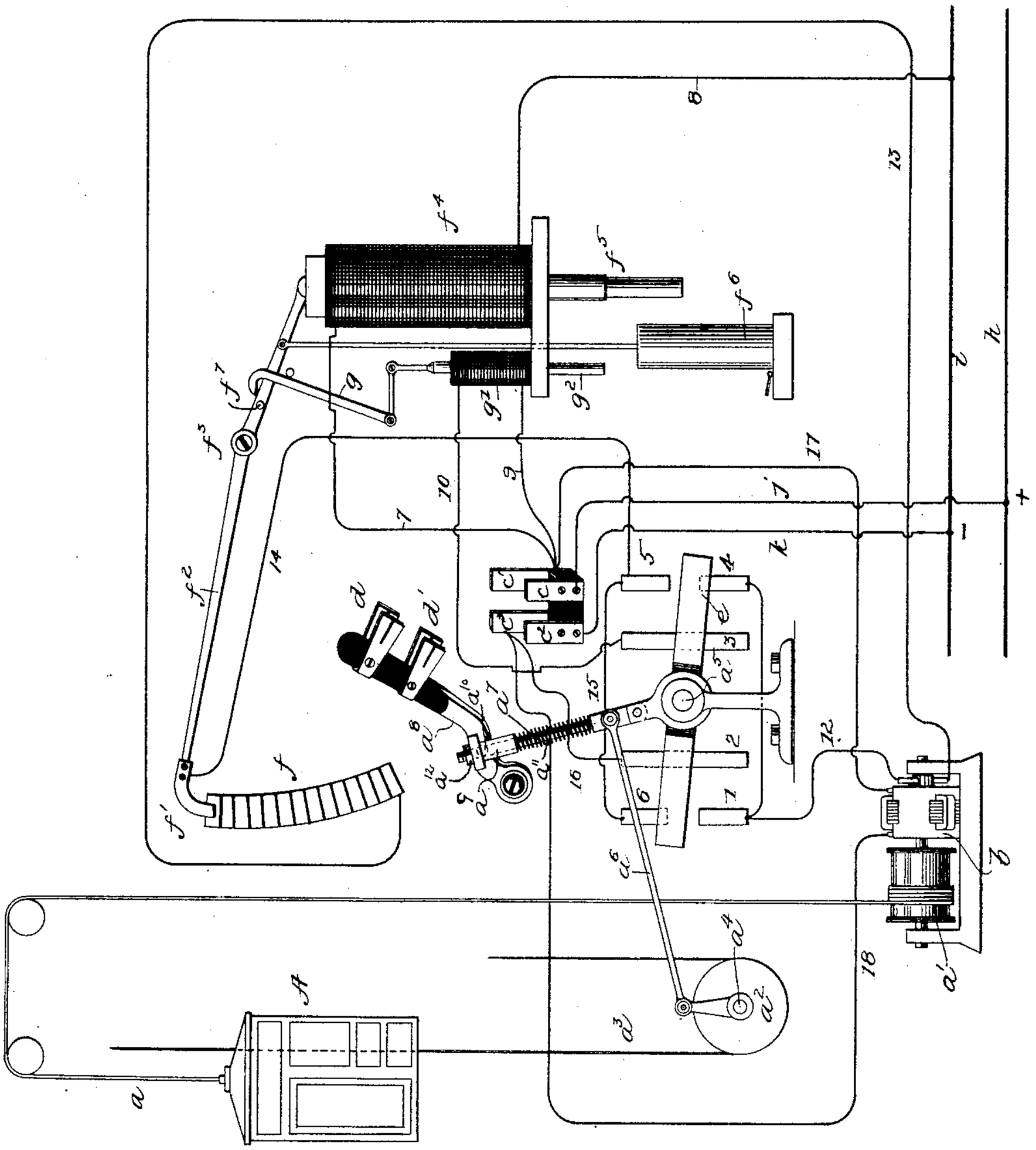
(No Model.)

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

REGULATING SWITCH FOR ELECTRIC ELEVATORS.

No. 500,274. Patented June 27, 1893.



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REGULATING-SWITCH FOR ELECTRIC ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 500,274, dated June 27, 1893.

Application filed November 12, 1892. Serial No. 451,749. (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 at 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 full, clear, and exact description.

This invention relates to electric elevators, the object being to provide a system of apparatus and circuits, for controlling the electric motor which raises and lowers the elevator, which will be simple in construction and efficient in operation.

The invention consists of the apparatus and circuits hereinafter described and claimed.

In the accompanying drawing, the figure represents a diagram of the entire apparatus and circuits.

Referring to the drawing by letter and figures, A represents an elevator car which is hoisted and lowered by means of a cable a passing over suitable guide sheaves and around a winding drum a' geared in any suitable manner to the shaft of an electric motor b. This motor is preferably shunt wound.

a^2 is a sheave over which passes the operating rope a^3 which extends through the car to be moved by the operator to start and stop the car. This sheave is geared to a crank shaft a^4, the crank of which is connected to a rod a^7 by another rod a^6. Rod a^7 is hinged at one end to a crank on shaft a^5 and at the other end passes loosely through a sleeve a^9 which is pivoted at the back to a swinging switch lever a^8 by means of pin a^{10}. Rod a^7 is surrounded by a coiled spring a^{11} which exerts a pressure between the end of the crank and the sleeve a^9 pivoted to the lever, and the rod is fitted with a nut a^{12} which may bear against the outer end of the sleeve to limit the movement of the rod a^7 through the sleeve.

c, c', and c^2, c^3, represent two pairs of metallic contacts supported in any suitable manner and insulated from each other, as shown. The lever a^8 carries two metallic clips d, d', respectively, which are adapted to engage with the respective pairs of contacts c, c', and c^2, c^3; these clips are insulated from each other, as shown.

This apparatus constitutes a make and break double pole switch. Shaft a^5 carries a double armed circuit controlling lever e, which engages with metallic contact pieces 1, 2, 3, 4, 5, and 6; this lever and the contact pieces constitute the pole changer.

f is a series of plates forming the terminals of a rheostat which is used to control and protect motor b. f' is a brush adapted to slide over these contacts. It is carried by an arm f^2, pivoted at f^3, and moved by a solenoid f^4, to the core of which f^5, it is attached.

f^6 is a dash pot which cushions the movement of lever f^2 in either direction. Lever f^2 is provided with a pin f^7, with which a hook g is adapted to engage and lock the lever in the position shown in the drawing.

g' is a solenoid whose core g^2 operates the hook g.

h and i are the mains supplying the current to operate the apparatus. These mains connect respectively with contacts c, c^2 of the switch by wires j and k.

From the contact c' the following circuit extends: wire 7, solenoid f^4, wire 8, to the main i. This puts the terminals of the solenoid on the opposite sides of the switch. Another circuit leads from contact c' by wire 9 through the solenoid g', wire 10, contact 3 of the pole changer, lever e, contact 4, wire 11, contact 1, wire 12, through the armature of the motor, wire 13, to one end of the rheostat, through the resistance to brush f', wire 14, contact 5 of the pole changer, wire 15, contact 6, arm e, contact 2, wire 16, contact c^3 of the switch. This circuit, it will be observed, connects the motor armature, the solenoid g' and the resistance f in series. Another circuit extends from contact c' by wire 17, through the field magnet of the motor, wire 18 to contact c^3 of the switch, the field thereby being in shunt with the armature.

The operation is as follows:—The operator in the car pulls on rope a^3 which closes the switch, pulling clip d across c, c' and clip d', across c^2, c^3. This admits current to the field magnet of the motor, to the solenoid f^4, and to the armature of the motor, the solenoid g' and resistance f. Solenoid g' becoming energized will throw upward its core and throw the hook g' over the pin f^7, thus locking the arm f^2. If the motor is not overloaded it will commence to revolve by the current permitted to pass to it through the resistance f, all

of which is in circuit. As soon as the motor commences to revolve, counter-electro-motive force is generated and the current through the solenoid g' is weakened; this permits the core to fall and release arm f^2. Immediately solenoid f^4, which is already energized, lifts its core and cuts out the resistance f as fast as dash pot f^6 will permit it to do so. The resistance being cut out the motor increases its speed to the maximum. To stop, the pull on hand rope a^3 is reversed and the switch thrown into the position shown in the drawing. This breaks all circuits and the motor stops. In accomplishing this movement of the switch, it will be seen that the spring a^{11} is first compressed (the rod a^7 sliding meanwhile through the sleeve) until the pressure against the switch lever overcomes the friction between the clips, when the connection is suddenly broken. To reverse the movement and lower the car, the movement of the hand rope is continued in the same direction as for stopping. This will again close the switch, but will reverse the position of arm e and thus change the polarity of the armature. The motor will then start and lower the car. If, during the operation of the car, the current is suddenly turned off from the supply mains for any reason, the car will commence to fall by its own weight and will rotate the armature of the motor, which will convert the motor into a generator and supply a current to the following circuit: from one brush of the motor by wire 13, through the resistance f, wire 14, contact 5 or 6, (according to the position of the pole changer,) arm e, contact 2 or three, then, say, by wire 16, to contact c^3, wire 18, field magnet of the motor, wire 17, contact c', wire 9, solenoid g', wire 10, contact 3, arm e, contact 4, wire 11, and wire 12 to the other brush of the motor. This, it will be seen, connects the field magnet, the rheostat, and solenoid g' in series in a closed circuit. The motor then being strongly magnetized will offer a resistance to the downward movement of the car. At the same time the motor itself is protected by the resistance f, all of which is in the circuit. The solenoid f^4 is not included in the closed circuit just traced, and is de-energized whenever current from the mains h and i fails, because one of its terminals is connected directly to said mains.

Having thus described our invention, we claim—

1. In an electric elevator, the combination, of an electric motor, an electric switch, a rheostat, an electro-magnetic rheostat controller, a main circuit, a circuit branching from the main circuit beyond the switch and including the field magnet of the motor, and a second circuit branching from the mains beyond the switch and including the armature of the motor and the rheostat and a third circuit branching from the main circuit at points on the opposite sides of the switch and containing said electro-magnetic rheostat controller, substantially as described.

2. The combination with the switch lever, of a crank and shaft a^5 carrying the same, a rod connected with crank and having a sliding connection with the lever and pivoted to both, a spring interposed between the crank and the lever and a stop to limit the sliding movement of the rod in one direction, substantially as and for the purpose set forth.

In testimony whereof we subscribe our signatures in presence of two witnesses.

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