

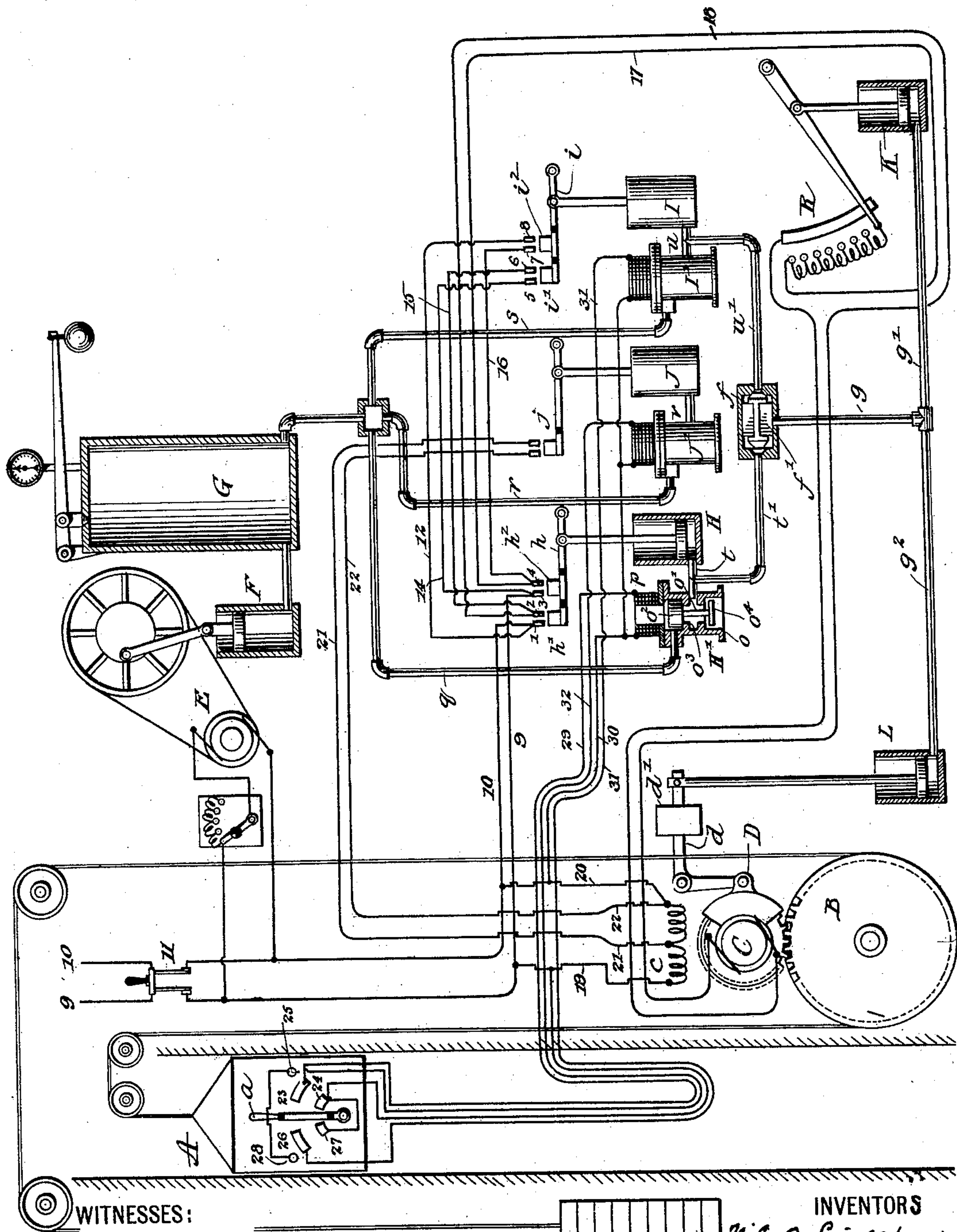
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Patented July 31, 1900.

N. O. LINDSTROM & A. COWPERTHWAIT.
ELEVATOR CONTROLLER.

(Application filed Apr. 11, 1900.)

(No Model.)



WITNESSES:

Frank S. Ober
Jas Donnelly.

INVENTORS

Nils O. Lindstrom
Allan Cowperthwait

BY

W. A. Rosenbaum
ATTORNEY

UNITED STATES PATENT OFFICE.

NILS O. LINDSTROM AND ALLAN COWPERTHWAIT, OF NEW YORK, N. Y.,
ASSIGNORS TO A. B. SEE MANUFACTURING CO.

ELEVATOR-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 654,656, dated July 31, 1900.

Application filed April 11, 1900. Serial No. 12,409. (No model.)

To all whom it may concern:

Be it known that we, NILS O. LINDSTROM, residing at New York, borough of Queens, and ALLAN COWPERTHWAIT, residing at New York, borough of Brooklyn, State of New York, citizens of the United States, have invented certain new and useful Improvements in Elevator-Controllers, of which the following is a full, clear, and exact description.

This invention relates to the control of electric elevators, the object being to provide means whereby the electric hoisting machinery can be started, stopped, and reversed and the speed altered with reliability and positiveness by simple apparatus controlled from the car through the medium of electric circuits.

In general terms the invention consists of fluid-pressure motors respectively controlling certain electric switches and the brake, which switches in turn serve to stop, start, reverse, and change the speed of the actuating electric motor, said fluid-pressure motors being controlled by electromagnetic valves operated from the car.

The invention further consists of the construction and arrangement of the apparatus itself, all of which will be described hereinafter with particularity and finally pointed out in the claims.

The invention is illustrated in the accompanying drawing, which represents, diagrammatically and conventionally, our entire controlling system.

The elevator-car is indicated by A. It is sustained, raised, and lowered by a cord *a* passing around a drum B and thence to a counterweight W. The drum is actuated by an electric motor C, geared thereto in any desired manner. A brake D is applied to the motor-shaft or to some shaft driven by it to bring the motor to a stop after the working circuit has been opened.

E is an auxiliary electric motor or other source of power arranged to operate an air-compressor F, and G is a reservoir or receiver for the air so compressed.

H is an air-motor consisting merely of a cylinder and piston, the latter being connected through its piston-rod with a switch-lever *h*, carrying two bridging contacts *h'* *h*², adapted

to be thrown into and out of engagement with contacts 1, 2, 3, and 4. I is another air-motor similar in every respect to H and with its piston-rod connected with a lever *i*, carrying two bridging contacts *i'* and *i*², adapted to connect with four contacts 5, 6, 7, and 8. J is another air-motor of the same character whose function is to bridge the two contacts *j*. K and L are two other air-motors of the same kind, the former controlling a resistance R and the latter controlling a brake D, the brake for this purpose being mounted upon a bell-crank *d*, one arm of which carries a weight *d'*, opposing the piston of the motor L.

In connection with each of the motors H, I, and J are electromagnetic valves H', I', and J', respectively. Each of these consists of a casing *o*, containing a valve *o'*, having two heads, one of which, *o*², rests by gravity upon its seat *o*³, while the other, *o*⁴, is at the same time off its seat and opening a passage to the atmosphere. The valve-head *o*² is of soft iron to form an armature for an electromagnet *p*, mounted at the upper end of the casing and axially in line with the valve. When this magnet is energized, the valve is lifted, thus uncovering the seat *o*³ and closing the opening below leading to the atmosphere. A pipe for the conveyance of the compressed fluid leads from the tank G to the upper part of the casings *o*, the pipes leading to the respective valve-casings being indicated by *q*, *r*, and *s*, from which it will be seen that the air-pressure is always above the valve-heads *o*². The motor H is connected with its valve-casing H' by a pipe *t*, entering the casing at a point between the two valve-heads. The motor I and the casing I' are similarly connected by a pipe *u*, and the motor J and casing J' are likewise connected by a pipe *v*. From the pipes *t* and *u* branches *t'* and *u'* lead to a valve-casing *f*, containing a double-acting check-valve *f'*, adapted to close either of the pipes *t'* *u'*, while leaving the other open to admit the pressure into the casing *f*. From this casing *f* another pipe *g*, branching into two pipes *g'* and *g*², leads to the motor K and to the motor L.

The function of the motor H and its valve H' is to start the actuating electric motor C in one direction, while the function of the motor I and its valve I' is to start the motor

C in the other direction, and to accomplish this efficiently the valve H' and the valve I' not only control the air for closing the main switches, but also to operate the rheostat R and the brake D . The function of the motor J and its valve J' is merely to short-circuit a portion of the winding of the field-magnet of the actuating-motor C to increase the speed.

The electric circuits are as follows: The main wires 9 and 10 come in through the hand-switch 11, from which they lead, respectively, to the contacts 1 and 3, and thence by wires 12 and 14 to contacts 8 and 5. Contacts 2 and 6 are connected together by wire 15 and contacts 4 and 7 are connected together by wire 16, these connections between the two sets of contacts being the usual connections for reversing the polarity of the armature-leads, (indicated by 17 and 18.) The field-magnet c of the motor is constantly in a closed circuit 19 and 20 across the mains 9 and 10; but the field-magnet is divided into two sections, one of which is adapted to be short-circuited when the circuit 21 22 is closed at the contacts j . In the car is placed a manually-operated lever a , adapted to make connections when moved in one direction between contacts 23 and 24 or 23, 25, and 24 and when moved in the other direction between 26 and 27 or 26, 28, and 27. 28 and 25 are connected together, and 27 and 24 are connected together. 24 leads to one side of the main circuit, (represented by 19.) 23 leads by wire 29 to the magnet p , operating the valve H' , and thence by wire 30 to the other side of the main circuit, (represented by wire 20.) Contact 26 leads by wire 31 to the magnet on the valve I' , and thence by wire 30 to wire 20. Contact 25 leads by wire 32 to the magnet attached to the valve J' and thence by wire 31 to wire 20. Thus valve J' is in parallel with both valves H' and I' .

The operation is as follows: Assume the receiver G to be charged to the proper pressure, the elevator stationary with the brake applied, and the pistons of the several air-motors all at the lower ends of their strokes. To start the car—say to go up—the operator moves the handle a to the first position to the right to bridge contacts 23 and 24. This closes a circuit over the wires 30 31 and 19 20 and energizes the magnet attached to the valve H' . The magnet lifts valve o' , thus closing the escape to the atmosphere and admitting pressure from the pipe q to the pipe t , whence it leads beneath the piston of motor H and lifts lever h , causing contacts 1 and 2 to be bridged by h' and 3 and 4 by h^2 . At the same time the pressure passes through pipe t' , forces the valve f' to the right, thus closing the pipe u' , and enters the pipes g , g' , and g^2 , finally actuating the pistons in motors K and L . The closing of the switch h sends a current through the armature of motor C in the proper direction to elevate the car. This circuit may be traced as follows: Wire 10, contact 1, contact 2, wire 18, motor-armature, resistance R , wire 17, contact 4,

contact 3, and wire 9. Motor L releases the brake, and the actuating-motor C starts with the entire resistance R in circuit; but this resistance is gradually cut out by motor K , until finally, with the resistance all out, the motor runs at full normal speed. To increase the speed of the actuating-motor, the plan of weakening the field of the motor is adopted. The operator in the car throws the hand-lever over to the second position to the right, which connects the magnet attached to the valve J' in parallel with the magnet attached to valve H' , the circuit of the magnet attached to valve J' being traced from contact 25 in the car by wire 32, thence through the magnet to wire 30, to which the other magnet remains connected. Magnet p of valve J' then being energized, valve o' is lifted and admits pressure from pipe r beneath the piston in motor J , causing it to lift the lever to which it is connected and bridge the contacts j . This completes a short circuit 21 22 around a portion of the field-magnet coil c of the motor, thus weakening the field and speeding up the machine. To stop the elevator, the hand-switch in the car is moved to a central position, (shown in the drawing,) whereupon the circuits of the valve-magnets are opened, allowing the valves to drop, cutting off communication between the source of air-pressure and the motors, and opening exhaust-passages to the atmosphere. The air from motors K and L flows backward through the pipes g' , g^2 , and g , through the valve-casing f' into the open pipe t' , through the pipe t , and thence through the valve-casing H' to the atmosphere. At the same time the air flows from the motor H through the same exhaust-port in the valve-casing H' . The main switch is therefore opened and the resistance R thrown into circuit and the brake applied simultaneously. To start the car in the opposite direction, the hand-lever a is thrown to the first position to the left, bridging contacts 26 and 27, which closes the circuit through the magnet attached to the valve I' by way of wires 30 and 31, whereupon pressure is admitted to the motor I , which closes the switch i , establishing a current in wires 17 and 18 of reversed polarity, in consequence of which the motor lowers the car. At the same time pressure is admitted to the pipe u' , which forces the valve f' over to the left, closing the pipe t' and admitting pressure to the motors K and L , which cut out the resistance R and release the brake. To increase the speed, the hand-lever a is thrown to the second position to the left to bridge the contact 28 and establish a circuit for the valve J' in parallel with I' , resulting in the operation before described.

It will be understood that the construction of the motors and valves may be altered to suit conditions without departing from the spirit of our invention, the forms shown being merely intended to illustrate the principle of our invention. Our invention also ex-

tends to the use of any liquid or gas as a source of power instead of atmospheric air.

Having described our invention, we claim—

1. The combination of an elevator-car, an actuating electric machine therefor, two controlling-switches for the respective directions of rotation of the actuating-machine, a fluid-pressure motor for each switch, a valve controlling each motor, a brake for the actuating-machine and a fluid-pressure motor operating said brake and means whereby, the operation of either of said valves will control the pressure in the motor operating the brake, substantially as described.

2. The combination of an elevator-car, an actuating electric machine, an electric switch for stopping and starting said machine, a fluid-pressure motor operating said switch a valve controlling said fluid-pressure motor, means for increasing the speed of said actuating-machine, another fluid-pressure motor controlling said means, a valve controlling the second fluid-pressure motor and means whereby first one and then both of said valves can be operated from the elevator-car.

3. The combination of an elevator-car, an electric actuating-machine therefor, two electric switches controlling the two directions of movement of said actuating-machine, two fluid-pressure motors operating said switches respectively, two valves controlling said motors, means for operating either of said valves from the elevator-car, a pipe leading from each of said fluid-pressure motors, a third fluid-pressure motor controlling the actuating-machine, a pipe connecting said third motor with each of the pipes leading from the other two motors and means whereby one of the pipes leading from the first two motors, can be automatically closed while the other is opened to the third fluid-pressure motor, substantially as described.

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

NILS O. LINDSTROM.

ALLAN COWPERTHWAIT.

Witnesses:

WM. A. ROSENBAUM,
JAMES A. DONNELLY.