 3 within the housing and having exterior binding posts by which the devices are connected in the circuits of the system.

The electrical devices above referred to consist of two relay coils 42 and 43 one of which controls the position of three pivoted fingers 44, 45 and 46 with relation to contacts between which they extend and the other one of which controls the position of one pivoted finger 47 with relation to a single contact 48.

The finger 44 of the first-mentioned relay moves between two contacts 49 and 50, the finger 45 between two contacts 51 and 52, and the finger 46 between two contacts 53 and 54.

Inasmuch as the construction and manner of mounting the fingers and their contacts are immaterial in the operation of the electric system of which they are a part they have been indicated in the drawings only by the conventional symbols used in the diagrammatic representation of the circuit.

In the following description of the operation of the instrument, the different circuits by which the electrical elements of the system are interconnected will be traced with reference to the numerals used in Figure 4 of the drawings in which the source of electricity has been designated by the reference numeral 55 and the armature and field of the motor respectively by the reference numerals 56 and 57.

The numeral 58 indicates a switch in the power circuit which under normal conditions is in an open position and the numerals 59 and 60 designate the terminals at which the instrument is connected in the power circuit.

The switch or circuit breaker 58 is of a type which is automatically operated by the movement of a passing train to temporarily close the feed or power circuit the conductors of which are designated by the reference characters 61 and 62.

It will be understood, however, that any other switch may be used in connection with the signaling system to control the power circuit either by hand or through the instrumentality of a mechanical operating appliance.

When the instrument is in a condition of rest its semaphore hangs perpendicularly, the contacts 26 and 27 are engaged by the branches 28 of the contact-plate 18, the tail-piece of which is in constant engagement with the contact 29, as shown in Figure 4 of the drawings.

The finger 35 is under the same conditions either engaged or separated from the conductive stop 37 and the contact 31 is in constant engagement with the contact plate 19 which closes the circuit of the lamp on the semaphore, as will hereinafter be more fully described.

The relays 42 and 43 are deenergized and the consequent inactive position of the armatures holds the fingers 44, 45 and 46 of the coil 42 respectively in engagement with the contacts 49, 51 and 53 and the finger 47 of the coil 43 in separated relation to the contact 48.

When the power circuit is closed by actuation of the switch 58, the relay 43 is energized by a flow of current which follows the path indicated by the heavy solid lines in Figure 4 of the drawings.

This relay circuit includes commencing at the terminal 60, the conductor 63, the contact 29, the contact-plate 18, the contact 26, the conductor 65, the contact 51 of the relay 42, the finger 45 of the same, the conductor 66, the coil of the relay 43 and the conductor 67 which connects with the opposite terminal 59.

The energization of the relay 43 closes the motor-circuit which in the drawings has been shown in light broken lines, by the

engagement of its finger 47 with the contact 48. The motor circuit in its closed position comprises the following conductors of electricity:

Commencing at terminal 59, a portion of the conductor 67 of the relay circuit, the conductor 68, the finger 47 of the relay 43, the contact 48 which is engaged thereby, the conductor 69 which terminates in the contact 54 of the relay 42, the wire 70 which connects this contact with the contact 49 of the same relay, which is normally engaged by the finger 44, the conductor 71 which connects with the last-mentioned finger, the armature 56 of the motor, the conductor 72 which connects with the finger 46 of the relay 42, which normally engages the contact 53, the conductor 73 which connects with this contact, the field 57 of the motor and the conductor 74 which connects with the other terminal 60.

The finger 35 of the automatic circuit controlling element of the signaling instrument in cooperation with the stop 37 which is in electric connection with the contact-plate 18, provides an auxiliary switch which controls the current flow through the relay 42 which in the operation of the system serves to reverse the direction of the current-flow through the motor and thereby reverses the direction of rotation of its rotary element which is in driving connection with the rocker-shaft 8 of the semaphore.

Presuming that the finger 35 is separated from the contact 37 the closing of the motor-circuit through the relay 43 produces a counter-clockwise rotation of the rotary element of the motor, with the result that the rocker-shaft from which the semaphore is suspended rotates in the opposite direction as indicated by the arrow "*a*" in Figures 4, 5, and 6.

The motor continues its driving action upon the rocker-shaft until by movement of the cam of the automatic switch, its contact-plate 18 is separated from the contact 26 as shown in Figure 6, when the circuit of the relay 43 is broken and the relay is in consequence deenergized.

The deenergization of the relay breaks the motor-circuit by the separation of its finger 47 from the contact 48 and the rotary movement of the rocker-shaft incited by the operation of the motor, is now continued by the momentum of the semaphore only. Upon the conclusion of its swing, the semaphore causes the rocker-shaft to reverse its movement by gravitation, with the result that the conductive stop 37 on the contact-plate 18 moves into engagement with the finger 35 and closes the circuit of the relay 42.

This circuit which in the drawings is shown in a heavy broken line includes commencing at the terminal 60, the conductor 63, the contact 29, the plate 18, the contact 37, the finger 35, the conductor 75, the coil 42, the conductor 76, the conductor 67 and the opposite terminal 59.

The energization of the relay-coil 42 causes its fingers to reverse their position with relation to the contacts between which they extend so that the finger 46 engages the contact 54 and thereby establishes a connection between the before-mentioned conductors 69 and 70 of the motor-circuit, and the finger 45 is separated from the contact 51 and thereby breaks the circuit of the relay 43 at that point and at the same time engages the contact 52 to connect the contact 27 of the automatic switch in the motor circuit through the medium of the conductor 77 which in the drawings is shown in a dash-dot line.

The third finger 44 of the relay is separated from the contact 49 and thereby breaks the connection between the conductors 70 and 71 of the motor circuit at that point and at the same time establishes by engagement with the contact 50 a path for current between the conductors 71 and 73 of the motor-circuit through the medium of a conductor 78 which connects the contact 50 with the contact 53.

When by the return movement of the cam, the contact-plate 18 is brought in engagement with the contact 27, the relay coil 43 is reenergized by a flow of current along the following path. Commencing at the terminal 60 the conductor 63 which is common to both relay circuits, the contact 29, the contact-plate 18, the contact 27, the conductor 77, the contact 52 and the finger 45 of the relay 42, the conductor 66, the coil of the relay 43 and the conductor 67 which connects with the other terminal 59.

Both relays are now energized and the flow of current through the field of the motor is reversed as follows: Beginning at the terminal 59, a portion of the conductor 67 of the circuit of the relay 43, the conductor 68 of the motor circuit, the finger 47 of the relay 43, the contact 48, the conductor 69 of the motor-circuit connecting with the contact 54 of the relay 42, the finger 46 which engages the last-mentioned contact, the conductor 72, the armature 56 of the motor, the conductor 71, the finger 44 of the relay 42, the contact 50, the conductor 78 which connects the last-mentioned contact with the contact 53, the conductor 73, the field 57 of the motor and the conductor 74 which connects with the terminal 60.

The consequent rotation of the moving element of the motor in clockwise direction causes the rocker-shaft to turn likewise in the opposite direction, as illustrated in Figures 7 and 8, and the shaft is thus impelled until the contact-plate 18 disengages the contact 27 as shown in Figure 8, when the motor-circuit is broken and the rocker-shaft

continues its movement by the inertia of the semaphore.

After the semaphore has completed its swing, it returns to its position of equilibrium by gravitation, during which movement the finger 35 is again separated from the conductive stop 37 and all the parts are restored to their normal condition.

As soon as the contact-plate 18 engages the contact 26, the operation is repeated and a constant uniform oscillatory movement of the semaphore is thus produced by intermittently reversing the current flow through the field of the motor, as long as the circuit-breaker 58 remains in the closed condition.

It will be understood that if at the time the circuit-breaker is actuated to close the power circuit, the finger 35 of the auxiliary switch engages the conductive stop 37, both relays are energized and the motor begins its impellent movement by clockwise rotation of its rotary element.

The contact 31 which is in constant engagement with the contact-plate 19 of the cam 17 is connected with the terminal 59 by a conductor 79, and inasmuch as the lamp on the semaphore is connected with the binding posts of the two contact-plates by the conductors 32 passing through the hollow rod, current is continuously supplied to the lamp when the signal is in operation, along the following path:

Commencing at the terminal 60, the conductor 63, the contact 29 which is in constant engagement with the contact plate 18, one of the conductors 32, the filament of the lamp, the other conductor 32, the contact-plate 19, the contact 31 and the conductor 79 which connects with the opposite terminal 59.

What I claim and desire to secure by Letters-Patent is:

1. In a signaling-system, an oscillating member, an electric motor in driving connection therewith, a circuit, a relay-switch connected therein, a circuit for the motor controlled by the switch and including two selective paths for current, a second relay-switch controlling the current flow along said paths to reverse the direction of the current through the motor-circuit, a circuit for the second relay-switch, and circuit-breaking means operated by the movement of the member to periodically open the first mentioned circuit and to close and open the circuit of the second relay switch, alternately during the periods of inactivity of the motor.

2. In a signaling-system, an oscillating member, an electric motor in driving connection therewith, a circuit, a relay switch connected therein, a circuit for the motor controlled by the switch and including two selective paths for current, a second relay-switch controlling the current-flow along said paths to reverse the direction of the current through the motor-circuit, a circuit for the second relay-switch, a main switch operated by the movement of the member to periodically open the first mentioned circuit, and an auxiliary switch subordinate to the main switch, to open and close the circuit of the second relay-switch alternately during periods of inactivity of the motor.

In testimony whereof I have affixed my signature.

WILL C. NEAHR.