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H. P. McCOLL.

REGULATING MAGNET CONTROLLER FOR ELECTRIC ELEVATORS.

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Fig-1-

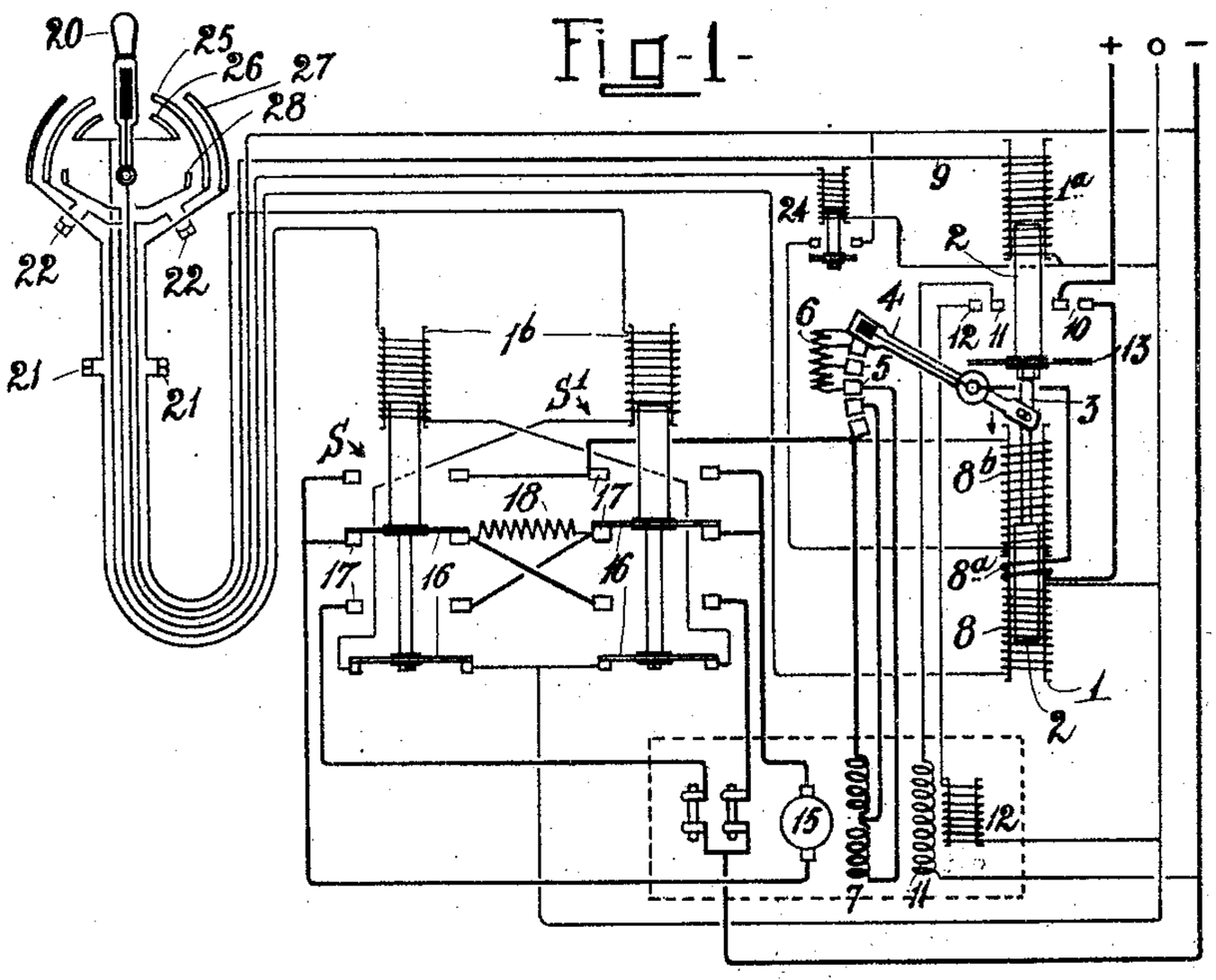
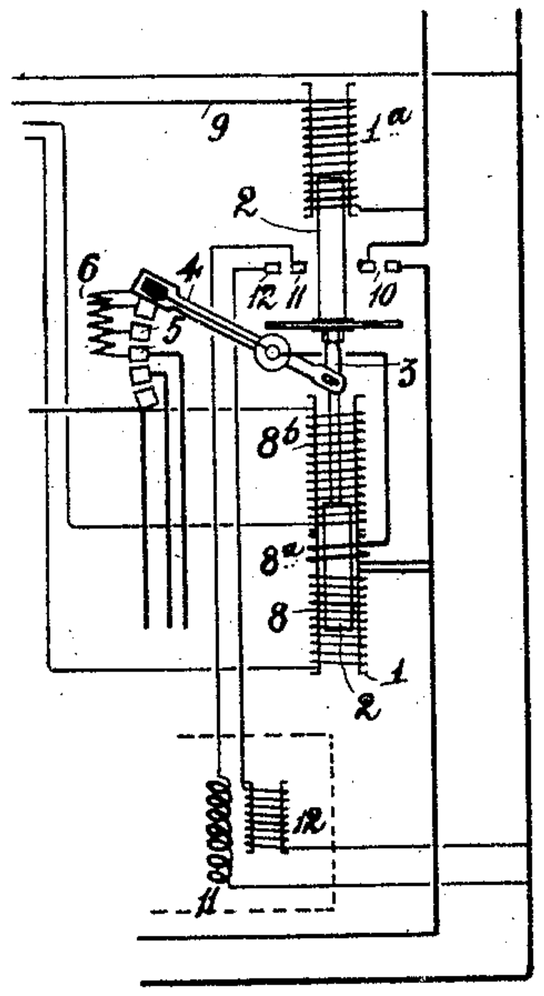


Fig-2-



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REGULATING MAGNET-CONTROLLER FOR ELECTRIC ELEVATORS.

No. 879,789. Specification of Letters Patent. Patented Feb. 18, 1908.

Application filed May 29, 1906, Serial No. 319,249. Renewed August 7, 1907. Serial No. 387,566.

To all whom it may concern:

Be it known that I, HENRY PERCY McCOLL, a subject of the King of Great Britain, residing at No. 16 Edward street, Hawthorn, in the State of Victoria, Australia, electrical engineer, have invented an Improved Regulating Magnet-Controller for Electric Elevators, of which the following is a specification.

This invention has been devised with the object of providing means whereby electric elevators may be more efficiently controlled and thus to obviate the tendency of such cars to over-run their limits both at the top and bottom of their travel, and, furthermore, to obtain a more gradual starting and stopping without the inconvenience of jerks and jolts, and also to enable the speed to be regulated at will.

The invention is illustrated by the accompanying diagrams wherein,—

Figure 1 shows the arrangement of circuits in a three wire system, while Fig. 2 is a similar view to part of Fig. 1 showing the circuits of a two wire system.

Referring now to these drawings it will be seen that in the circuits there are placed solenoids1, 1^a, 1^b, provided with movable iron cores 2 arranged and constructed in the following manner. One of said solenoids 1 is wound as a double solenoid, that is to say, one end is wound in a different manner to the other and is in a different circuit. The core 2 of this solenoid is provided at one end with a rod or projection 3 of non-magnetic material which is attached to one end of a rheostat lever 4 whose other end contacts successively with a set of contacts 5 connected to the usual armature resistance 6 and series field 7 in suitable circuits. Instead of the lever 4 other suitable mechanical devices may be employed for the same purpose. The winding 8 of the lower end of this double solenoid 1 is connected when in circuit directly across the mains and another winding 8^a on the same end is placed in series with the armature circuit. The direction of winding 8^a opposes and neutralizes the action of the winding 8^b on the upper end of said solenoid and assists the winding 8 on the lower end thereof.

The windings 8 and 8^a tend to pull the above-mentioned lever 4 in the direction as indicated by an arrow and so place all the resistance into circuit. For this reason the coils at the bottom end of the solenoid 1 are termed the "slow" coils. The other end of this solenoid has a winding or "fast" coil 8^b (mentioned above) which when put in circuit is connected across the terminals of the armature 15 and therefore its strength varies directly as the speed of the motor, and influences the core in the opposite direction. It will be understood that when the armature is at rest there is no current flowing through winding 8^b and therefore there is no pull on the lever and no resistance can be cut out until the armature is started. It will be understood that instead of this double solenoid two separate solenoids may be used to operate the rheostat in the same manner. Above this double solenoid is a single solenoid 1^a connected with a circuit 9 and so arranged as to insure that the main line switch 10 is closed and the shunt field 11 and brake 12 are in circuit when the car-switch is on contact 25. The core of said solenoid 1^a is provided with an insulated disk 13 and rests upon the rheostat lever 4 or rod 3 of the solenoid 1 and holds said lever down thereby insuring that the lever 4 is in the starting-position and all armature resistance is in circuit and also that the main line switch 10 brake switch 12 and shunt field switch 11 are open.

The lever 4 is balanced and adjusted so that when the core of the solenoid 1^a is raised thus permitting free movement it will remain in whatever position it is placed when not under the influence of the double solenoid coils. In connection with this lever a dash pot or a similar contrivance may be employed to prevent said lever moving too suddenly. The apparatus also includes reversing switches S S^1 for operating the armature in either direction. Said switches are controlled by solenoids 1^b the cores of which are provided with two insulated contact disks 16, 16 or their equivalents. Contacts 17 are provided above and below said disks and the connections are so arranged that when the switches rest on the lower contacts a resistance 18 is connected direct across the armature. A car switch 20 is also provided for operating the controller from the car, and for controlling the several circuits above described. Limit switches 21, 21, 22, 22, for automatically slowing and stopping the car at its extremities are situated on the elevator and operated by suitable striking devices in

the well. The positions of these limit switches can be adjusted independently of each other.

In connection with the solenoids it is preferable to employ a relay switch 24 on the circuit 8^b in order to avoid the necessity of a current of high voltage in the car when on a three wire system as shown in diagram Fig. 1, whereas in a two wire system, as shown in Fig. 2, said relay switch 24 is unnecessary.

With my arrangement the fields remain excited while the motor is stopping before the brake is applied, and though all current is cut off from the armature the motor runs as a generator with a resistance 18 across the armature, and the fields being still strongly excited a powerful retarding effect is obtained which slows the speed of the motor before the brake is finally applied to stop it altogether.

When about to start a car the switch 20 therein is moved over four of the contacts 25, 26, 27, 28, with the result that,—

First,—the winding 8 around the solenoid 1 and solenoid 1^a are placed in circuit. This insures that the armature resistance 6 is in circuit and that the main line switch 10, shunt field switch 11 and brake switch 12 are closed;

Secondly,—the reversing switch S or S^1 is lifted thus closing the armature circuit through the armature resistance 6 and series field. The motor now starts at a slow speed.

Thirdly,—Circuit 8 of the "slow" coils of the double solenoid is broken but no alteration takes place until,

Fourthly,—the "fast" solenoid circuit is closed. The lever 4 now lifts and proceeds to cut out the armature resistance 6 and series field 7; this will continue until all the latter are cut out when the motor runs full speed. This fast movement can be arrested at any time by returning the car switch 20 back into the third position (contacts 25 and 27) when the solenoid circuit 8^b is broken; or the motor can be slowed by moving the car switch back to the second position on contacts 25, 26 and 27 which results in the "slow" coil of the solenoid 1 drawing the rheostat lever 4 down again and placing the armature resistance and series field in circuit again.

On returning the car switch 20 to the first position on contacts 25 and 26 all current is cut off from the armature 15 and the reversing switch S or S^1 returns to its normal position. The motor now runs as a generator with a resistance 18 across the armature and the fields are strongly excited thereby giving a powerful retarding effect and slowing the speed of said motor. By now moving the car switch 20 off the contacts entirely in the position shown in Fig. 1 the circuit of solenoid 1^a and that of the winding 8 of solenoid 1 are broken and the main switch 10 and the shunt field and brake switches 11 and 12 are opened thus bringing the brake into action and stopping the motor and therefore the car. The dropping of the core of solenoid 1^a and its disk 13 forces the lever down if same is not already in such a position.

The car is automatically stopped at the end of its travel by the limit switches 21, 22 on the elevator as aforementioned, which results first in the reversing switch S or S^1 being opened thus cutting off the supply of current to the armature 15 as above described, and secondly, in opening the circuit 9 which applies the brake and stops the motor.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:—

1. A regulating magnet controller for electric elevators comprising a rheostat actuated by solenoids having windings with opposite influences, said windings being controlled by the car switch so that acceleration of the motor may be suspended at any speed by the operation of said switch.

2. A regulating magnet controller for electric elevators comprising a balanced rheostat lever actuated by a double solenoid, said solenoid having "fast" and "slow" coils wound in opposite directions and operated from a car switch, said fast coil being connected respectively with the armature terminals, and said slow coils with the mains and motor circuit, substantially as and for the purpose set forth.

3. In a regulating magnet controller for electric elevators a solenoid having a winding at one end and connected when in circuit directly across the mains and another winding on the same end in series with the armature circuit said windings constituting a "slow" circuit and a third winding or "fast" circuit on the other end connected across the armature terminals said solenoid having a soft iron core provided at one end with a rod or projection attached to one end of a rheostat lever substantially as and for the purpose set forth.

4. In a regulating magnet-controller for electric elevators a solenoid having a winding at one end connected when in circuit directly across the mains and another winding on the same end in series with the armature circuit said windings constituting a "slow" circuit and a third winding or "fast" circuit on the other end connected across the armature terminals, a balanced rheostat lever connected to the core of said solenoid and adapted to make contact with the rheostat contacts in combination with a single solenoid for controlling the brake and motor substantially as set forth.

5. In a regulating magnet controller for electric elevators a solenoid having a winding at one end connected, when in circuit directly

across the mains and another winding on the same end in series with the armature circuit said windings constituting a "slow" circuit and a third winding or "fast" circuit on the other end connected across the armature terminals, a balanced rheostat lever connected at one end to a rod on the core of said solenoid and adapted to make contact at the other end with the rheostat contacts in combination with a single solenoid having an insulated disk attached to the core thereof, the said core adapted to normally rest upon the rheostat lever or the rod of the double solenoid and when raised by the single solenoid to close the switches of the mains, brake and shunt field substantially as set forth.

6. In a regulating magnet controller for electric elevators a double solenoid having "fast" and "slow" coils adapted to operate a rheostat in combination with a reversing switch comprising a pair of solenoids each having a pair of contact disks on its core adapted to place the armature in circuit in either direction substantially as set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HENRY PERCY McCOLL.

Witnesses:
EDWARD WATERS,
WALTER CHARLES HART.