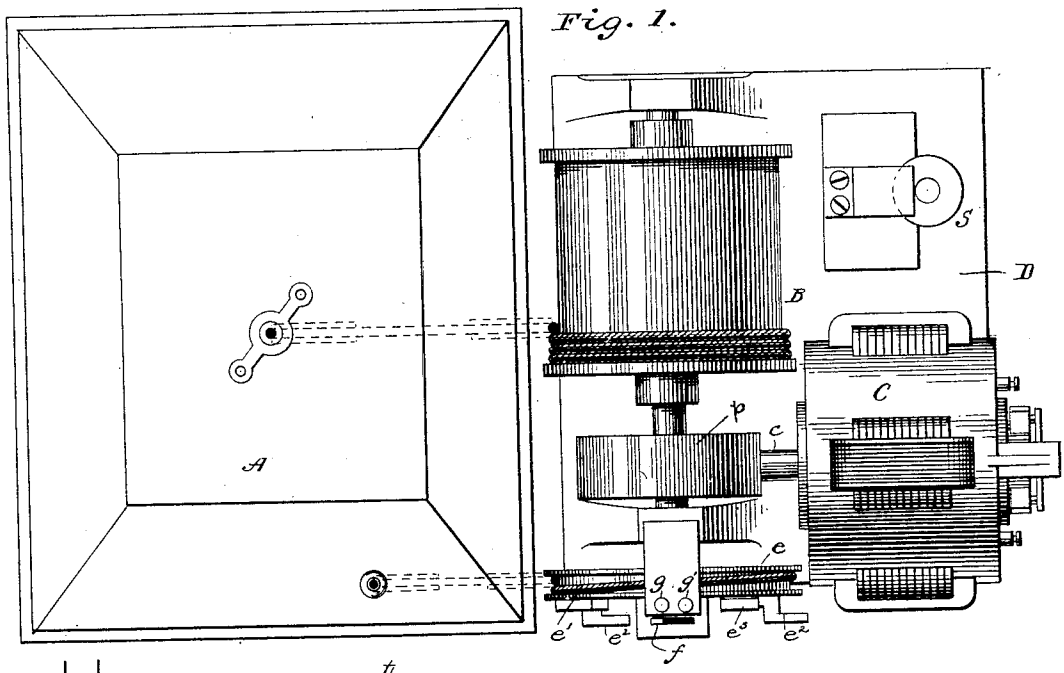
(No Model.)

# A. B. SEE & W. L. TYLER.

## ELECTRIC ELEVATOR.

No. 478,821. Patented July 12, 1892.

*Fig. 1.*



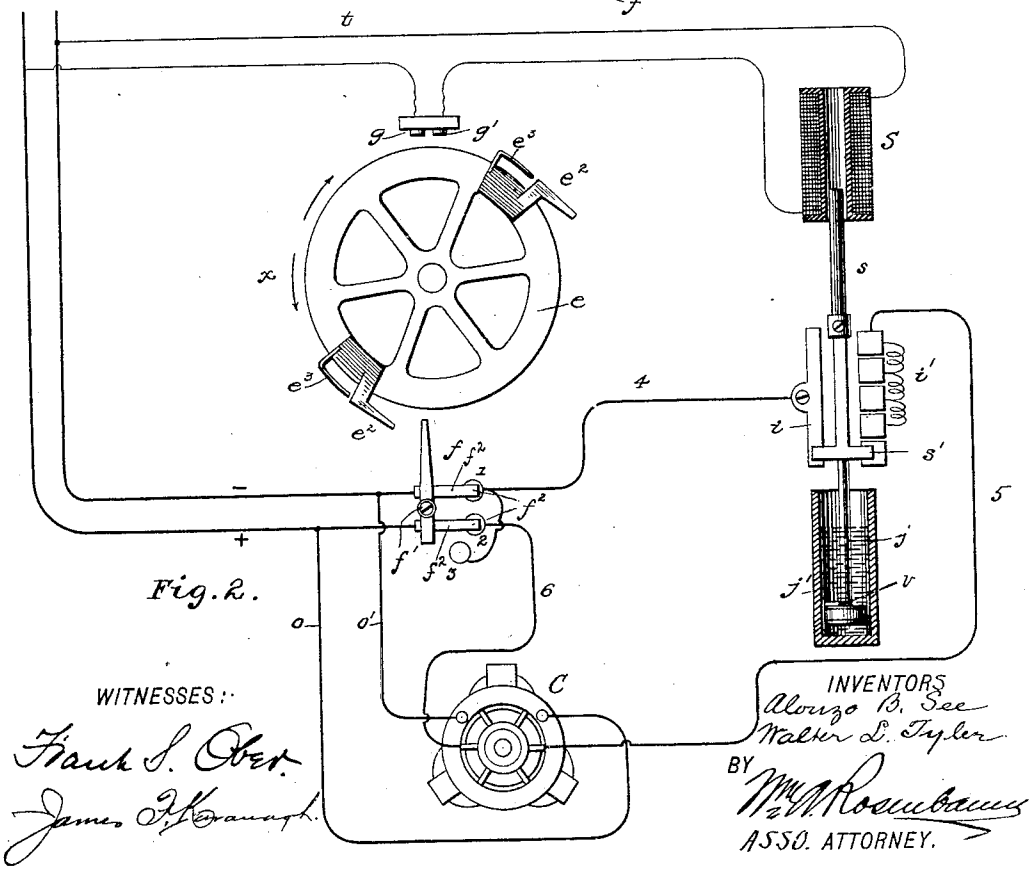




*Fig. 2.*

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## ELECTRIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 478,821, dated July 12, 1892.

Application filed March 14, 1892. Serial No. 424,764. (No model.)

*To all whom it may concern:*

Be it known that we, ALONZO B. SEE and WALTER L. TYLER, citizens of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Electric Elevators, of which the following is a specification.

This invention relates to electric elevators and has special reference to the mechanism for stopping and starting the same.

The object is to provide means for graduating the motion when stopping or starting, especially when starting, and thereby avoid the injurious effect of shocks due to an abrupt stopping or starting of the elevator. We are aware that we are not the first to attempt to accomplish this, but we believe our organization of elements to be more advantageous than any heretofore produced.

Our invention consists, in general, of the combination, with a wheel or switch-arm operated from the car, of a pole-changer and circuit-controller operated in succession thereby and an electro-magnetic apparatus controlling the motor-circuit and itself controlled by the said circuit-controller.

Referring to the accompanying drawings, Figure 1 represents a plan of the elevator and hoisting apparatus, and Fig. 2 represents a diagram of the circuits and apparatus comprehended by our invention.

In Fig. 1, A represents the car, B the drum upon which the cable supporting the car is wound and unwound, and C represents an electric motor whose shaft *c* has a worm gearing directly to a worm-wheel on the drum-shaft. This gearing is covered by a box *p*, and therefore does not show in the drawings. The drum and motor are mounted upon the same base D, so as to give the greatest rigidity and to maintain them constantly in the same relative positions. The connection between the motor and the drum is ordinarily through a worm and gear, although this detail is omitted from the drawings.

*e* represents the ordinary check-wheel mounted upon a stud entirely independent of the drum or motor. The rim of this wheel is grooved and the ordinary check-rope *e'* passes around it and extends up through the elevator-shaft, passing through the car and over suitable sheaves, the rope being an endless one and, as usual, under the control of the operator in the car.

Referring now to Fig. 2, this wheel *e* is shown provided at diametrically-opposite points with an offset abutment $e^2$ and a metallic spring $e^3$. Below the wheel and in the same plane with the abutments $e^2$ is a lever *f*, of insulating material, pivoted at *f'* and carrying two metallic arms $f^2$. Adjacent to the extremities of these arms $f^2$ are three metallic contact-pieces 1, 2, and 3, respectively. This device comprises a pole-changer for reversing the direction of the current which flows through the motor, as will be presently described. On the other side of the wheel, diametrically opposite the pole-changer, are located two metallic contact-pieces *g g'*, respectively suitably mounted and insulated from each other. These pieces are located in the same plane with the metallic springs $e^3$.

S represents a solenoid placed, preferably, in a vertical position so that its armature will be operated in one direction by gravity. This armature is represented by *s*, and is provided with a cross-head *s'*, one end of which is upon a continuous strip *i* and the other end upon a series of contact-plates *i'*, which are terminals of a series of resistance-coils. The armature also carries a piston *j*, which works in a dash-pot *j'*.

The electric circuits are as follows: Plus and minus signs respectively represent the supply-mains. They extend, respectively, to the two arms of the pole-changer $f^2$. *o o'* represent the shunt-circuit for supplying the field-magnets of the motor C. From contact-point 1 of the pole-changer a wire 4 leads to the continuous strip *i*, and from the last contact-point of the rheostat a wire 5 leads to one side of the armature. From the other side of the armature a wire 6 leads to point 2 of the pole-changer. Points 1 and 3 are electrically connected, as shown. The solenoid S is in a branch circuit *t*, normally open at the points *g g'*. The first contact-piece of the rheostat is entirely disconnected electrically from the other contacts, so that when the cross-piece *s'* is upon it the armature-circuit of the motor is open.

The operation is as follows: When the apparatus is in the position shown in Fig. 2, we

will assume that the elevator-car has arrived at the bottom of the shaft and is about to start upward. The operator then pulls down on the check-rope and the check-wheel *e* is turned in the direction of arrow *x*. The abutment $e^2$ strikes the lever *f* and shifts the pole-changer so that the current will travel through the armature of the motor in a direction the reverse of what it did while the elevator-car was descending. Immediately after reversing the current the contact-spring $e^3$ on the opposite side of the wheel bridges the points *g g'* and closes the circuit of the solenoid. The solenoid then attracts its armature and causes it to first close the circuit of the armature through the entire resistance of the rheostat and then gradually cut the entire resistance out and give the entire current to the motor. This movement of the solenoid-armature is comparatively slow, as the necessity for a gradual movement is greater than in stopping. When the elevator is to be stopped at an intermediate landing, the check-rope is pulled upward a distance sufficient to open the circuit of the solenoid, but no farther. The armature *s*, then being released, falls by its own weight. Its movement, however, is less retarded by the dash-pot on account of the valve *v* in the piston, and the resistance is first thrown into the circuit and finally cut out and the circuit quickly opened to stop the motor. In starting up again the rope is pulled to complete the solenoid-circuit and the motor starts, as before. When the upper end of the shaft is reached and it is desired to descend, the check-rope is pulled up and the wheel rotated until the other abutment $e^2$ strikes the lever *f* of the pole-changer on the opposite side and reverses it. Then the continued movement of the wheel brings the other contact-spring $e^3$ into connection with the points *g g'* and the solenoid-circuit is closed. The motor again starts up, as before, but in a reverse direction and the car descends.

The particular advantage of this apparatus for elevator-work is that the main circuit is not directly controlled by the operator in the car, but is controlled through the contacts *g g'* and the solenoid. The solenoid does not act until the connection between the contacts *g g'* is completely broken or perfected and then the solenoid throws the armature to the full length of its stroke in one direction or the other. In all apparatus of this nature, so far as known to us, the check-rope has been connected in some manner directly with the rheostat-lever, so that inasmuch as the rheostat is not visible to the operator in the car he is liable to leave the rheostat-arm in a position where an arc will be established between it and one of the contacts and cause a great deal of injury. Such a thing cannot happen with our apparatus.

Having thus described our invention, we claim—

1. The combination, with an elevator-car and electric motor therefor, of an electric-circuit-supplying current to the motor, an electro-responsive apparatus in a separate circuit and controlling the motor, a switch controlling the electro-responsive apparatus, a wheel carrying a device arranged to throw the switch, and connections from the car to the wheel, whereby the latter may be turned to move the switch, substantially as described.

2. The combination of an elevator-car, a motor therefor, a switch and rheostat in the motor-circuit, a solenoid in a separate circuit, said solenoid moving the switch and rheostat, a retarding device for the solenoid, a switch in the circuit with the solenoid, and mechanical connections from the car to the switch in the solenoid-circuit, whereby the solenoid may be controlled.

3. The combination, with an elevator-car and electric motor therefor, of a pole-changer in the motor-circuit, an electro-responsive apparatus in a separate circuit and controlling the motor-circuit, a switch controlling the electro-responsive apparatus, and a wheel carrying two pairs of devices, one device of each pair arranged to throw the pole-changer and the other device of each pair arranged to throw the switch, for the purpose set forth.

4. The combination of an elevator-car, a motor therefor, a rheostat in the motor-circuit, a solenoid in a separate circuit and operating said rheostat, a retarding device for the solenoid, a switch in the solenoid-circuit, a pole-changer in the motor-circuit, the wheel *e*, and rope *e'*, said wheel being provided with devices for operating said switch and pole-changer, substantially as described.

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

ALONZO B. SEE.
WALTER L. TYLER.

Witnesses:
FRANK S. OBER,
JAMES F. KAVANAGH.