D. D. HUNGERFORD.

AUTOMATIC STOP AND REVERSE MECHANISM.

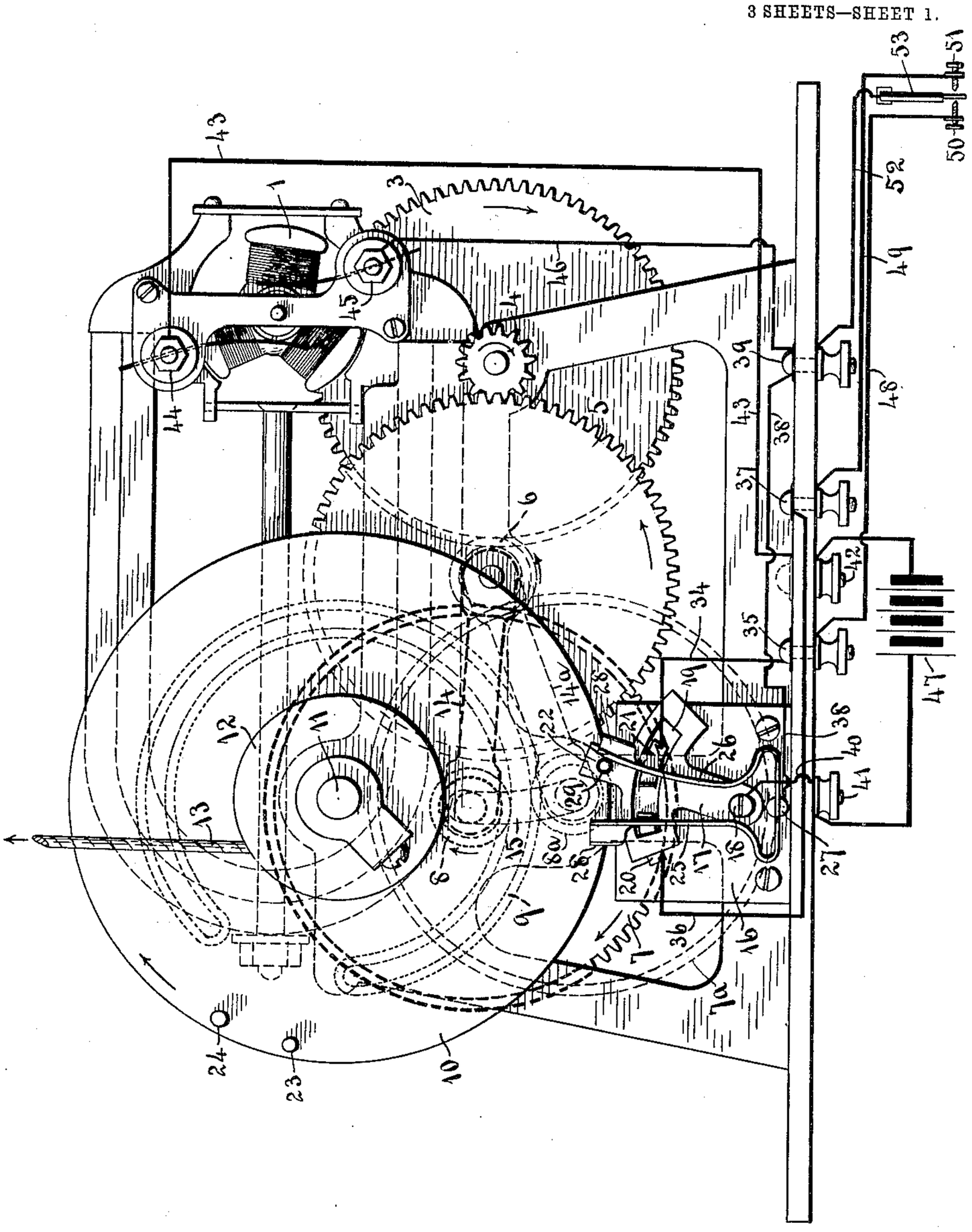
APPLICATION FILED JULY 22, 1909.

952,991.

Patented Mar. 22, 1910.

3 SHEETS—SHEET 1.

Fig. 1.



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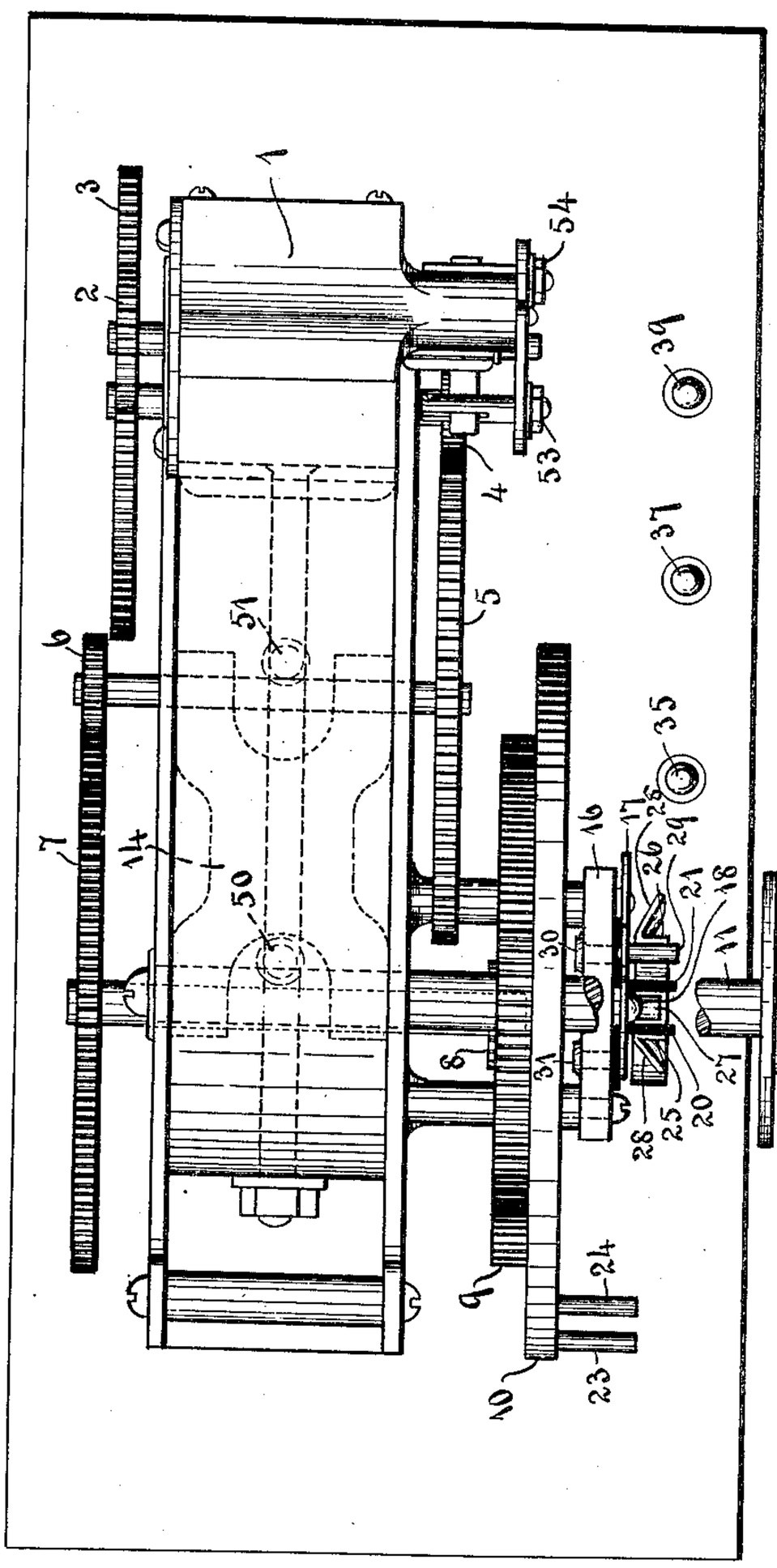
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 4.

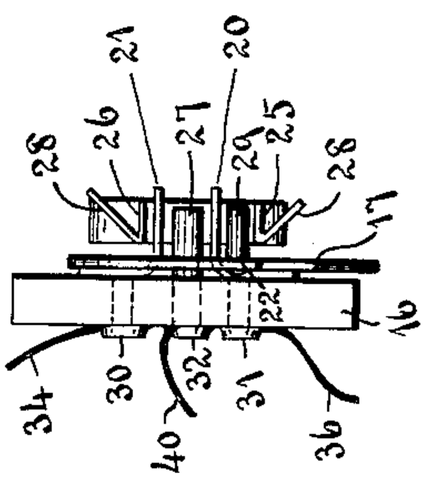


Fig. 5.

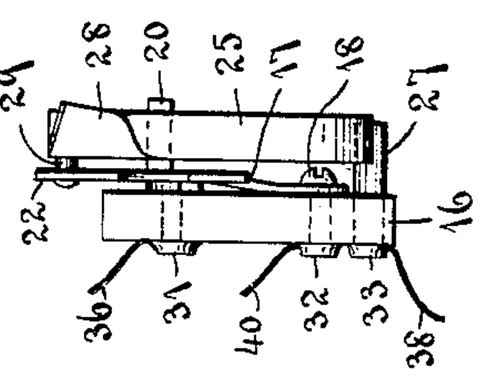
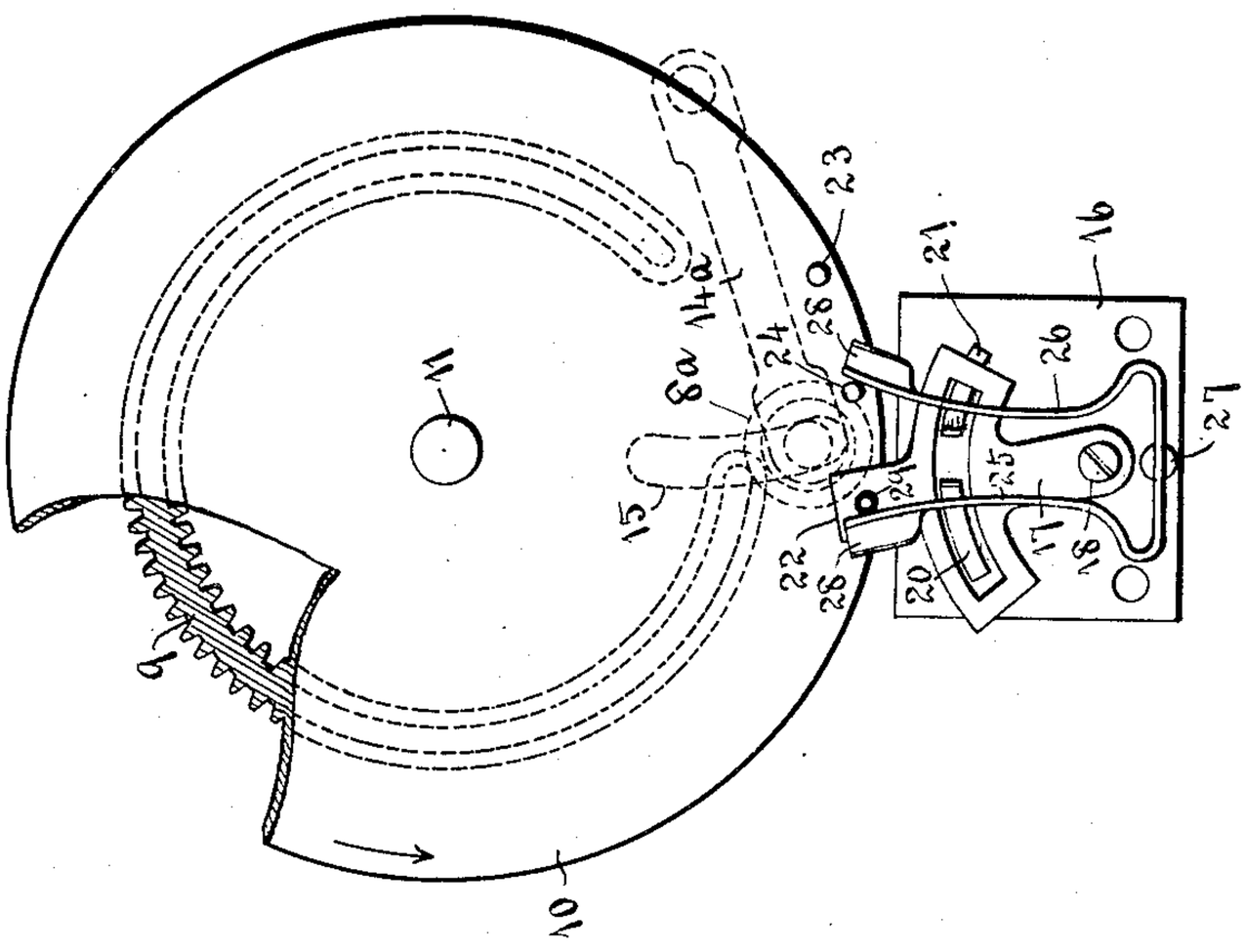


Fig. 3.



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DANIEL D. HUNGERFORD, OF ELMIRA, NEW YORK, ASSIGNOR TO AMERICAN THERMOSTAT COMPANY, OF ELMIRA, NEW YORK.

AUTOMATIC STOP AND REVERSE MECHANISM.

952,991. Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed July 22, 1909. Serial No. 509,070.

To all whom it may concern:

Be it known that I, DANIEL D. HUNGERFORD, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Automatic Stop and Reverse Mechanisms, of which the following is a specification.

This invention relates to improvements in electrically controlled motor driven stop and reverse mechanisms such as are employed in thermostatic damper regulating apparatus, automatic clock winders, and the like.

The object of my invention is to provide means whereby the reverse motion will be accomplished without reversing the motor, in combination with an automatic stop and reverse switch, whereby the connections leading to the circuit closing device will be short circuited immediately upon the closing of the motor circuit; thereby eliminating the effect of any fluctuation in the circuit closer, and insuring the continuous operation of the mechanism for the prescribed period, or number of revolutions.

I attain my object by constructing the mechanism in the manner illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of the mechanism; Fig. 2, a plan view thereof; Fig. 3, a detail showing the position of the switch parts when the battery circuit has been opened to stop the motor; and Figs. 4 and 5, details showing plan and end views respectively of the switch.

Like numerals designate like parts in the several views.

The mechanism is herein illustrated as arranged for connection with a thermostat for damper regulating purposes. Upon a suitable frame an electric motor 1 is mounted to drive, through a train of reducing gears 2, 3, 4, 5, 6, and 7, a pinion 8, which meshes with the gear teeth 9 on the inward side of the mangle wheel 10, on the drum shaft 11. This shaft projects outwardly at one side of the mechanism to receive a drum 12, to which a cable or chain 13 is attached; said cable being suitably connected to the damper, or dampers, which are to be opened and closed by the operation of the mechanism.

The shaft for the pinion 8 and gear 7 is mounted in a bearing 14, which is pivotally hung on the shaft for the gears 5 and 6, and the side frames of the mechanism are slotted at 15, as indicated by the broken lines in Fig. 1, to permit the pinion 8 to pass from the position 8 to the position 8^a as it operates the mangle wheel gear. As shown in Fig. 1, the wheel is being rotated from left to right, as indicated by the arrows, the positions of the gear 7, pinion 8, and bearing 14 being shown by the heavy lines. The positions of these parts for the reverse motion of the wheel are indicated by the lighter line positions 7^a, 8^a, and 14^a.

Below the mangle wheel, there is an upright switchboard 16, of insulating material, upon which an oscillating switchplate 17 is mounted, said plate swinging upon a pivot screw 18. The switchplate is provided with a curved slot 19, so as to be thrown into and out of engagement with the contacts 20 and 21, which are fastened to the outward face of the switchboard. At its top, the switchplate 17 is provided with a projection 22, so positioned as to be struck by one or the other of the pins 23 and 24 on the mangle wheel, as the wheel rotates in one direction or the other.

Outside of the switchplate, there are two spring arms 25 and 26, fastened to a post 27, which projects from the switchboard below the switchplate. These spring arms at their upper ends are adapted to be engaged by a pin 29, which extends outwardly from the projection 22 on the switchplate, said pin being provided with an insulating sleeve to prevent the electric current from passing from the spring arms to the switchplate. These spring arms are provided at their upper ends with flaring sidepieces 28, whereby, when the pins 23 and 24 strike the ends of the respective arms, the arms will be sprung outward to permit the passage of the pins by them. The contacts 20 and 21 are bent outward at their adjacent ends, so that they will be engaged by the spring arms 25 and 26, respectively, as will hereinafter be described.

At the back of the switchboard the contacts 20 and 21 are provided with wire connections 31 and 30, respectively, the pivot 18 with wire connection 32, and the post 27 with wire connection 33. From the connections 30 and 31 wires 34 and 36 are carried to binding posts 35 and 37, respectively, on the bedplate of the mechanism, (see Fig. 1). From the wire connection 33 wire 38 runs to the binding post 39, and from the

wire connection 32 wire 40 runs to the binding post 41. From the binding post 42 a wire 43 runs to the brush holder 44 on the motor; and from the other brush holder 45, wire 46 runs to the binding post 39. This wiring is all done when the machine is assembled. When placed in position connections are made by wires from the binding posts 41 and 42 to the battery 47, and it is immaterial which way the current flows. The binding posts 35 and 37 are connected by the wires 48 and 49 with the opposite contact points 50 and 51, respectively, of a thermostat, the binding post 39 being connected by wire 52 with the thermostat bar 53.

As the several parts are shown in Fig. 1, there has been a rise in temperature and the mechanism has been set in motion in the direction indicated by the arrows, to unwind the cable 13 and close the draft dampers. To start the mechanism in motion, the thermostat bar has been thrown into engagement with the righthand contact 51, thereby closing the circuit between the wires 49 and 52; and thus closing the battery circuit to the motor through wire 52, binding post 39, wire 46, the motor brushes 45 and 44, wire 43, binding post 42, through the battery 47 to binding post 41; thence by wire 40, to the switchplate 17; thence through contact 20, and wire 36 to binding post 37 and the wire 49. After the motor starts, the spring arm 25, as hereafter will be explained, engages the contact 20, and thereafter the battery circuit to the motor runs from contact 20 through spring arm 25, post 27, and wire 38 to binding post 39; thence, short circuiting the thermostat wires, the current passes through wire 46, to the motor; thence from the motor through wire 43 and binding post 42 to the battery; thence through binding post 41, wire 40, and switchplate 17, back to contact 20. The battery circuit to the motor is thus held closed regardless of the action of the thermostat until the mangle wheel has made a complete revolution.

When the mangle wheel nears the end of its revolution, (see Fig. 3), the pin 24 snaps past the spring arm 26, and pushes the switchplate 17 over to the left, thereby moving the switchplate out of engagement with contact 20 and into engagement with contact 21, and also pushing the spring arm 25 out of engagement with contact 20, since the pin 29, on projection 22, will engage the end of the spring arm 25, and bend it away from the contact. After the pin 24 has passed the spring arm 26, said arm springs back into engagement with contact 21, and establishes a short circuit from the battery to the motor through the contact 21, which is now in engagement with the switchplate 17. The current now passes from the battery through the binding post 41, wire 40, switchplate 17, contact 21, spring arm 26, wires 38 and 46, to the motor; thence back through wire 43 to binding post 42 and to the battery. During this period the pinion 8 passes around the end of the mangle wheel gear and down into its lower position, thereby starting the wheel backward, as indicated by the arrow in Fig. 3. The backward motion of the wheel brings the pin 24 again into engagement with the spring arm 26, and forces it away from contact 21. The parts are then in the position shown in Fig. 3, and the battery circuit to the motor is opened, thereby stopping the motor.

When the temperature falls and the thermostat bar is thrown to the left, the battery circuit to the motor is again closed, the current then passing from the battery through binding post 41, wire 40, switchplate 17, contact 21, wire 34, to binding post 35; thence, through wires 48 and 52, to binding post 39; thence through wires 46 and 43 to and from the motor to binding post 42, and back to the battery. As soon as the wheel is started on its return movement the pin 24 will be snapped past the spring arm 26, and said arm will again engage the contact 21, thereby short circuiting the thermostat connections, and holding the motor circuit closed until the wheel has completed its return motion, at which time the pin 23 will strike the switchplate, throwing it over to the right, and then partially return it to throw the spring arm 25 out of engagement with contact 20, in the same manner as described with reference to pin 24 and spring arm 26.

As so constructed, the mechanism runs independent of the direction of flow of the electric current; and the mangle wheel, as it arrives at the end of each oscillation automatically stops the motor and opens the direct battery circuit to the motor, so that the motor can only be started by the action of the circuit closing device, which, in this instance, is the thermostat. After the motor is started, it will not stop until the mangle wheel has completed a full oscillation, regardless of any fluctuations of the circuit closing device. This gives a positive reciprocatory movement to the cable, which may be utilized for many purposes.

The mechanism may be arranged to be operated by different circuit closing devices, either manual or automatic, to meet different requirements, and I do not limit myself to any particular arrangement or application of the mechanism in this respect. Moreover, the mangle wheel may be driven by any electrically controlled motor.

I claim as my invention, and desire to secure by Letters Patent—

1. The combination, with an electric motor having a circuit controlled by a circuit closing device, of a mangle wheel driven by the motor, a switch in the circuit adapted

to be actuated by the mangle wheel at the end of each oscillation to open the circuit and stop the motor, and means actuated by the starting of the wheel in motion for short circuiting the connections leading to the circuit closing device.

2. The combination, with a motor driven mangle wheel, of an electric circuit controlled by a circuit closing device by which the motor may be set in motion, and a switch in the circuit adapted to be actuated by the mangle wheel at the end of each oscillation to open the circuit and stop the motor.

3. The combination, with a motor driven mangle wheel, of an electric circuit controlled by a circuit closing device by which the motor may be set in motion, a switch in the circuit adapted to be actuated by the mangle wheel at the end of each oscillation to open the switch and stop the motor, and means actuated by the wheel at the same time whereby the circuit will be placed in position to be closed by the circuit closing device to again start the motor.

4. The combination, with a motor driven mangle wheel, of an electric circuit controlled by a circuit closing device by which the motor may be set in motion, a switch in the circuit adapted to be actuated by the mangle wheel at the end of each oscillation to open the circuit and stop the motor, means actuated by the wheel at the same time whereby the circuit will be placed in condition to be closed by the circuit closing device to again start the motor, and means actuated by the starting of the wheel in motion for short circuiting the connections leading to the circuit closing device.

5. The combination, with a motor driven mangle wheel and an electric circuit controlled by a circuit closing device by which the motor may be set in motion, of a switch in the circuit comprising a switchplate pivotally mounted adjacent the mangle wheel, a contact adapted to be placed in and out of engagement with the switchplate when the plate is moved from one side to the other, and means on the mangle wheel for engaging the switchplate at the end of an oscillation to shift the plate.

6. The combination, with a motor driven mangle wheel and an electric circuit controlled by a circuit closing device by which the motor may be set in motion, of a switch in the circuit comprising a switchplate pivotally mounted adjacent the mangle wheel, a contact adapted to be placed in and out of engagement with the switchplate when the plate is moved from one side to the other, means on the mangle wheel for engaging the switchplate at the end of an oscillation to shift the plate, and means actuated by the starting of the mangle wheel for short circuiting the circuit closing device.

7. The combination, with a motor driven mangle wheel and an electric circuit controlled by a double acting circuit closing device by which the motor may be set in motion, a switch in the circuit comprising a switchplate pivotally mounted adjacent the mangle wheel, oppositely disposed contacts adapted to be placed in and out of engagement alternately with the switchplate when the plate is moved from one side to the other, connections leading from each of said contacts to a contact on the circuit closer, and means on the mangle wheel for engaging the switch plate at the end of each oscillation to shift the plate.

8. The combination, with a motor driven mangle wheel and an electric circuit controlled by a double acting circuit closing device by which the motor may be set in motion, a switch in the circuit comprising a switchplate pivotally mounted adjacent the mangle wheel, oppositely disposed contacts adapted to be placed in and out of engagement alternately with the switchplate when the plate is moved from one side to the other, connections leading from each of said contacts to a contact on the circuit closer, means on the mangle wheel for engaging the switchplate at the end of each oscillation to shift the plate, and means actuated by the starting of the mangle wheel in either direction for short circuiting the connections leading to the circuit closing device.

9. The switch comprising a pivotally mounted switchplate having a curved slot, oppositely disposed contacts in the line of travel of said slot whereby the contacts will be placed alternately in engagement with the switchplate as it is shifted from one side to the other, projections provided on the adjacent ends of the contacts which pass outward through the slot, and spring arms adapted to be moved in and out of engagement with said projections, the switchplate and spring arms having connection with an electric circuit, and the contacts with a circuit closing device.

10. The switch comprising a pivotally mounted switchplate having a curved slot, oppositely disposed contacts in the line of travel of said slot whereby the contacts will be placed alternately in engagement with the switchplate as it is shifted from one side to the other, projections provided on the adjacent ends of the contacts which pass outward through the slot, spring arms adapted to be moved in and out of engagement with said projections, the switchplate and spring arms having connection with an electric circuit, and the contacts with a circuit closing device, said switch being in combination with a mangle wheel driven by a motor operated by said circuit, and said wheel being provided with means for

shifting the switchplate and spring arms at the end of each oscillation substantially as described.

11. A stop and reverse mechanism comprising a shaft, a motor adapted to drive the shaft, an electric circuit to operate the motor, a circuit closing device, a switch actuated through the shaft to stop the motor when the shaft has turned through a prescribed angular distance, and means for reversing the direction of rotation of the shaft without reversing the motor when the motor is next set in motion.

In testimony whereof I have affixed my signature, in presence of two witnesses.

DANIEL D. HUNGERFORD.

Witnesses:
M. E. VERBECK,
EUGENE DIVEN.