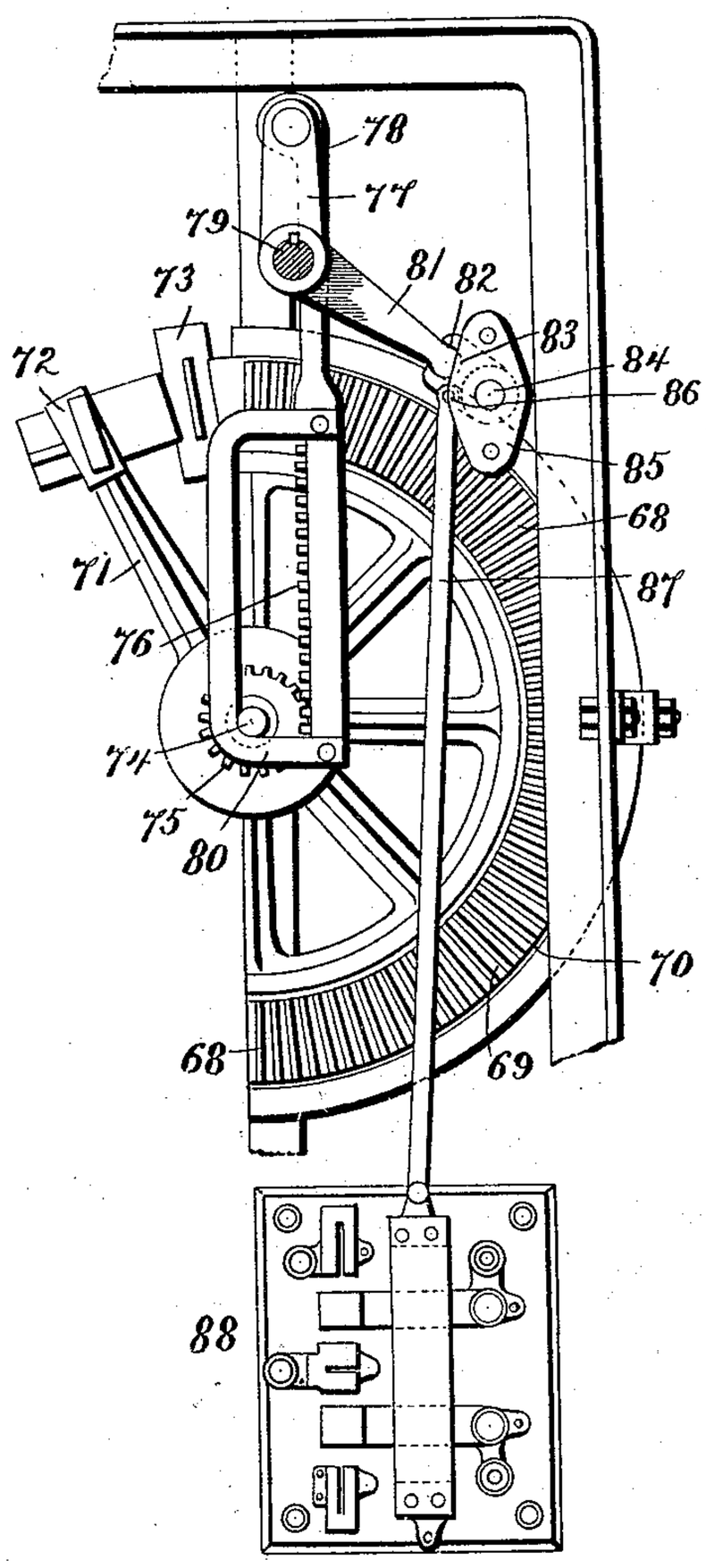
(No Model.) 2 Sheets—Sheet 1.

W. H. MORGAN.

CURRENT CONTROLLING DEVICE.

No. 509,322. Patented Nov. 21, 1893.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

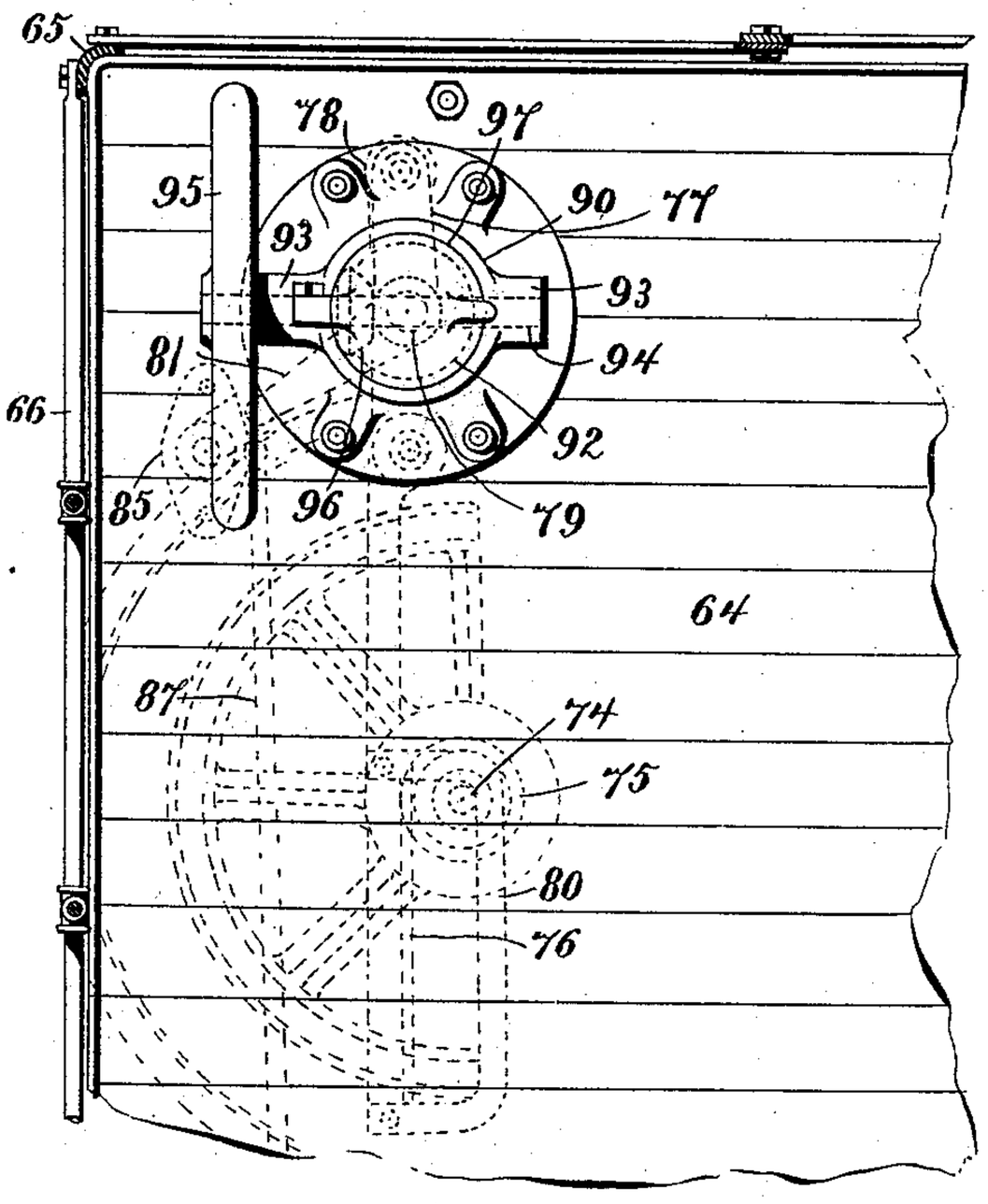
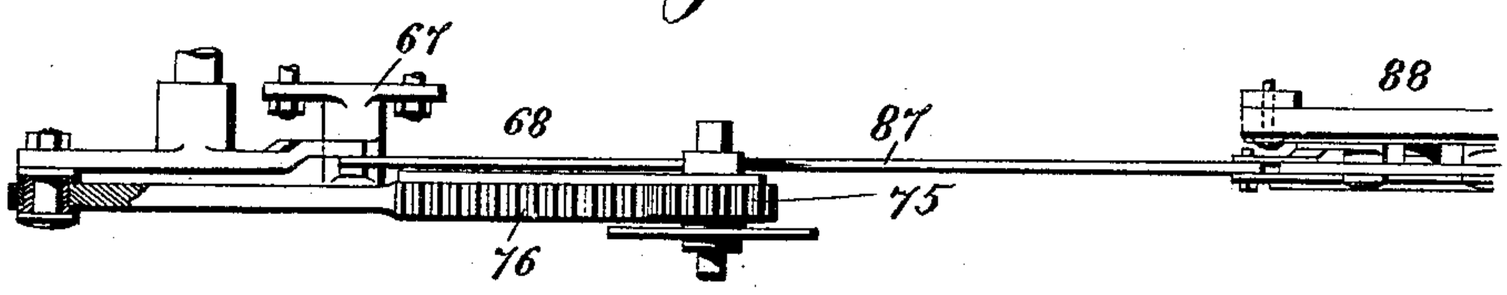


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM HENRY MORGAN, OF ALLIANCE, OHIO, ASSIGNOR OF THREE-FOURTHS TO THOMAS R. MORGAN, SR., THOMAS R. MORGAN, JR., AND JOHN R. MORGAN, OF SAME PLACE.

CURRENT-CONTROLLING DEVICE.

SPECIFICATION forming part of Letters Patent No. 509,322, dated November 21, 1893.

Original application filed July 22, 1891, Serial No. 400,341. Divided and this application filed September 22, 1892. Serial No. 446,594. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY MORGAN, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Current-Controlling Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in current controlling devices whereby electric motors may be started, controlled, stopped and reversed and is a division of application Serial No. 400,341, filed by me July 22, 1891.

My invention consists of a rheostat and reversing switch coupled to a common operating mechanism and so constructed that the switch may be moved in either direction to start the motor forward or backward as the case may be, while the rheostat will always operate to include a greater or less amount of resistance in the motor circuit so that the current flowing through the same may be controlled in the usual manner.

In the accompanying drawings Figure 1 is a view in plan showing the rheostat and reversing switch together with the connecting and operating mechanism. Fig. 2 is a view in edge elevation showing the operating mechanism and switch, and Fig. 3 is one of the operating stands.

This device was designed to be employed in connection with overhead traveling cranes, but it is equally applicable for other machines and devices employing an electric motor. When employed with a traveling crane, the parts to be described are carried by the operator's cage hung from one end of the bridge. This cage consists of a platform 64 suspended by hangers 65 secured at their lower ends to the platform and at their upper ends to the bridge. The cage is provided with guard rails 66, to prevent the operator from accidentally stepping from the platform. Secured to the under side of the platform by brackets 67, are rheostats 68, one for each motor on the crane, and each included in the respective motor circuit. Each rheostat consists essentially of a semi-circular series of resistance plates (or coils) 69, seated in the semi-circular groove or channel formed in a frame 70. Pivotally supported at a point central to the semi-circular series of resistance plates, there is an arm 71, carrying at its outer end a brush 72 constructed to sweep over the resistance plates as the arm is swung on its pivot, and make contact successively with the exposed edges of said plates, or with separate contact plates when the rheostat is formed of coils of wire or other resistance material.

The construction of the rheostat is such that when the circuit is completed by moving the brush 72 onto the contact plate 73 which is the first one of the series of resistance plates, the entire resistance is included in the circuit, and as the forward movement of the brush is continued, the resistance plates are successively cut out of circuit and the resistance correspondingly reduced until the brush arm has reached the other end of the semi-circular series of plates at which point the resistance is entirely cut out of the circuit and the full current flows to the motor.

The pivotal support of the arm 71 consists of an upright spindle 74, journaled in the frame 70 and carrying above the arm 71, a pinion 75 meshing with a rack bar 76, which serves to partially rotate the pinion 75, thereby causing the brush arm to sweep over the resistance plates in the manner described.

The rack bar 76 is pivotally connected at one end to an arm 77 of a bell-crank lever 78 on the lower end of an upright shaft 79 extending upward through the platform 64. The other end of the rack bar is maintained in engagement with the pinion 75 by means of a guide frame 80 consisting essentially of a bar or rod having its ends bent at right angles to the main portion and there secured to the upper face of the rack bar so that the main portion of the guide frame is parallel with the toothed edge of the rack bar and sufficiently above the latter to rest on the upper face of the pinion 75 when the rack bar is in engagement therewith. The frame 80 is of such dimension that when the rack bar is in engagement with the pinion 75, the in-

ner edge of the said frame will bear against the spindle 74 and being parallel to the toothed edge of the rack bar, will maintain the latter always in contact with the pinion while the other end of the rack bar is moved through an arc shaped path by the bell-crank lever 78. It will be observed that as shown in the drawings, the rack bar is at the limit of its movement in one direction and that whether the shaft 79 be turned in one direction altogether, the rack bar will be moved to rotate the pinion 75 in one direction only, that is, in a direction which will carry the brush arm over the resistance plates.

The bell-crank lever 78 is provided with an arm 81 terminating in a knuckle 82, in the path of which is a socket arm 83, projecting from an upright hub 84 pivotally mounted in a bracket 85 depending from the under side of the platform 64. The hub 84, has a stud 86 projecting from it to which stud is pivoted a link 87, connected to the movable member of a reversing switch 88 which latter may be of any well known construction.

When the parts are in position, shown in Fig. 1, the rheostat switch arm is at the limit of its movement in one direction with the brush 72 on the idle contact 73, while the knuckle arm 81 of the bell-crank lever, is in engagement with the socket arm 83 and the latter is in such a position that the movable member of the switch 88 is midway between the contacts of said switch so that the circuit is broken. If now the shaft 79 be turned in one direction altogether, the knuckle arm 81 will move the hub 84 on its pivot until the movable member of the switch 88 makes contact with the contact plates of said switch to either drive the motor ahead or to reverse the same, as the case may be, and the knuckle arm then escapes from the socket in the arm 83. The movement of the switch operating mechanism is so timed that when the circuit has been completed at the reversing switch, the rack bar has turned the pinion 75 sufficiently to bring the brush 72 into contact with the first of a series of resistance plates, thus establishing the motor circuit and including the maximum resistance. The brush may then be moved successively over the resistance plates until as many as necessary are cut out in order that the desired amount of current may be delivered to the motor. When it is desired to stop the motor or to reverse it, the shaft 79 is rotated in the opposite direction thus successively cutting in the resistance until the brush 72 passes the idle contact 73, and the knuckle arm 81 engages the socket arm 83 and moves the reversing strip sufficiently to break the circuit. Continuing the movement of the shaft 79, the circuit will be again completed but the current will flow to the motor in reverse direction, and the resistance will be cut out in the manner before described.

The shaft 79 extends upward to the platform 64 through a bushing therein and through a hollow post 90, securely bolted on the platform in the upper end of which post there is formed a journal bearing for the shaft and the latter is provided at its upper end with a bevel gear 92 which seated on the bearing serves to uphold the shaft 79. The upper end of the post 90 is expanded to form a chamber 93 and on diametrical opposite sides of which are formed bearings for a horizontal shaft 94 carrying a manipulating hand wheel 95 outside of the said post, and the bevel pinion 96 within the chamber 93 and meshing with the gear wheel 92. Access to the chamber 93 may be had through a hinged cap or cover 97 applied to the top of the post 90.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a rheostat, a removable contact for same, and a switch, of an actuating shaft, means attached to and carried by said shaft for actuating the movable contact of the rheostat and means independent of the rheostat and actuated by the shaft for throwing the switch, the said parts being so arranged that the switch will be moved and automatically disconnected from the shaft before the movable contact of the rheostat comes in contact with the resistance plates and will remain disconnected while such movable contact is in engagement with said resistance plates, substantially as set forth.

2. The combination with a rheostat, its movable contact and a switch, of a shaft or operating lever, a device permanently attached to and carried by the shaft or lever for actuating the movable contact of the rheostat, and an arm or projection from said shaft or lever for actuating the switch, the said arm or projection being independent of the rheostat, the parts being so arranged that the switch is moved and then automatically disconnected from the shaft or lever, before the movable contact of the rheostat engages any of the resistance plates of the rheostat, substantially as set forth.

3. The combination with a motor, a reversing switch and a rheostat, of a shaft, a rack carried by said shaft for moving the movable contact of the rheostat, an arm projecting from said shaft and independent of the rheostat, and a socket arm connected with the reversing switch and adapted to be engaged by and disengaged from the arm on the shaft, substantially as set forth.

4. The combination with a motor, a rheostat and a reversing switch of a shaft a bell crank lever thereon, a rack bar carried by one arm of said bell crank for actuating the movable contact of the rheostat and a socket arm connected to the reversing switch and adapted to be engaged with and disengaged from the other arm of the bell crank, substantially as set forth.

5. The combination with a motor, a rheostat and a reversing switch, of a bell crank le-

ver, a rack bar carried by one arm of said lever for actuating the movable contact of the rheostat a knuckle connected to the reversing switch and adapted to be engaged and disengaged by the other arm of said bell crank lever, and means for actuating said bell crank lever, substantially as set forth.

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

WILLIAM HENRY MORGAN.

Witnesses:

FRANK. E. DUSSEL,

WM. J. W. WOOLGAR.