No. 719,114. PATENTED JAN. 27, 1903.

N. HISS.

ELEVATOR.

APPLICATION FILED MAY 22, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

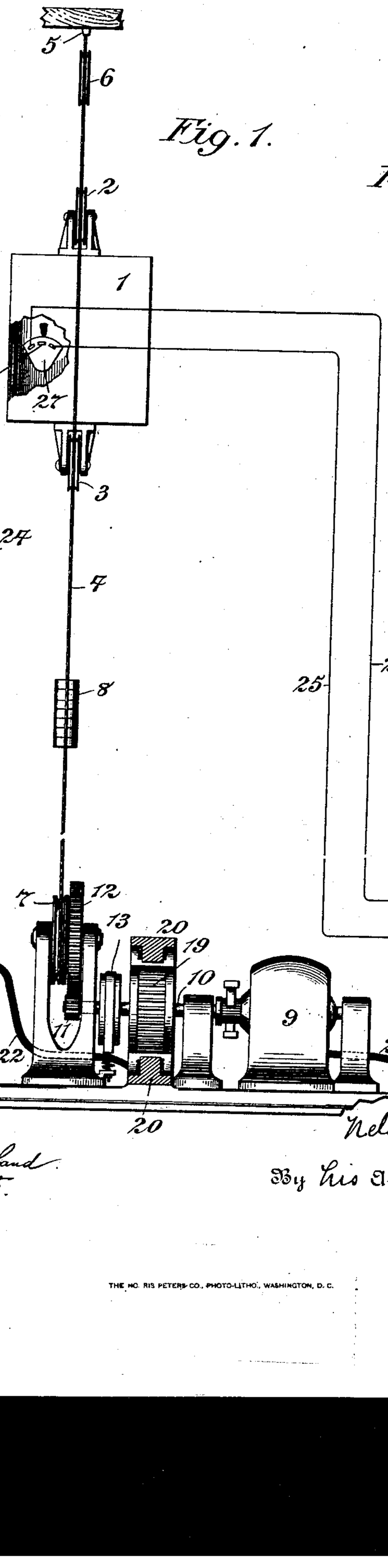
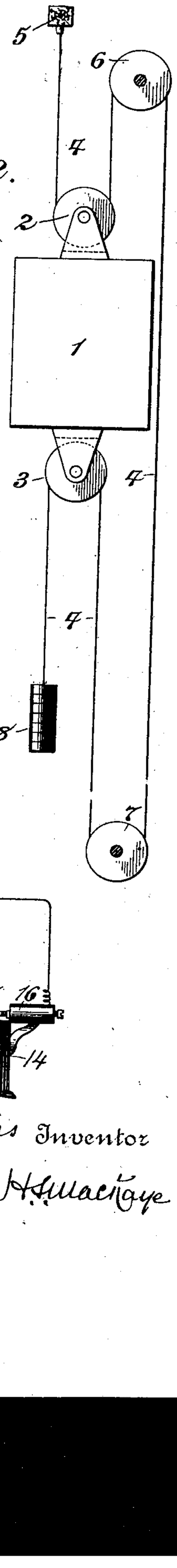


Fig. 2.



Witnesses
Edward C. Rowland
Walter Scott.

Nelson Hiss Inventor
By his Attorney H. S. MacKaye

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NO MODEL. 2 SHEETS—SHEET 2.

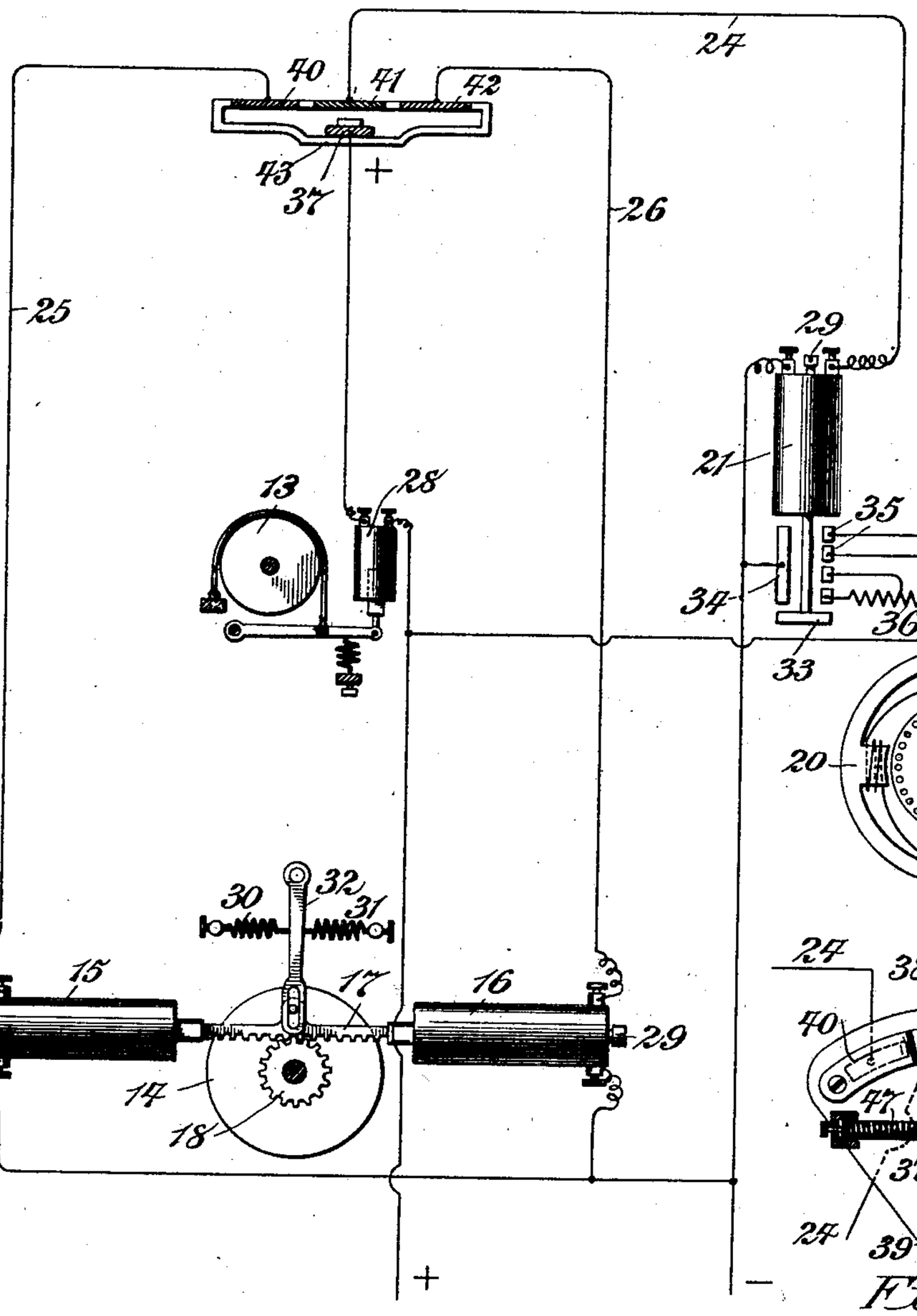


Fig. 3.

Fig. 4.

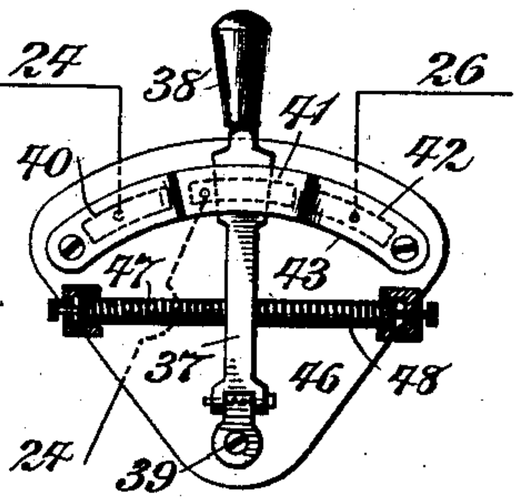
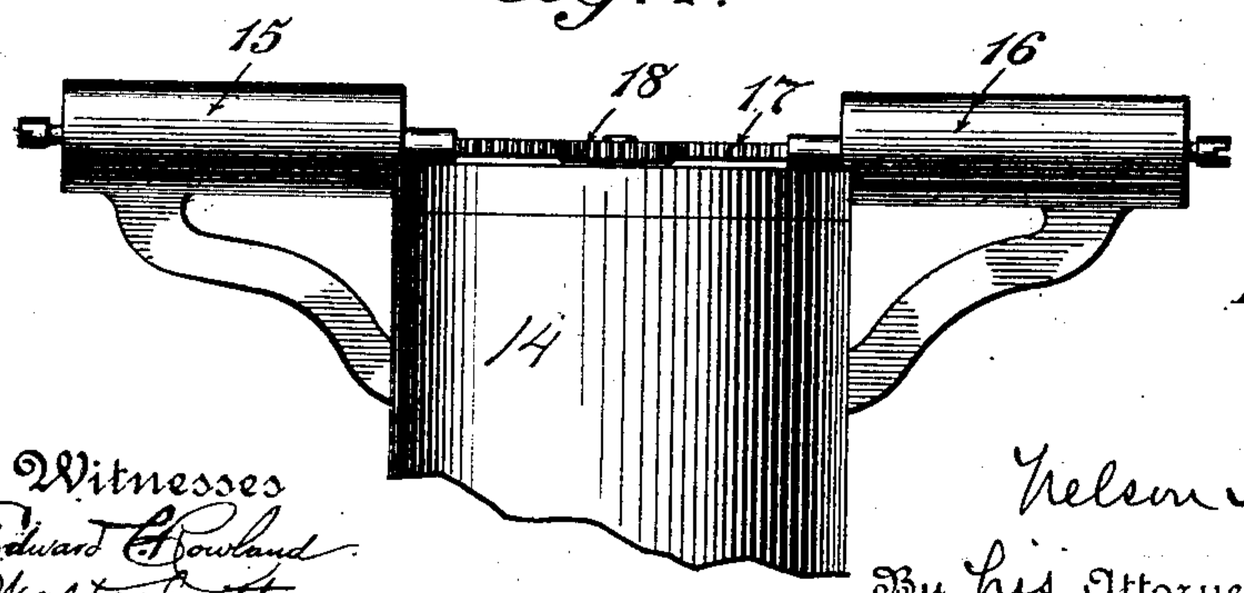


Fig. 5.



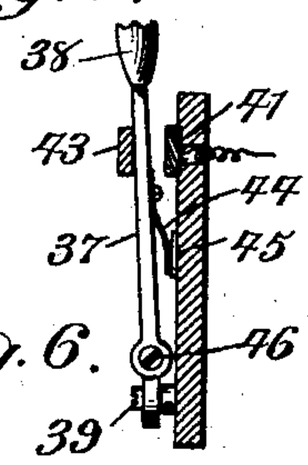


Fig. 6.

Witnesses
Edward C. Howland
Walter Scott.

Nelson Hiss Inventor
By his Attorney H. MacKaye

UNITED STATES PATENT OFFICE.

NELSON HISS, OF NEW YORK, N. Y.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 719,114, dated January 27, 1903.

Application filed May 22, 1902. Serial No. 108,469. (No model.)

To all whom it may concern:

Be it known that I, NELSON HISS, residing in the city, county, and State of New York, have invented a certain new and useful Improvement in Elevators, of which the following is a specification.

My present invention has relation to an improved apparatus for controlling the movements of elevator-cars; and its principal object is the provision of means whereby a gradual stoppage is obtained whether the elevator be moving up or down.

My device is particularly useful in connection with electrically-driven elevators, and by its use I obtain the effects desired without resort to complicated means for the safe use of the driving-motor as a dynamo.

A subsidiary branch of my invention is an improved form of hand-operated controller for the prime mover adapted to be located upon the elevator-car.

A preferred form of my invention as used with electric elevators is illustrated in the accompanying drawings, wherein—

Figure 1 is a side view of one form of electric-driven elevator employing my invention. Fig. 2 is a view of the hoisting cables and sheaves of Fig. 1, seen at right angles to the view shown in Fig. 1. Fig. 3 is a diagrammatic development of the electric connections and their relations to the various mechanical elements of my invention. Fig. 4 is a side view of the top of one form of electromagnetically-operated controller-drum capable of use with my invention. Fig. 5 is a front view of the manipulator-switch preferably employed by me on the car, and Fig. 6 is a sectional view of said manipulator.

My invention is capable of application to many types of hoisting devices; but I have shown it in the accompanying drawings associated with the type of hoisting means described and claimed by me in my pending application, Serial No. 97,279, filed March 8, 1902. Here the cage 1 is shown provided with pulleys 2 and 3, secured, respectively, to the top and bottom thereof. A hoisting-cable 4 is fastened, as at 5, over the elevator-shaft and passes, as shown, under pulley 2, over the fixed sheaves 6 and 7, and over pulley 3. At the end of the cable 4 is fixed a weight 8 or other means for holding the cable taut. In this system any of the pulleys or sheaves over which the cable 4 passes may be revolved, and thus used as a driving-pulley. The tension exerted by the weight 8 is always transmitted equally to both sides of the driving-sheave, as 7, and since said weight or its equivalent does not move when the car is operated its effective influence in producing operative tractional friction at the driving-sheaves is never impaired.

As shown in Fig. 1, the sheave 7 may be used as the driving-sheave. The prime mover, an electric motor 9, acts through the shaft 10 and pinion 11 to drive the larger gear 12, thus reducing the speed of the sheave 7, which turns with 12.

At 13 is shown an automatic strap-brake of a well-known type (better shown in Fig. 3) arranged in a well-known manner, so that when current is introduced into the driving-motor 9 the brake is off, but is applied automatically when current is interrupted.

I have not illustrated in detail the various changes in circuit adopted for control of the motor 9 and its reversal, since various means are well known in the art for this purpose. I have therefore simply shown a drum-controller box 14, operated in one direction or the other by solenoids 15 and 16, which reciprocate a rack 17, engaging a pinion 18 on the end of the operating-shaft of the controller.

Preferably mounted upon the shaft 10 or otherwise arranged to necessarily turn with the sheave 7 is a closed-circuit armature 19, preferably of the familiar mouse-mill or squirrel-cage type, as shown. The field-magnet poles 20, wound with suitable conductors, surround said armature, and when said poles are excited they exert a strong inductive retarding effect upon the armature. This combination of field-magnet and closed-circuit armature may be fitly termed a "dynamic brake" and will be so referred to herein. The solenoid 21 acts to control the flow of current in the coils of the field-magnet 20, the current being conveyed by cable 22. Cable 23 connects the controller 14 and motor 9. By means of suitable conductors 24, 25, and 26 the solenoids 21, 15, and 16 are controlled from the manipulator 27 on the car.

The parts above described are all shown in

diagrammatic relation in Fig. 3, wherein are also illustrated certain further details, which I shall now proceed to describe.

The three solenoids 15, 16, and 21 are all intended to act slowly upon their cores, so that the positions of such cores will be at any moment dependent upon the length of time that they have been operating. For this purpose a well-known arrangement of adjustable valve 29 is employed to regulate the escape of air on movement of the cores within their inclosing coils, and thus moderate the movement thereof when moving under the electromagnetic influence. I shall not illustrate these valves in detail, as I do not claim them herein and as they are well-known devices for the purpose named as used in solenoids.

The solenoids 15 and 16 act oppositely upon a rack 17 to operate the motor in one direction or the other through the intermediary of the controller-box 14. The rack 17 is brought back automatically to the middle position (shown in Fig. 3) by the two springs 30 31, acting through the slotted lever 32. There is no resistance opposed by valves 29 to this automatic return movement of the rack 17, and hence the stoppage of the motor 9 can be instantaneously accomplished, if desired. The solenoid 21 acts to gradually lift the bridging contact-piece 33, which introduces current from the long terminal 34 to one or another of the short terminals 35 for controlling the braking action of the dynamic brake 19 20. For this purpose the resistance-coils 36 are employed, or other well-known means may be used. It will be seen that as the contact 33 slowly rises one after the other of the resistance-coils is cut out, until finally unimpeded current is introduced into the coils of the magnet 20 and the full power of the brake is applied. When current ceases to flow in the solenoid 21, the contact 33 drops back into the position shown in Fig. 3 and the brake 19 20 ceases to act.

The manipulator on the car is shown in Figs. 3, 5, and 6. It consists of a movable contact-lever 37, having a handle 38 and pivoted at 39 to rock in front of circularly-disposed contact-pieces 40 41 42. (Shown in dotted lines in Fig. 5.) These contacts are disposed in a single plane, and 37 rocks between them and an arc-shaped guide or retaining-piece 43. On the back of the lever 37 is a flat spring 44, which bears against an appropriate abutment 45 and tends to press the lever 37 forward against the guide 43. This tipping of the lever 37 is permitted by a joint or hinge 46. Suitable means are provided for bringing the lever 37 to the central position, and for this purpose I have shown herein the springs 47 48. As shown in Fig. 3, the shape of the guide 43 is such that when the lever 37 is brought to middle position it is allowed to fall away from the plane of the contact-pieces 40 41 42, and so leaves all circuits broken. Supposing now that the car were to be started in one direction, the lever would be rocked, say, to the right in Fig. 3 and would be pressed against the contact 42 in opposition to the spring 44. Current entering at the wire marked plus would energize the solenoid 28 and take off the brake 13, thus liberating the motor. If desired, this liberating action could be accomplished by the actual motor-current in the well-known way without departing from my invention. The current passes from the solenoid 28 directly to the lever 37, and when this latter is pressed against the contact 42 current passes by wire 26 to solenoid 16 and then to the return-main marked minus. This effects a gradual start of the motor 9 by the controller 14. If an emergency stop is required, the handle is brought directly back to the position shown in Fig. 3, either automatically or by hand. The solenoid 16 being thus deënergized, the spring 30 brings the rack 17 to the position shown and the motor is stopped, while at the same time the brake 13 is applied automatically by failure of current in the solenoid 28. By pressing lever 37 against 40 the opposite solenoid 15 acts to produce contrary movement of the controller 14 and operate the car in the contrary direction. Where a normal stop is to be had, however, instead of bringing the lever directly to the position shown in Fig. 3 it is kept pressed back, but is moved against the contact-piece 41. This operates the solenoid 21 to gradually apply the dynamic brake, and thus bring the car gradually and easily to rest, with an effect similar to that of an air-cushion. When nearly or quite a full stop is reached, contact may be broken at 41, releasing the dynamic brake and locking the car by means of the brake 13. It is evident that the dynamic brake may be applied on the lever 37, leaving either contact-piece 40 or 42, by simply maintaining pressure on the handle in opposition to the spring 44.

It is to be understood that my present invention is not limited to the use of any particular type of controllers for motor or dynamic brake, whether using solenoid control or not. Various means may be employed for suitably operating the various principal agencies used by me, and my claims are to be interpreted as covering these various means, however organized or constructed, unless otherwise limited by the terms of said claims.

What I claim is—

1. In elevator apparatus, the combination of hoisting means, a prime mover therefor, an electrodynamic brake for said hoisting means and means for successively controlling the movement of said prime mover and applying said brake.

2. In elevator apparatus, the combination of hoisting means, an electric motor therefor, an electrodynamic brake for said hoisting means and means for successively modifying circuit conditions in said motor and in said brake.

3. In elevator apparatus, the combination of hoisting means, an electric motor therefor,

an electrodynamic brake for said hoisting means, a manipulator-switch having two terminals respectively for opposite movements of said motor and a third terminal between the others for control of said electrodynamic brake, an electric circuit and a movable contact-piece in said circuit adapted to be pressed against either of said stationary terminals at will.

4. In elevator apparatus, hoisting means, an electric motor therefor, an electrodynamic brake for said hoisting means, main controllers for said motor and brake, electromagnetic means for operating each of said controllers and a switch adapted to establish operative electric circuits in said main controllers successively.

5. In elevator apparatus, a driving-sheave, an electric motor therefor, a closed-circuit brake-armature adapted to turn with said motor and sheave, a field-magnet surrounding said armature and a switch adapted to successively control the circuits of said motor and said field-magnet.

6. In elevator apparatus, hoisting means, an electric motor and an electrodynamic brake therefor; in combination with a switch having a stationary terminal for each direction of motion of said motor, a middle terminal for applying said brake, a movable lever capable of swinging over said terminals and of moving against or away from their plane and automatic means tending to keep said lever out of the plane of said terminals.

7. In elevator apparatus, hoisting means, an electric motor and an electrodynamic brake therefor; in combination with a switch having two stationary terminals for said motor and a middle terminal for said brake, a movable lever adapted to swing over said stationary terminals and means tending to bring said lever to a middle position out of contact with any of said terminals.

8. In elevator apparatus, hoisting means, an electric motor, an electrodynamic brake, a locking-brake, automatic means for applying the latter brake and electromagnetic means for releasing it; in combination with a switch having two stationary terminals for said motor and a middle terminal for said brake, a circuit through the releasing means of the locking-brake, a movable switch-lever in said circuit adapted to swing over said stationary terminals and means tending to bring said lever to a middle position out of contact with any of said terminals.

NELSON HISS.

Witnesses:
CHAS. F. HALSTED,
HAROLD S. MACKAYE.