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G. A. LE FEVRE.

ELEVATOR SYSTEM.

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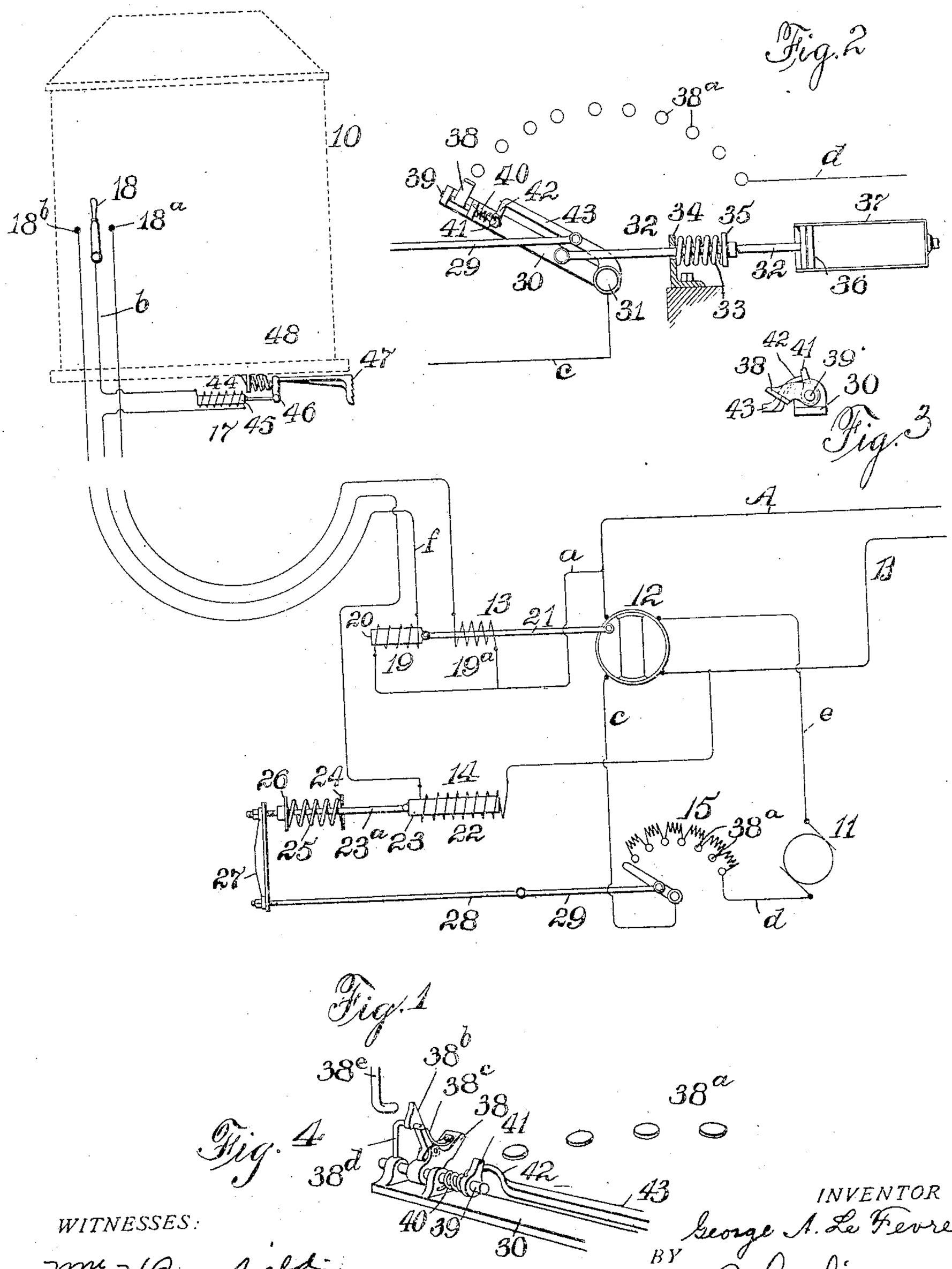

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ELEVATOR SYSTEM.

No. 806,745. Specification of Letters Patent. Patented Dec. 5, 1905.

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To all whom it may concern:

Be it known that I, GEORGE A. LE FEVRE, of Orangeburg, in the county of Rockland and State of New York, have invented a new and Improved Elevator System, of which the following is a full, clear, and exact description.

My invention relates to improvements in the organization and equipment of electric elevators; and the object of my invention is to produce a simple and reliable scheme for operating such elevators, for placing them under absolute control of the operator, for making easy stops and starts, and for effecting an absolute active safety brake by means of a clutch whenever the car is stopped. This safety-brake is intended to operate as auxiliary to any usual starting and stopping means, so as to effect a positive lock while the car is at a given floor.

My invention also relates to certain detail improvements in connection with the scheme by which the motor is automatically and easily started and controlled and by means of which the pole-changer of the motor is also easily and automatically regulated.

With these ends in view my invention consists of an electric elevator system the organization, construction, and operation of which will be hereinafter described and the novel structure claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters and figures of reference indicate corresponding parts in all the views.

Figure 1 is a general diagrammatic view of the system as a whole. Fig. 2 is an enlarged detail view, partly in section, of a form of rheostat used in connection with the system. Fig. 3 is an end view of the rheostat-lever and its accessories, and Fig. 4 is a detail perspective view showing how the contact-shoe of the rheostat-lever is kept out of contact except at the desired points.

The system comprises in its organization a car 10, a motor 11, a pole-changer 12, a device 13 for operating the pole-changer, a device 14 for working the rheostat 15, the rheostat, and the safety-clutch 17. These things so far as their details are necessary will be described below. It will be understood, however, that the car 10, the motor 11, and the pole-changer 12 can be of any usual construction, and these things are shown conventionally merely for this reason. The operation of the car is controlled, as usual, by a lever 18, which serves to close the circuit as presently described.

The apparatus (shown at 13) for operating the pole-changer comprises opposed solenoids 19 and 19ª, which can be of any approved construction, which operate a plunger 20, and this connects by a rod 21 with the pole-changer 12, the latter being of any usual kind. Consequently when the solenoid 19 is energized it pulls the plunger 20 and starts the motor 11 in one direction, while the energizing of the solenoids 19ª has the reverse effect.

The device 14 comprises a solenoid 22, which moves a plunger 23, having a connected rod 23ª, and this is held in a suitable support 24 and moved against the action of the solenoid by a spring 25, which is arranged between the support and an abutment 26 on the rod 23ª. A link 27 connects the rod 23ª with a second rod 28, and an extension 29 of this rod moves the lever of the rheostat 15. Obviously the details of this structure can be varied almost indefinitely, the essential thing being to have the opposed spring and solenoid move the arm or lever of the rheostat, as presently described. The lever 30 of the rheostat and its mechanical accessories I claim as novel, and this structure, which is shown in Figs. 2 and 3, is in principle essential to the successful operation of the system.

The lever 30 is pivoted, as shown at 31, and connects pivotally with a rod 32, which is pulled normally by a spring 33, arranged between a support 34 and an abutment 35 on the rod and which connects with a piston 36, working in an ordinary dash-pot 37. The lever 30 carries, preferably near its free end, a contact-shoe 38, which moves over the contact 38ª of the rheostat 15, the latter being shown conventionally only, because it has the usual rheostat-coils and can be in this respect like any ordinary rheostat. The shoe 38 is carried on a shaft 39, which is journaled in suitable supports on the lever 30, and a spring 40, which is coiled around the shaft and fastened to one of the supports, as usual in such structures, presses the shoe 38 into engagement with the contact-points 38ª. The shaft 39 has an offset lug or crank 41, which is engaged by the nose 42 of the arm 43, which is pivoted also at 31, but moves independently of the lever 30. The result of this structure is that when the arm 43 is pushed over by the rod 29 it releases the lever 30 to the action of the spring 33, and the lever 30 is therefore

pulled across the rheostat and is prevented from too rapid movement by the piston 36 and dash-pot 37. This prevents the current from being turned on too quickly; but in cutting out the current it is desirable to break the circuit quickly, and so at the first movement of the arm 43 the shaft 39 is tilted and the shoe 38 raised off the contacts 38^a, and the continued movement of the arm 43 is transmitted to the lever 30 and the whole device moved back to the original position, (shown in Fig. 2,) thus shutting off the current.

The shoe 38 of the lever 30 is preferably provided with a hook 38^b or equivalent device, which is pressed by a spring 38^c, so that when the shoe is tilted up by the contact of the lug 41 and arm 42, as already described, the hook will engage the catch 38^d, which is mounted on the end of the lever 30, and so the hook will be held and the shoe raised out of contact with the points 38^a and kept out of contact until the lever 30 returns to the first point on the rheostat, at which time the hook 38^b strikes an abutment 38^e, and then the hook is knocked out of engagement with the catch 38^d and the shoe drops to position to engage the contacts of the rheostat. The object of this arrangement is to prevent the shoe from dropping by any possibility into contact with the points 38^a at the wrong time. For instance, if the lever 30 had traveled half the distance back over the contacts 38^a and the operator should decide to start the elevator a foot or two, it will be seen that this action would, except for the arrangement of the hook and catch just described, permit the shoe 38 to drop at a point midway of the rheostat-contacts, and so damage might result to some part of the system by reason of the sudden turning on of so much current.

The active safety device or clutch 17 can be made in many ways; but I have shown a solenoid 44 acting on a plunger 45, which connects, as shown at 46, with a brake-shoe 47, which is normally pressed into engagement with a rack or similar structure in the elevator-well by a spring 48. I have shown the above mechanism for working the safety clutch or shoe 47 as a most simple form of motor; but it will be understood that any usual motor can be substituted without changing the principle of the invention. It will be understood that the solenoid 44 and spring 48, acting in opposition, as shown, can be made to actuate any safety device, and therefore I have only shown the conventional shoe 47, as this part of my invention consists not in any form of the shoe, but in the fact that the device is worked and the car locked every time the car is stopped, thereby rendering accidents unlikely. It will be noticed that this safety device or shoe acts in the nature of a clutch to grip the adjacent portions of the elevator guide or well, so as to lock the car securely while it is at a floor. The circuits will be described in following the operation of the system, which is as follows:

When the lever 18 is turned to start the car, we will say, in an upward direction, it is moved into contact with the point 18^a. This closes the circuit through the starting device 13 and through the safety 14, so as to release the brake, the circuit being as follows: from the leading-in wire A through the wire *a*, including the solenoid 19^a, the lever 18 and the wire *b*, including the solenoids 44 and 22, to the leading-in wire B. The energizing of the solenoid 19^a pulls over the plunger 20 and shifts the pole-changer 12, so as to start the motor in the right direction, the current passing from the wire A through the pole-changer, the wire *c*, the rheostat 15, the wire *d*, the motor 11, and the wire *e* back through the pole-changer to the wire B.

It will be understood that in reversing the connections are such that the current is reversed through the armature only and not through the field; but this is the ordinary scheme for reversing, and so the detail is not illustrated. At the same time the solenoid 44 is energized, so as to pull the shoe or clutch 47 out of engagement with its engaging part, thus permitting the car to move freely. When the lever 18 is moved to a neutral position, as in the drawings, to break the circuit, the spring 48 pushes the shoe or clutch 47 into engagement with its opposed part of the well, thus locking the car. The breaking of the circuit also permits the spring 25 to return the lever 30 of the rheostat to normal position, and the action of this device has heretofore been described in detail. When the lever 18 is moved to the contact 18^b, the action is as already described, except that the motor 11 turns in the opposite direction, and to this end the contact 18^b connects by a wire *f* with the wire *a*, this shunt of the circuit including the solenoid 19. Consequently when the lever 18 is moved onto the contact 18^b the circuit is from the leading-in wire A through the wire *a* to the wire *f* which includes the solenoid 19, the lever 18, the wire *b*, the solenoid 22 and back to the wire B.

From the foregoing description it will be seen that the system is very simple, that the parts work automatically as stated, and that whenever the car is stopped the active safety 17 locks it. It will be noticed that when the car is started the safety is released and that the pole-changer and the rheostat work automatically and in the necessary way to produce a smooth-working system.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. An electric elevator system comprising a car, an electric motor, a rheostat in the circuit of the motor, a pole-changer, and a safety-clutch for locking the car, the said rheostat, pole-changer and safety-clutch being

automatically operated by the making and breaking of the controller-circuit.

2. In an electric elevator system, the combination with the car-controller and the motor, of a rheostat included in the circuit of the motor and controller, electrically-operated means governed by the controller for moving the lever of the rheostat in one direction, a spring to move the said lever in the opposite direction, and means for quickly placing the rheostat-lever out of circuit as it is opened.

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