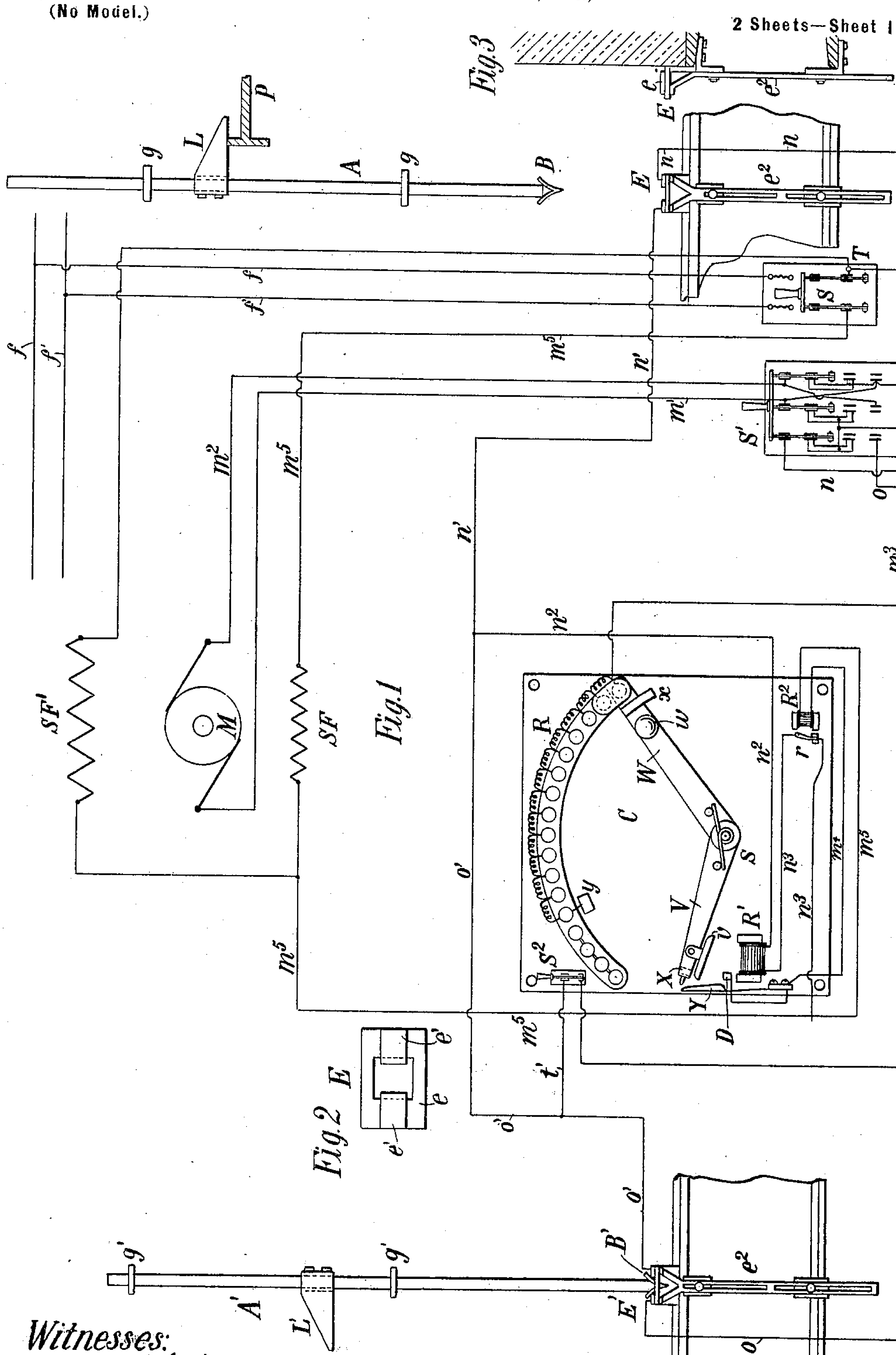
No. 679,004. Patented July 23, 1901.

H. B. NEWHALL, Jr.

AUTOMATIC ELECTRIC STOP FOR ELEVATORS.

(Application filed Oct. 31, 1900.)

(No Model.) 2 Sheets—Sheet 1.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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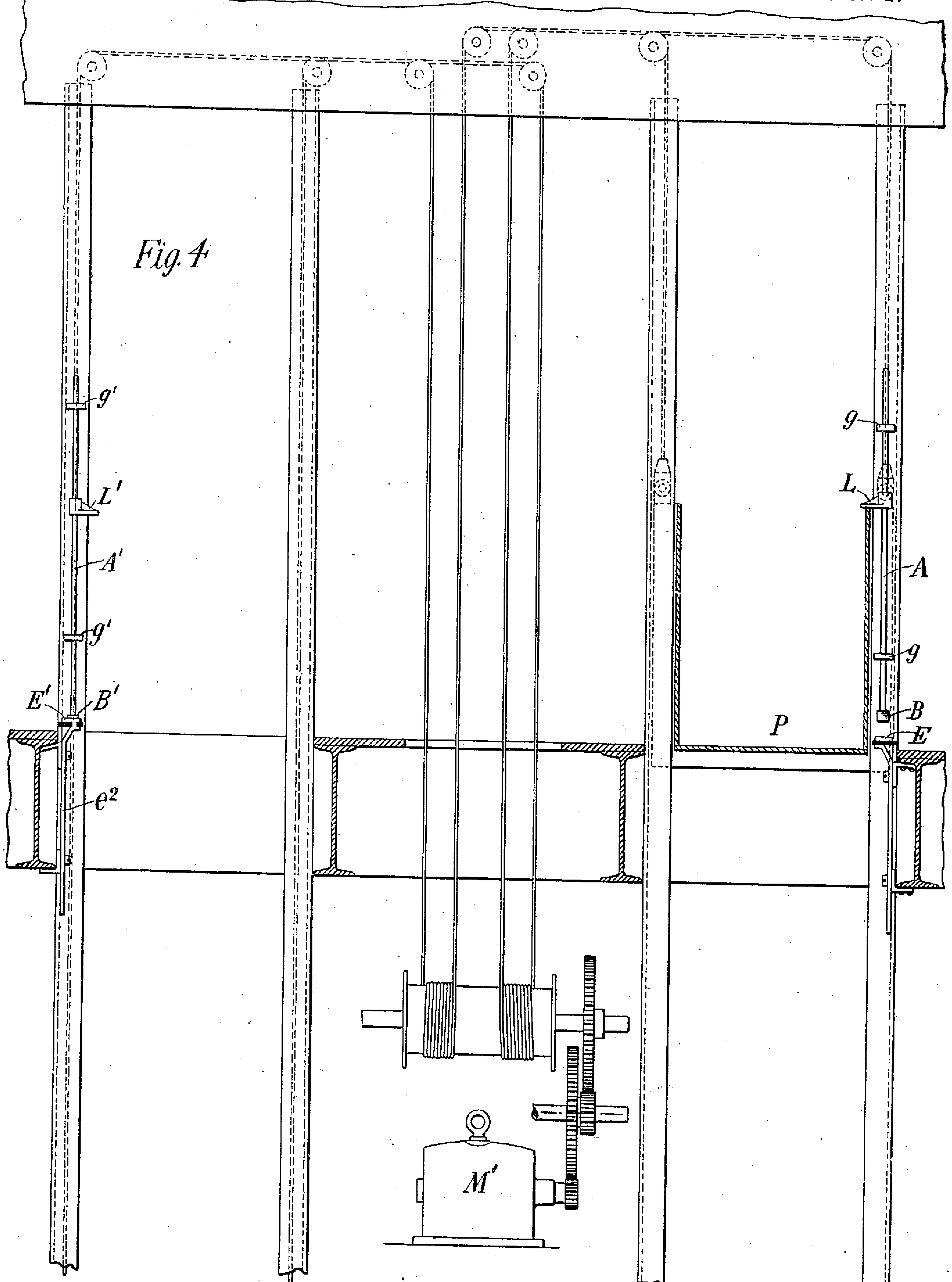

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UNITED STATES PATENT OFFICE.

HENRY B. NEWHALL, JR., OF PLAINFIELD, NEW JERSEY, ASSIGNOR TO HENRY B. NEWHALL, SR., OF SAME PLACE.

AUTOMATIC ELECTRIC STOP FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 679,004, dated July 23, 1901.

Application filed October 31, 1900. Serial No. 35,009. (No model.)

To all whom it may concern:

Be it known that I, HENRY B. NEWHALL, Jr., of Plainfield, county of Union, and State of New Jersey, have invented a new and useful Improvement in Automatic Electric Stops for Elevators, of which the following is a specification, reference being had to the drawings which accompany and form a part of the same.

My invention relates to that class of apparatus by which the movement of elevators may be controlled; and it consists in the construction and arrangement of parts hereinafter described.

The objects of my invention are to provide means whereby the upward and downward movement of elevators may be automatically limited and also means whereby the automatic features of the device may be entirely cut out, leaving the apparatus to work as though no such devices were attached.

Figure 1 is a view in elevation of my automatic stop, the motors and other apparatus for conveying and controlling the electric currents being shown diagrammatically. Fig. 2 is a top view of one portion of the automatic brake apparatus. Fig. 3 is a side view of one part of the automatic brake apparatus. Fig. 4 is an elevation, partly in section, showing general arrangement of hoisting apparatus and elevator-platforms in connection with my electric stop mechanism.

My invention is shown in the drawings and described as adapted for use with an ammunition-hoist having ascending and descending platforms arranged on a suitable cable or chain, said cable being driven by means of an electric motor M'.

The general arrangement of the motor, the hoisting apparatus, and the platforms is shown in Fig. 4 of the drawings.

P indicates the platform of the hoist.

A is a rod arranged to slide in the guides *g g*, attached to which rod is a lug L, which projects into the line of travel of the platform. The lower end of the rod A is provided with an insulated copper plug B, preferably of V shape, which is adapted to fit into the opening in the base E, said base E, together with the plug B, constituting an automatic brake device which I call a "table-switch."

As shown more particularly in Fig. 2, the base E consists of a table *e*, of slate or other non-conducting material, having an opening in its center to receive the plug B. Two copper terminals *e' e'* project into the opening in the table and into the path of movement of the plug B. These terminals are connected with the current-conveying wires, as hereinafter described. The table *e* is adjustably carried on its supports e^2, so that the position of the table can be regulated at will. When the plug B rests upon the copper terminals *e' e'*, electric connection is made between the wires attached to said terminals respectively. When the plug B is not in contact with said terminals—as, for example, when the rod A is raised to the position shown in the drawings—the circuit through said terminals is broken. The table *e*, the rod A, and the lug L are so arranged that when the platform P reaches the desired point in its upward travel it engages the lug L and, lifting the rod A, removes the plug B from contact with the terminals *e' e'*, thus breaking the circuit which, as hereinafter described, controls the motor that causes the upward motion of the platform. At the left-hand side of the drawings is shown the rod A' with its plug B' and lug L' arranged to operate in relation to the base E' and in connection with the opposite side of the cable which carries the platforms. The arrangement of these parts and their action relative to the platform is exactly the same as that of the similar parts A, B, and L.

S is the main switch, through which the operating-current is conveyed over the feeding-wires *f* and *f'* to the motor.

M represents the armature of the motor, the other parts being diagrammatically shown at S F and S F'.

S' is a reversing-switch.

C is a starting-box, with rheostat-terminals at R and an overload-release at R^2.

W and V are pivoted arms, through which electric connection may be had from the rheostat-terminals to the contact-piece D, B and D constituting what I call a "stop-switch."

s is a spring, which operates to fold the arm V back against a stop *w* on the arm W.

v is an armature carried on the end of the arm V.

R′ is a magnet, which when excited attracts and holds the armature v, thus bringing the contact-piece X on the end of the arm V into contact with the contact-piece D, which forms part of the main circuit.

Y is a carbon-terminal which takes the spark from the contact-piece X, which results when the circuit through the arm V and the contact-piece D is broken, and x and y are carbon-terminals for taking the spark when the arm W is moved to the left beyond the rheostat-terminals. The rheostat may be used either for running the motor continuously at varying speed or, as would generally be preferable, simply for use as a starting resistance.

The main circuit is from the feeder f through the switch S, over the wire m to the switch S′, through which it passes over the wire m' to the armature M of the motor, and returning over the wire m^2 to the right-hand portion of the switch S′. It then passes through this switch over the wire m^3 into the rheostat connections R, thence through the arm W and the arm V. If the contact X is in contact with the contact-piece D, as is the case when the magnet R′ is excited, the main current then passes from the arm V through the contact-pieces X and D over the wire m^4 through the magnet R^2, the function of which will be hereinafter described, thence over the wire m^5 through the series-field S F, and thence to the left-hand portion of the switch S and to the feeder f', thus completing the circuit. It is to be noticed that this circuit is complete only when the contacts X and D are held together by the action of magnet R′ on the armature v. The main circuit, in addition to operating the motor, as above described, serves to make an auxiliary circuit, which excites the magnet R′ and holds the contact X in contact with the contact-piece D. This auxiliary circuit may be traced as follows: Starting from the upper left-hand corner of the switch S′, it passes over the wire n to one of the copper terminals of the table E. Another wire n' leads from the opposite terminal of the table E to the wire n^2, which leads to the magnet R′. Thence the connection is made along the wire n^3 to the main circuit, which passes along the wire m^5. It is to be noted that it is only when the copper plug B is in place in the table E that complete connection is made along this circuit. When the plug B is withdrawn from the copper terminals on the table E, the circuit is broken and the magnet R′ is no longer excited, and the arm V is carried by the spring s around against the arm W, thus breaking the contact between the contact X and the contact-piece D, and thus breaking the main circuit and stopping the motor.

In order to start my device into operation, the switches S S′ being closed, the auxiliary circuit containing the magnet R′ is completed and the magnet energized, and the operator then grasps the handle w of the arm W, against which the arm V is normally pressed by the spring s, and moves the arm W on its pivot toward the left until the contact X is brought into contact with the contact-piece D and is held there by the attraction of the magnet R′ on the armature v. As the arm W is then moved back, so that it comes into contact with the rheostat-terminals R, the main circuit is established and the motor commences its operation, causing the upward travel of the platform P. The lug L is so arranged on the rod A that when the platform P has reached a given point in its upward travel it comes in contact with the lug L and lifts the rod A and its plug B, thus breaking the auxiliary circuit at the table E. The magnet R′ is thus deënergized, the armature v is released, and the arm V flies back under the action of the spring s, thus breaking the main circuit and causing the motor to cease its operation and the platform to come to a stop.

In order that my apparatus may work equally well to limit the downward motion of the platform P or the upward motion of a platform on the opposite side of the endless chain, a similar table, plug, rod, and lug are arranged in connection with the other branch of the chain in a manner similar to that already described. A second auxiliary circuit is connected with the table E′ as follows: Said circuit is connected with the lower terminals of the reversing-switch S′ and comes into use only when such switch is reversed. The circuit leads from the lower terminals of said reversing-switch over the wire o to the table E′, thence through the plug B′ and over the wire o' to the wire n^2, through which it passes into the magnet R′, and thence over the wire n^3, where it joins the main current on the wire m^5, and thus passes to the main switch S. The influence of this auxiliary circuit upon the main current and upon the motor operated by the main circuit is the same as that already described in connection with the auxiliary circuit passing through the table E. The reversing-switch enables the operator to use whichever of these auxiliary circuits is required to limit the motion of the platform.

It is evident that the second auxiliary circuit and the breaking devices shown in connection therewith may easily be adapted to limit the downward motion of a single-hoist elevator, the lug being so arranged as to be acted upon by the descending elevator, thus withdrawing the plug from the table and breaking the second auxiliary circuit.

S^2 is a cut-out switch, which is normally held open by a spring. When this switch is closed by the operator, the two automatic breaking devices at E and E′ are short-circuited, thus permitting the motor and elevators to be operated free from any automatic control. From the lower terminal of the switch S^2 the wire t leads to a connection with the main circuit on the wire m at a point between the main switch and the reversing-switch. From the upper terminal of the switch S^2 the wire t' leads to a connection with the wire o' between the tables E' and E. It is also to be noticed that from the upper terminal the wire t' connects with the wire o', with the wire n^2, the magnet R', the wire n^3, and thence with the main current on the wire m^5. Thus if the plug B is inserted in the table E, putting said auxiliary circuit into readiness for automatic action, the closing of the switch S^2 will create a shunt-circuit in one direction over the wires t', o', n^2, n^3, and m^5 back to the main switch S, and in the other direction over the wire t to the wire m and to the other pole of the main switch, thus cutting out altogether the auxiliary circuit over the wires n and n' and through the table E and the plug B. In this case the removal of the plug from the table will in no wise affect the main circuit and the movement of the motor. When the reversing-switch is thrown down, so as to put into action the auxiliary circuit operating through the table E', the closing of the switch S^2 will create the shunt-circuit above described, thus cutting out of action the auxiliary circuit over the wires o and o' and through the table E' and the plug B'. Thus the closing of the switch S^2 cuts out all of the automatic features of my device above described and leaves it free to be controlled entirely by movement of the arm W and switch S'. This feature of my invention is of particular importance where the platforms are called upon to carry varying loads. If the loads are always of the same weight, the automatic devices may be set so that the platforms will always come to rest at a specified point; but with varying loads it is impossible to overcome the momentum of the platform in the same space and bring the platform to a stop at exactly the same point. By using this feature of my device, which permits the cutting out of the automatic features, the motion of the platforms may be controlled at will independent of the automatic stops. There are other instances also where the desirability of cutting out the automatic features will be apparent to one familiar with the practical use of hoisting apparatus.

The magnet R^2 and the armature r constitute an overload-release of ordinary construction used in connection with rheostats.

It is apparent that my device, which is here diagrammatically shown, may be embodied in various ways and that changes and modifications may be made therein without departing from the spirit of my invention.

In using in the specification and claims the phrases "table-switch," "stop-switch," and "cut-out switch" I do not intend to limit myself either to the exact construction of switches shown or to the classes of switches shown, but intend to include any kind of switch which could be used to operate substantially the same as those here shown.

Having thus described my invention, what I desire to secure by Letters Patent is—

1. In an apparatus for electrical control of elevators an electric motor and a stop-switch with connections therefor constituting a motor-circuit, a stop-magnet and a table-switch with connections therefor constituting an auxiliary circuit and arranged in connection with the motor-circuit to receive current when the motor is actuated, and means connected to said table-switch and arranged in the path of the elevator so that the elevator is adapted to open said table-switch to open the motor-circuit.

2. In an apparatus for electrical control of elevators, an electric motor and a stop-switch constituting a motor-circuit, a stop-magnet and a table-switch with connections therefor constituting an auxiliary circuit arranged to receive current when the motor is actuated, an armature for said stop-magnet attached to said stop-switch and means for withdrawing said armature from said magnet to open said stop-switch and thereby break the motor-circuit, and means connected with said table-switch and arranged in the path of the elevator so that the elevator is adapted to open said table-switch and break said auxiliary circuit.

3. In an apparatus for electrical control of elevators, a motor arranged to operate an elevator, a stop-switch and an overload-magnet with connections therefor constituting with said motor a motor-circuit, a table-switch, an overload-switch controlled by said overload-magnet and a stop-magnet controlling said stop-switch with connections therefor constituting an auxiliary circuit which is connected with said motor-circuit and means connected to said table-switch whereby the elevator is adapted to open said table-switch and thereby break said motor-circuit.

4. In an apparatus for electrical control of elevators, an electric motor and a stop-switch with connections therefor constituting a motor-circuit, a stop-magnet and a table-switch with connections therefor constituting an auxiliary circuit and arranged in connection with the motor-circuit to receive current when the motor is actuated, said table-switch being adjusted longitudinally of the direction of travel of the elevator and means connected with said table-switch arranged in the path of the elevator whereby the elevator is adapted to open said table-switch.

5. In an apparatus for electrical control of elevators, an electric motor and a stop-switch with connections therefor constituting a motor-circuit, a stop-magnet and a table-switch with connections therefor constituting an auxiliary circuit arranged to receive current when the motor is actuated, an armature for said stop-magnet attached to said stop-switch, a spring connected with said stop-switch arranged to withdraw said armature from said magnet to open said stop-switch and thereby break the motor-circuit

said table-switch being adjusted longitudinally of the direction of travel of the elevator, and means connected with said table-switch arranged in the path of the elevator whereby the elevator is adapted to open said table-switch.

6. In an apparatus for electrical control of elevators, a reversing-switch, a motor-circuit connected thereto and comprising an electric motor arranged to operate an elevator in either direction and a stop-switch, two auxiliary circuits connected with said reversing-switch and each comprising the stop-magnet arranged to control said stop-switch and a table-switch, and means connected with each of said table-switches and arranged in the path of the elevator whereby the elevator is adapted to open said table-switches and thereby limit the motion of said elevator in either direction.

7. In an apparatus for electrical control of elevators, a reversing-switch arranged to be connected with a source of electricity, a motor-circuit connected with said reversing-switch and comprising a motor and a stop-magnet, two auxiliary circuits connected with said reversing-switch and each comprising the stop-magnet having an armature attached to said stop-switch whereby said stop-magnet is adapted to control said stop-switch and a table-switch adjustably mounted adjacent the elevator which is arranged to be actuated by the motor and means connected with said table-switch and arranged to be engaged by the elevator whereby the movement of the elevator is limited.

8. In an apparatus for electrical control of elevators, a motor arranged to operate an elevator and a stop-switch constituting a motor-circuit, a stop-magnet controlling said stop-switch and a table-switch constituting an auxiliary circuit which is connected with said motor-circuit and means whereby the elevator is adapted to open said table-switch and thereby limit the movement of said elevator and a cut-out switch connected in shunt around said table-switch whereby when said cut-out switch is closed, said table-switch does not limit the movement of the elevator.

9. In an apparatus for electrical control of elevators, a reversing-switch, a motor connected with said reversing-switch and arranged to operate an elevator in either direction, a spring-actuated stop-switch constituting with said motor a motor-circuit, two auxiliary circuits connected to said reversing-switch whereby they are arranged to be alternately energized therefrom, each of said auxiliary circuits comprising a table-switch and both of said circuits including a stop-magnet controlling said stop-switch, said table-switches being adjustably mounted adjacent the elevator and each of said switches having means connected therewith arranged in the path of said elevator whereby said elevator is arranged to be stopped when the said table-switches are open, and a cut-out switch connected in shunt around both of said table-switches and adapted when closed to prevent the stopping of the elevator when the table-switches are opened.

10. In an apparatus for electrical control of elevators, a reversing-switch, a motor-circuit connected therewith comprising a stop-switch, an overload-magnet and a motor arranged to actuate an elevator in either direction, two auxiliary circuits connected with said reversing-switch and arranged to be energized alternately therefrom and each of said auxiliary circuits comprising a table-switch adjustably mounted adjacent an elevator and both of said circuits including a stop-magnet controlling said stop-switch and an overload-switch controlled by said overload-magnet, and means whereby the elevator is arranged to open one of said table-switches and thereby limit its motion and a cut-out switch connected in shunt around both of said table-switches and so arranged that when it is closed the opening of either of said table-switches does not break the corresponding auxiliary circuit.

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