980,475.

A. J. BARLOW.

MOTOR CONTROLLED SWITCH.

APPLICATION FILED DEC. 4, 1909.

Patented Jan. 3, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

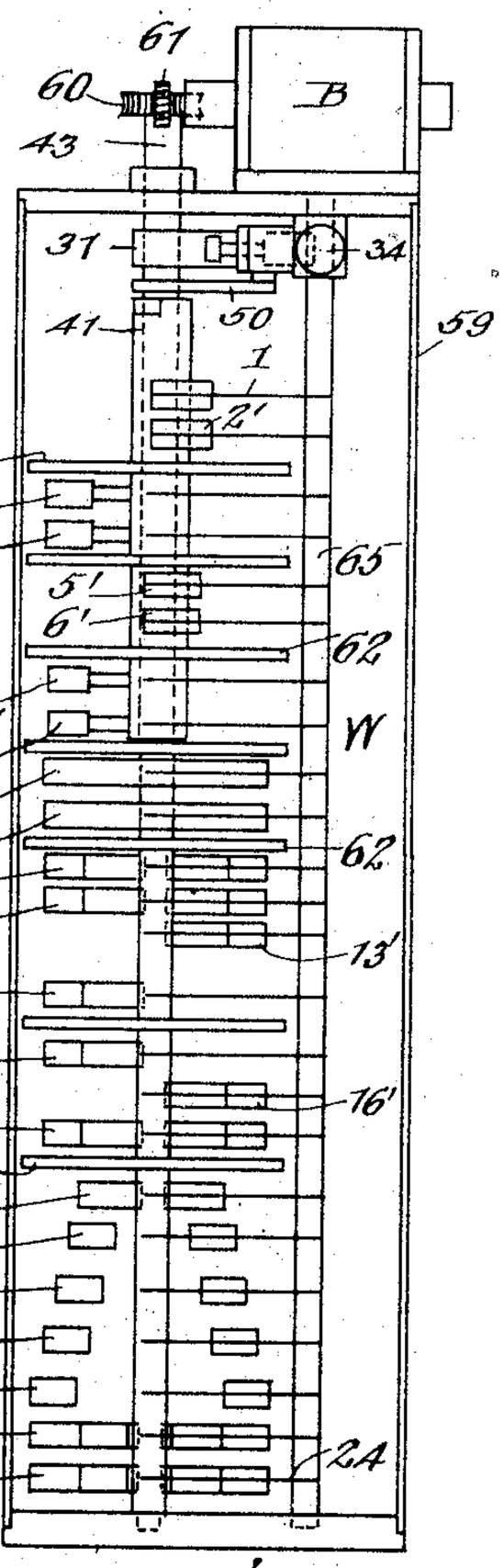
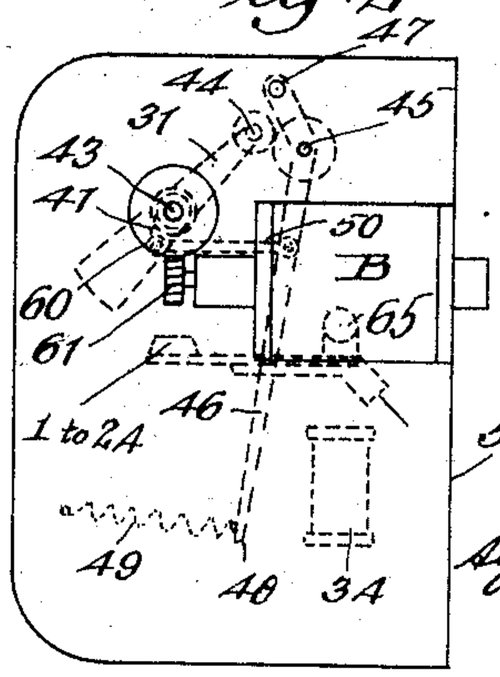


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

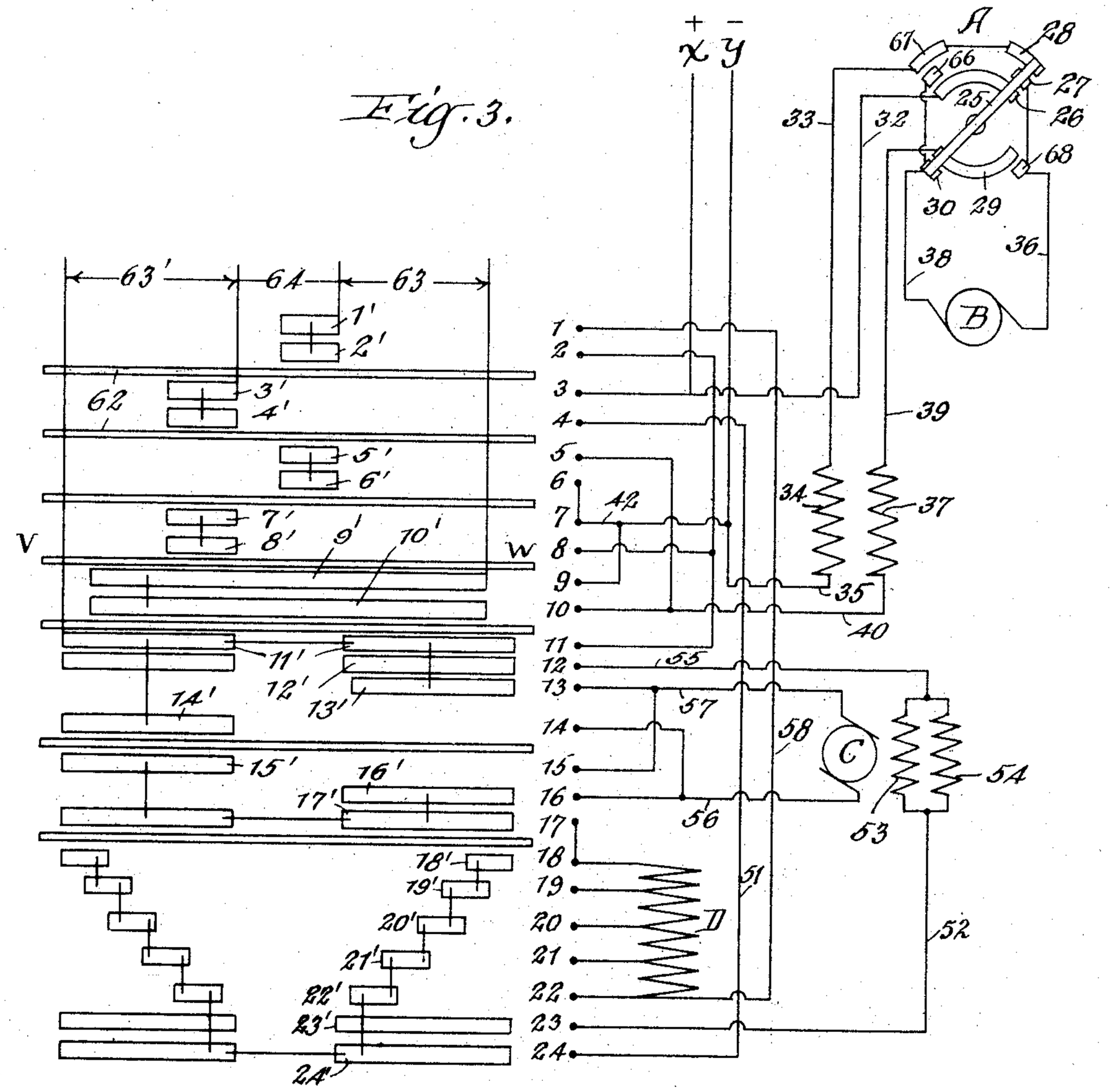
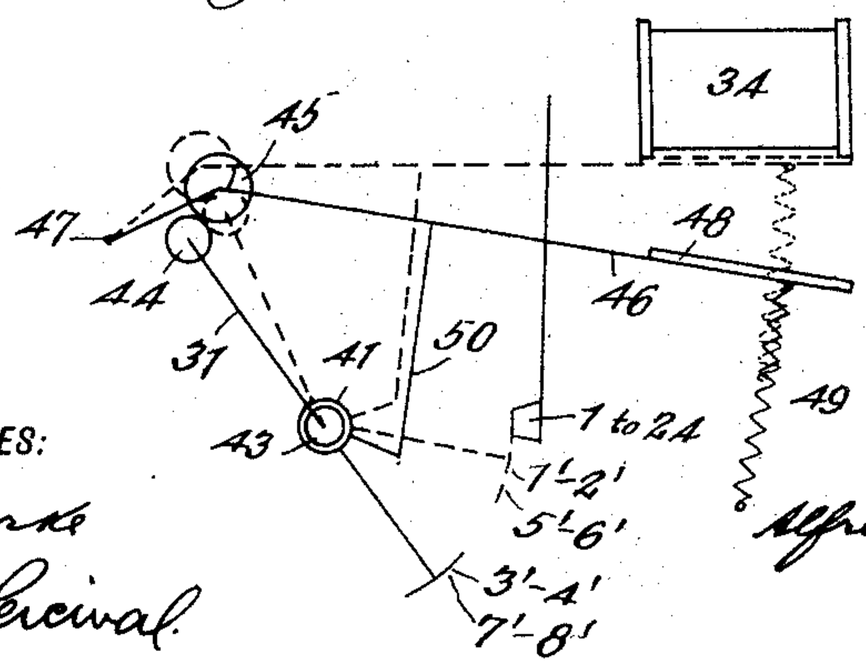


Fig. 4.



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UNITED STATES PATENT OFFICE.

ALFRED JAMES BARLOW, OF TOTTENHAM, ENGLAND, ASSIGNOR OF TWO-THIRDS TO ELECTROMOTOR EQUIPMENT COMPANY LIMITED, OF LONDON, ENGLAND.

MOTOR-CONTROLLED SWITCH.

980,475. Specification of Letters Patent. **Patented Jan. 3, 1911.**

Application filed December 4, 1909. Serial No. 531,408.

To all whom it may concern:

Be it known that I, ALFRED JAMES BARLOW, a subject of the King of England, residing at 25 Phillip Lane, Tottenham, in the county of Middlesex, England, have invented certain new and useful Improvements in Motor-Controlled Switches, of which the following is a specification.

My invention relates to a motor-controlled switch of the kind in which the pilot motor is always operatively geared direct to the switch spindle, without the interposition of clutches of any kind and has its circuit broken automatically when all the resistance in the main motor circuit has been cut out, and consists in the provision of additional contacts, whereby, for intermittent rotation of the main motor in any one direction, the main switch is left in starting position when the main motor is stopped, without further rotation of the pilot motor.

The means I employ according to my invention consists of the use of a type of switch known as the tramway or drum pattern to which I gear the said auxiliary motor direct, without the interposition of friction, magnetic, or like clutch devices, using additional contacts on the said switch with lever-operating and locking motion to facilitate starting the said auxiliary motor and for stopping the auxiliary motor after the said switch has been operated by the auxiliary motor for the purpose of starting the aforesaid main motor. The said lever operating the locking motion has a further object in stopping the said main motor when the voltage fails and in so doing reinstating the said additional contacts of the switch ready for repeating the cycle of operation.

My invention is carried out in the manner hereinafter described and illustrated by the accompanying drawings in which—

Figure 1 is an elevation and Fig. 2 a plan showing the mechanical construction of my invention, whereas Figs. 3 and 4 represent diagrammatically the electrical connections and parts of my improved motor-controlled switch.

The same letters and figures in the different views indicate the same or similar parts.

The drawings show the application of my improved motor controlled switch arranged for controlling a reversing motor.

A is an auxiliary switch, B is the auxiliary motor for operating my improved switch and C is the main motor. The function of the switch A is to cause the operation of the auxiliary motor in either direction as desired, which is effected by moving the lever, 25, from zero to either side. If, for example, it is moved to the right hand, then the said lever makes contact with the terminals 26, 27, 28 and simultaneously with terminals 29, 30.

X is the positive and Y the negative mains. The current path is as follows: through main X, lead 32 to terminal 26 and through the medium of the contact lever 25 to terminals 27, 28, thence through lead 33, no-voltage coil 34, lead 35 to negative main Y. The current simultaneously follows the path by lead 36 through the armature of the auxiliary motor, B, lead 38 and through the medium of the lever 25 via terminals 30, 29, lead 39, thence through the series field, 37, of the motor B, lead 40, finger contacts 5, 6, barrel contacts 5′, 6′, lead 42, into negative main Y, and as the motor circuit is completed, the motor B commences to operate the drum axis, 43, of the controller. If the lever 25 is moved to the left, the current flows through main X, lead 32, to terminal 26 and through the medium of the contact lever 25 to terminals 66, 67, thence through lead 33, no-voltage coil 34, lead 35 to negative main Y. The current simultaneously follows the path by lead 38, through the armature of the auxiliary motor B, lead 36 and through the medium of lever 25 via terminals 68, 29 lead 39, thence through the series field 37 of the motor B, lead 40, finger contacts 5, 6, barrel contacts 5′ 6′, lead 42, into negative main Y, and as the motor circuit is completed the motor B commences to operate the drum axis, 43, of the controller in the opposite direction to that when the lever of switch A was moved to the right-hand side, as previously described.

The function of the auxiliary motor B is to rotate the controller drum axis. The first portion of the movement completes the circuit of the main motor and the further movement of the drum axis cuts out the resistance. This is carried out in the following manner: The drum contacts below V, W, are connected through gear, to be described hereafter, with the motor B, while the contacts above V, W are mounted upon a sleeve, 41, which has free movement upon the drum axis, 43. This sleeve is operated

by a system of levers controlled by the drum axis in such a manner that the contacts above V, W, have a lead over the operative section of those below and thus make contact first. The system of levers preferably employed for operating the contacts above V, W, viz., 1′, 2′, 3′, 4′, 5′, 6′, 7′, 8′, which are mounted and self-contained with the loose sleeve, 41, consists of a lever, 46, having a fulcrum, 47, and provided with a roller, 45. The lever 46 is connected to the sleeve 41 by means of the connecting link, 50, and the lever 46 is also connected with a spring, 49, attached to the end of the lever portion, 48. The lever 46 is operated by the aforesaid spring 49 in an inward direction and by a lever 31 which is secured to the drum axis, 43, in an outward direction. The auxiliary motor B, in commencing to rotate the axis 43 causes the operation of the lever 31, which, through the medium of the roller, 44, forces the lever 46 in an outward direction. This movement outward of the lever 46 partially rotates the aforesaid sleeve 41 through the agency of the connecting link, 50. The normal position of the sleeve 41 before being partially rotated is such that the contacts 1′, 2′, 5′, 6′ are in connection with the finger contacts 1, 2, 5, 6, and the contacts 3′, 4′, 7′, 8′ are in the position indicated in Figs. 3 and 4. The result of the first stage of the partial rotation of sleeve 41 is to break connection between contacts 1′, 2′, 5′, 6′ and finger contacts 1, 2, 5, 6, and the continued rotation of sleeve 41 makes connection between the contacts 3′, 4′, 7′, 8′ and the finger contacts 3, 4, 7, 8. At the completion of the outward movement of the lever 46, the no-voltage coil 34 retains the lever in its outward position by magnetic attraction acting upon the part 48. The movement of the contacts above V, W, is now completed and the function of the spring 49 is to bring the lever 46, and through the medium of lever 41, the contacts 1′, 2′, 3′, 4′, 5′, 6′, 7′, 8′ to their normal position when the current is cut off from the no-voltage coil 34. The movement of the drum axis 43 continues to operate the contacts below V, W, after the contacts V, W, have completed their movements. It will thus be seen that the contacts above V, W, have a lead over the movements of the contacts below V, W. Upon current being cut off from the no-voltage coil by placing the lever 25 of the switch A in its zero position, the lever 46 is returned, by means of the spring 49, into the position shown by full lines in Fig. 4.

The movement outward of the lever 46, as above described, through the medium of the connecting link 50, operates the sleeve contacts 1′, 2′, 3′, 4′, 5′, 6′, 7′, 8′, with the following results: 1′, 2′, 5′, 6′ break contact, whereas 3′, 4′, 7′, 8′ make contact with their respective finger contacts. The current path is then as follows: finger contacts 3, 4, through lead 51, finger contacts 24 (at this point the further movement of the drum axis 43 connects contacts 24, 23) via lead 52, shunt field 53, brake 54, lead 55, contacts 12, 11, contacts 8, 7, thence through lead 52 to the negative main Y. The further continued movement of the drum axis 43 completes the armature circuit of the main motor C, by the drum contact 22′ engaging the finger contact 22 when the current passes through the resistance D, finger contacts 18, 17, drum contacts 17′, 16′, finger contact 16, lead 56, armature C, lead 57, the drum contacts 13′, 12′ 11′ engaging finger contacts 13, 12, 11 the current passes to finger contact 8, then by drum contacts 8′, 7′, to finger contact 7 by lead 42, to the negative main Y. The further continued movement of the drum axis 43 cuts out the resistance D step-by-step in the following manner: drum contacts 21′, 20′, 19′, 18′ making contact with their corresponding finger contacts 21, 20, 19, 18, consecutively in the predetermined period of time regulated by the speed of rotation of the axis 43; and when all are cut out the drum contacts 9′, 10′ break connection with the finger contacts 9, 10, interrupting the circuit of the auxiliary motor and thereby stopping the same. The main motor continues to rotate until the lever 25 of the switch A is returned to zero position, as previously described, when the lever 46, being returned by the spring 49 to the normal position shown by full lines, reinstates the drum contacts 1′, 2′, 5′, 6′ in engagement with the finger contacts 1, 2, 5, 6 with the result that a closed circuit is formed through the armature of the main motor C, effecting a dynamic action assisting the stopping of motor C. The closed circuit is as follows: commencing with finger contact 1, lead 58, resistance D, finger contact 17, drum contacts 17′, 16′, lead 56, through armature of motor C, lead 57, finger contact 13, drum contacts 13′, 12′, 11′, finger contact 11, to finger contact 2, which by drum contacts 2′, 1′, makes the closed circuit complete without any connection with the positive main X or the negative main Y. The main motor then becomes a generator, and the current passing through the resistance D assists in stopping the main motor C. The drum contacts 5′, 6′ engage the finger contacts 5, 6, and the apparatus is in readiness for the next cycle of operation.

When the starter, or steering switch commutator, has reached one of the final starting positions, and when the elevator is again stopped by reversing the commutator A to the zero position, only the upper half of the steering switch commutator (contact above V, W) is guided back to the zero position, but not the lower roller-part which bears the starting contacts for the principal motor.

The lower contact-roller-part is placed in the neutral position before the principal commutator is engaged; this is the reason why no current passes through the drum toward the principal motor until the neutral position is reached, and there is no need of any further motion of the lower part of the drum in order to cut out the resistance in a certain time. In case the drum is stopped in the position shown in Fig. 4 through the medium of the roller 44, and in case said drum is to be turned in one direction, it would be necessary for the roller 44 to describe almost a complete circle before it could act upon roller 45, so that the roller 44 is capable of acting upon roller 45 only if the lower part of the contact-bearing drum is in the neutral position. The circuit of the principal motor is not closed until the lower part of the steering switch commutator or of the starter has reached the neutral position, in which position alone the principal commutator is thrown into gear, ready for the traversing of the current which results from the further revolutions of the lower part, so that the neutral position, as above described, must be reached whether the principal motor is to revolve in one or in the other direction. The resistance is therefore again completely engaged before the circuit of the principal motor is closed.

The auxiliary motor B can be conveniently fixed upon the top of the casing, 59, containing the controller, and the type of gear which I prefer to use consists of a worm wheel, 60, secured upon the axis 43 engaged by the worm, 61, secured upon the axis of the motor B.

The insulation diaphragms between the drum contacts are marked 62. The finger contacts 1 to 24 are carried by the bar 65. While the portion 64 is opposite the finger contacts the motor C is at rest. When the portion 63 is opposite the finger contacts the motor C is running in one direction, and 63′ represents the portion when the motor is running in the opposite direction.

Having described this invention in connection with the illustrative embodiment thereof to the details of which disclosure the invention is not, of course, to be limited what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

1. An apparatus of the class described in combination, a main motor, a rotatable member provided with contacts adapted to control the circuit thereof, an auxiliary motor directly geared to said rotatable member to actuate the same, a switch controlling said auxiliary motor, means actuated by said rotatable member for closing the circuit of said main motor and means controlled by said switch for maintaining said first mentioned means in its operative position.

2. An apparatus of the class described in combination, a main motor, a rotatable member provided with contacts adapted to control the circuit thereof, an auxiliary motor directly geared to said rotatable member to actuate the same, a switch controlling said auxiliary motor, means actuated by said rotatable member for closing the circuit of said main motor, electro-magnetic means controlled by said switch for maintaining said first mentioned means in its operative position, and means for causing said first mentioned means to return to its normal position upon the opening of said switch.

3. An apparatus of the class described in combination, a main motor, a rotatable spindle provided with contacts adapted to control the circuit of the main motor, an auxiliary motor directly geared to said spindle to actuate the same, a switch for controlling said auxiliary motor, a sleeve rotatably mounted upon said spindle and provided with contacts controlling the main motor circuit, means operatively associated with said spindle for rotating said sleeve and means controlled by said switch for maintaining said sleeve in its operative position.

4. An apparatus of the class described in combination, a main motor, a rotatable spindle provided with contacts adapted to control the circuit thereof, an auxiliary motor directly geared to said spindle to actuate the same, a switch controlling said auxiliary motor, a sleeve rotatably mounted upon said spindle and provided with contacts controlling the main motor circuit, means operatively associated with said spindle for rotating said sleeve, means controlled by said switch for maintaining said sleeve in its operative position, and means for returning said sleeve to its normal position upon the opening of said switch.

5. An apparatus of the class described in combination, a main motor, a rotatable spindle provided with contacts adapted to control the circuit thereof, an auxiliary motor geared to said spindle to actuate the same, a switch for controlling said auxiliary motor, a sleeve rotatably mounted upon said spindle, said sleeve being provided with contacts normally in said auxiliary motor circuit and with other contacts adapted to close said main motor circuit upon actuation of the sleeve, means actuated by said spindle for rotating said sleeve to close said main motor circuit and means controlled by said switch to maintain said sleeve in its moved position.

6. An apparatus of the class described in combination, a main motor, a rotatable spindle provided with contacts adapted to control the circuit thereof, an auxiliary motor geared to said spindle to actuate the same, a switch for controlling said auxiliary motor,

a sleeve rotatably mounted upon said spindle, said sleeve being provided with contacts normally in said auxiliary motor circuit and with other contacts adapted to close said main motor circuit upon actuation of the sleeve, means actuated by said spindle to rotate said sleeve to bring the main motor circuit contacts carried thereby into operative position before the main motor circuit contacts carried by the spindle assume their operative positions and means controlled by said switch to maintain said sleeve in its moved position.

7. An apparatus of the class described in combination, a main motor, an auxiliary motor, a switch controlling said auxiliary motor, a member actuated by said auxiliary motor and provided with contacts for controlling the circuit of said main motor, said member being provided with contacts adapted to control said auxiliary motor circuit, said contacts being so positioned upon said member that the contacts controlling said auxiliary motor circuit will be actuated to break said circuit upon the completion of the main motor circuit by said first mentioned contacts.

In witness whereof I have signed this specification in the presence of two witnesses.

ALFRED JAMES BARLOW.

Witnesses:
THOMAS MEACOCK,
THOMAS ALLARLL.