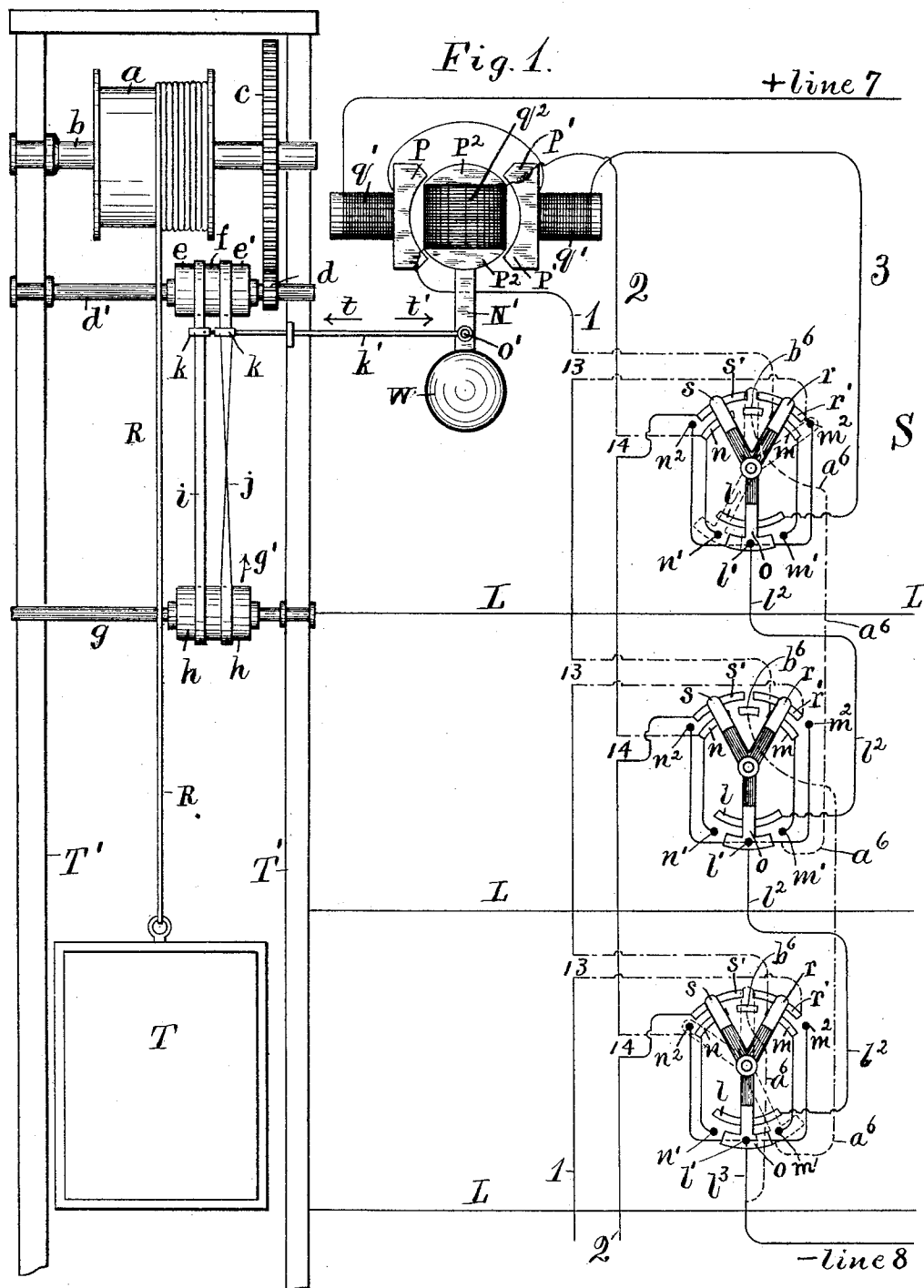


W. BAXTER, Jr.
ELECTRIC CONTROLLER FOR ELEVATORS.

No. 463,615.

Patented Nov. 24, 1891.

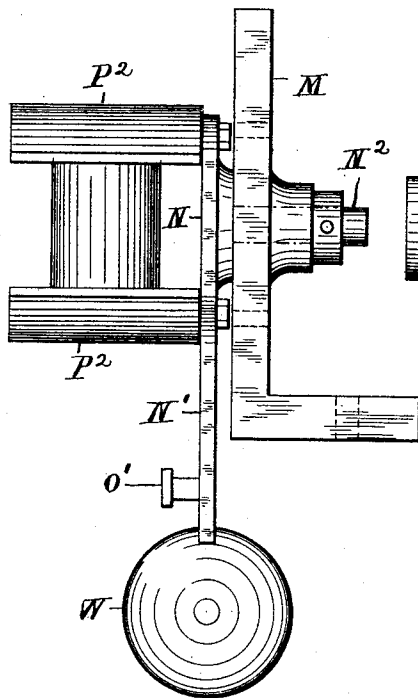
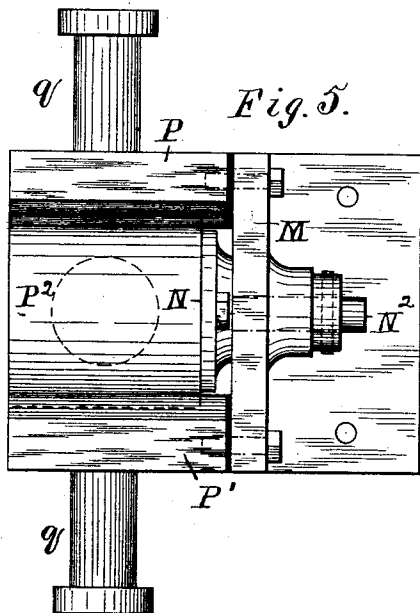
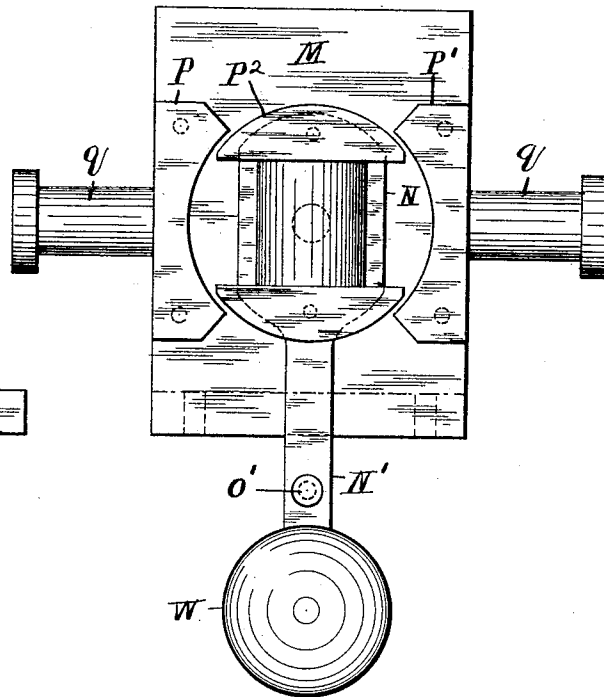
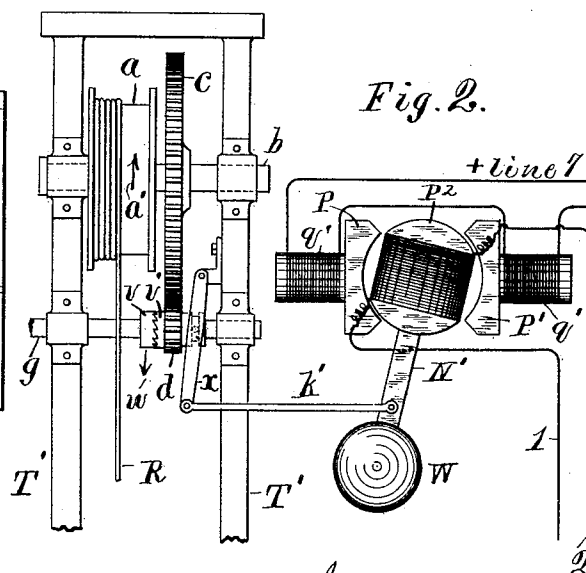


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Fig. 3.*Fig. 4.**Fig. 5.**Fig. 2.*

Attest:

L. Lee.

J. Vanhust Jr

Inventor.

William Baxter Jr., per
Crane & Miller, Atty.

UNITED STATES PATENT OFFICE.

WILLIAM BAXTER, JR., OF BALTIMORE, MARYLAND, ASSIGNOR TO THE
BAXTER ELECTRIC MOTOR COMPANY, OF MARYLAND.

ELECTRIC CONTROLLER FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 463,615, dated November 24, 1891.

Application filed January 29, 1891. Serial No. 379,550. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BAXTER, JR., a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Electric Shifters for Elevator-Motors, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 The present invention relates to power hoisting-machines actuated by any convenient motor, which may be rotated continuously, and the hoister connected therewith when it is desired to elevate the car and released
15 therefrom to permit the car to descend by gravity; or reversible mechanism may be interposed between the motor and the car, by which the car may be propelled upward or downward, as desired.

20 The invention consists in the combination, with means for coupling the motor-shaft with the hoisting-pulley, of an electro-magnetic shifter for operating such coupling device, an electric circuit connected with the coils
25 of the electro-magnetic shifter, and one or more switches connected with said circuit and adapted to actuate the electro-magnetic shifter when desired.

In the annexed drawings, Figure 1 is a diagram representing the electro-magnetic shifter with the motor-shaft coupled to the hoisting-pulley by reversible mechanism. Fig. 2 is a diagram showing the electric shifter and a sliding clutch for coupling the motor-shaft to the hoisting-pulley. Fig. 3 is
30 an edge view of the armature for the electro-magnetic shifter pivoted upon a standard. Fig. 4 is a front view of the same parts with the field-magnet poles also bolted upon the standard, and Fig. 5 is a plan of the parts shown in Fig. 4.

The cores of the armature and of the magnet-poles are stripped of their electric coils to show their construction.

45 In Fig. 1, *a* is the hoisting-pulley; *b*, the pulley-shaft; *c*, a cog-wheel fixed thereon, and *d* a pinion connected with such cog-wheel and coupled with the motor-shaft *g* by belts and pulleys. A car *T* is shown suspended
50 from a rope *R*, wound upon the pulley *a*, and posts *T'* are shown by the sides of the car to

represent the hoistway, which would connect with the several landings of the building, (indicated merely by the lines *L*.)

In Fig. 1 the pinion *d* is shown attached to 55 the pinion-shaft *d'*, provided with loose pulleys *e e'* and with a fast pulley *f*. The motor-shaft *g* is provided with one fast pulley *h*, and straight and cross belts *i* and *j* are shown applied to the pulleys *h* and *e e'* to 60 couple the pinion-shaft with the motor-shaft when required. A belt-shifter is provided with loops *k*, fitted to the belts *i* and *j*, and is connected by a rod *k'* with the arm *N'* of a magnetic shifter. Such shifter may be moved 65 in either direction by suitable actuating-switches *S*, located upon the landings *L*. The belts *i* and *j* are shown upon the loose pulleys *e e'* in the drawings, in which position the fast pulley *f* would be uncoupled from the 70 motor-shaft, and the pinion-shaft and pinion would be free to revolve, so that the car *T* could descend by gravity.

It is assumed that the motor-shaft *g* would revolve continuously in one direction, as indicated by the arrow *g'* upon the pulley *h*, and the shifting of the rod *k'* in the direction of the arrow *t* would throw the cross-belt *j* upon the pulley *f* and operate to wind up the rope *R* and elevate the car. The shifting of the rod *k'* in the opposite direction (indicated by the arrow *t'*) would throw the straight belt upon the pulley *f* and operate to lower the car at a regulated speed. With such construction the car would not be allowed to descend by gravity, but suitable means, as an automatic brake, would be provided to hold the drum from turning when neither belt was upon the fast pulley. Such brake may be operated electrically upon 80 the same circuit as the electro-magnetic shifter, but is not shown herein, as it is described and claimed in another application, Serial No. 267,524, filed March 17, 1888. The electro-magnetic shifter may be made of any 85 suitable form to move the rod *k'* by magnetic attraction, the form of shifter in the drawings consisting in two field-pole pieces *P P'*, between which is pivoted an armature having poles *P²* produced upon its ends by an electric coil *q²*, wound around its middle portion. 90 The armature opposite the middle of its

length is pivoted to a standard M by means of a plate N, provided with a pin N^2 , inserted in the standard, and an arm N' is extended from the plate and provided with a pin o' , connected with the shifter-rod k' . A weight W is applied to the lower end of the arm N' to hold the armature with its poles midway between the field-poles P P'.

In Figs. 4 and 5 these field-poles are shown provided with extensions or cores q , upon which the electric coils (shown in Figs. 1 and 2) are wound. The positive line conductor 7 is shown connected with one of the field-coils q' , from which the current is conducted to the other field-coil by a connection q^2 , and from the latter field-coil a conductor 3 is connected with a contact l in the nearest landing-switch. The coil q^2 upon the armature-core is connected at one end by conductor 1 with a contact m in each switch, and the other end of said coil is connected by conductor 2 with contacts n and n' in each switch.

The switches are constructed to operate with a current of constant strength, such as is used in arc-light circuits, and are arranged to furnish normally a series of electrical connections from the positive conductor 7 to the negative conductor 8 when the magnetic shifter is not in use. Each switch-lever is formed with three insulated arms o , r , and s , having each a spring adapted to press upon a contact-segment and upon other contacts adjacent thereto. The spring o rests upon the segment l , the spring r upon the segment m , and the spring s upon the segment n . Adjacent to the segment l in each switch is a contact l' , connected when the switch-lever is in its normal position with the segment l of the switch next in series by a wire l^2 , excepting that the contact in the last switch is connected with the line 8 by means of a wire l^3 . The conductors 1 and 2 are broken adjacent to each switch and provided with loops and with contacts, which serve when the switches are in their normal position to close such conductors through the switches. The conductor 1 is thus connected with contacts m and m' above the break 13 in such conductor and below such break with a contact r' adjacent to the contact m . The spring r normally connects the contacts m and r' , and thus normally maintains the circuit through the conductor 1. The breaks 14 in the conductor 2 are normally closed by contacts s' and n , the contact s' being connected with the conductor below the break 14 and normally connected by the spring s with the contact n , which is joined to the conductor above the break 14. Contact-studs m^2 and n^2 are arranged adjacent to the segments r' and s' and connected with the contacts l' .

When the switch-levers are all in their normal position, as shown in Fig. 1, the springs r serve to close the conductor 1 through all the segmental contacts m and r' , and the springs s operate to close the conductor 2 through all the segmental contacts n and s' .

The circuit in the main line is thus conducted from the + line 7 through the field-coils q' to the - line 8 by the wire 3, contacts l and l' , springs o , and wires l^2 and l^3 .

When any of the switch-levers are turned in one direction, as indicated by the dotted lines in the top switch, the current will be directed through the armature-coils q^2 in one direction, and when any of the switch-levers are turned in the opposite direction, as indicated by dotted lines in the bottom switch, the current will be directed through the same coils in the opposite direction. The poles of the armature would thus be reversed and the poles of the field-magnet would act upon them in a contrary manner. The attraction of the field-poles thus operates forcibly to rotate the armature upon the pin N^2 in a given direction and operates to pull the shifter-rod k' to shift the belts i and j , as desired. When the top of the switch-lever is turned to the right, the current, after passing through the field-coils, enters the segment l and passes thence by the arm o to the contact n' , thence to segment n , and by conductor 2 into the upper end of the armature-coils q^2 . From such armature-coils it passes by conductor 1 to the contact m , and thence by the arm r to the stud m^2 , and thence to the stud l' and to the - line 8. When the top of the switch-lever is turned to the left, as in the bottom switch, the current through the armature is reversed, as the current supplied by conductor 3 to the segment l passes through the arm o to the contact m' , and thence by the segment m and conductor 1 into the lower end of the armature-coil q^2 . From the upper end of the armature-coil the current then passes through conductor 2 to contact n , stud n^2 , and stud l' to the - line 8. As the last contact l' connects the circuit with the - line 8, it follows that when the lower switch is turned at the same time as any other switch in the series it cuts off the connection of the segment l with such contact, and the current reaching such segment l in the lower switch would not, therefore, reach the - line 8 without an additional connection. Such additional connection is provided in the contacts b^6 , arranged one in each switch near the adjacent ends of the segments r' and s' , to receive either of the arms r or s when the other arm is in the armature-circuit. The contact b^6 is connected by wire a^6 with the contacts l' , m^2 , and n^2 in the switch below it. When the arm o in the lower switch is shifted, it connects the contact l (which receives the current from the upper switch) with one of the adjacent contacts m' or n' , which are united electrically (as by wires) with the segments m and n . These segments are connected, respectively, with the conductors 1 and 2, so that a current passing therefrom may traverse either of such conductors to the segment r' or s' in the switch above.

When either of the arms r or s is turned to actuate the magnetic shifter, the other arm

falls upon the contact b^6 and simultaneously connects the same with the adjacent ends of the segments r' and s' , the contact-surface upon the arm being made wide enough to join such segments. The current entering such auxiliary contact is thus led to the wire b^3 and to the —line 8 independently of the arm in the lower switch-lever.

The contact-surfaces upon the several switch-arms are made of suitable width to bear upon one segment or contact-stud before leaving another, and it is thus impossible with the construction just described to make an open circuit, and the switches are thus adapted for a current of constant strength, as the construction wholly obviates any derangement of other apparatus (as arc lights or motors) that may be connected in series with such switches and their circuit.

The operation of two switches at once would result in breaking the circuit through the conductor 1, (which is normally closed in each switch by the spring r resting upon the contacts m and r'), and the switch nearest the motor would then control its movements. For example, if the lowest switch only in Fig. 1 were thrown into the position shown in dotted lines and the elevator were moving in the direction corresponding to that position of the switch, the current, in order to reach the armature from such switch, would pass through contact m' therein to the contact m , and thence through the conductor 1 and the contacts r' , r , and m of the middle and top switches. If either of the said last-named switches were to be turned in the position of the top switch while the car was moving, as aforesaid, the current, instead of passing through the armature from the lower switch, would be broken at r in the top switch. The top switch, being nearest the motor, would then control the current, which would in such case be diverted in the opposite direction to that previously effected by the lower switch, and the movement of the elevator and car would be reversed.

With the weight w upon the arm n' the shifter-rod shown in Fig. 1 is held normally in a neutral position; but where it is required merely to uncouple the hoisting-pulley from the motor-shaft a single-acting clutch may be used, and the magnetic shifter may be operated to hold the clutch engaged or disengaged as the switch-levers are moved into the opposite positions. (Indicated in dotted lines in Fig. 1.)

In Fig. 2 the motor-shaft g is shown provided with a toothed clutch-hub v , fixed to the shaft to rotate therewith, as indicated by the arrow w . The pinion d is made movable longitudinally upon the shaft and is provided with a toothed hub v' to engage the clutch-hub v . A clutch-lever x is provided to shift the pinion when required, and one end of the rod k' is attached to the lever to shift the pinion to and from the clutch.

In Fig. 2 the upper pole of the armature is

shown attracted and its lower pole repelled by the field-pole P' and the lever x shifted to engage the pinion with the clutch v . When thus engaged, the hoisting-pulley would be coupled with the motor-shaft and would rotate, as in the direction of the arrow a' , to wind up the rope R and elevate the car T . In this position of the armature-poles the current would be conducted around the core of the field-pole P , so as to attract the lower pole of the armature and to repel the upper pole of the same. By a reversal of the current through the armature-coils q^2 the action of the poles $P P'$ upon both the armature-poles would be reversed and the arm N' would be shifted and the lever x actuated to uncouple the pinion from the clutch v . The hoisting-pulley a would then be uncoupled from the motor-shaft and the car could be lowered in a suitable manner.

The illustrations furnished in Figs. 1 and 2 show how the means of coupling a motor-shaft and elevator-pulley may be varied to utilize the magnetic shifter described herein, and I do not, therefore, limit myself to the particular means shown herein.

The switches used are only illustrative in character, and any suitable switches adapted to employ a current of constant strength or constant potential may be used to convey the current to and from the magnetic shifter.

In the magnetic shifter shown the current passes first through the field-coils and then through the armature-coil; but other windings may be employed, as is common in various styles of electric motors.

The essential part of my invention consists in the combination, with a magnetic shifter for actuating the motor-coupling device, of an electric circuit and switches for varying the course of the current in the coils of the magnetic shifter.

By my invention I am enabled to dispense with the pull-ropes that have always heretofore been used to actuate a coupling-shifter and am enabled to connect a hoisting-pulley with a continuously-rotating shaft by any suitable coupling device and actuate such coupling device by the mere movement of an electric switch. Such means of actuating the coupling device is far more convenient and durable than a pull-rope, and it will therefore be seen that my invention does not consist in the particular construction of the magnetic shifter or of the switches for varying the current in the same, but in the combination of such elements with an electric circuit and the coupling device which requires to be shifted.

Having thus set forth the nature of my invention, what I claim herein is—

1. The combination, with a suspended car moving in a hoistway, of a rotating motor-shaft, a hoisting pulley and rope for elevating the car, means for coupling the motor-shaft with the hoisting-pulley, an electro-magnetic shifter for operating such coupling device, an electric circuit connected with the

coils of the electro-magnetic shifter, and one or more switches provided with suitable contacts connected with said circuit and adapted when the switches are operated to vary the course of the current in the coils of the electro-magnetic shifter, as and for the purpose set forth.

2. The combination, with a suspended car moving in a hoistway, of a rotating motor-shaft, a hoisting pulley and rope for elevating the car, means for coupling the motor-shaft with the hoisting-pulley, an electro-magnetic shifter for operating such coupling device, an electric circuit connected with the coils of the electro-magnetic shifter, and landing-switches located upon the landings of the hoistway and connected with the said circuit and adapted when operated to vary the course of the current in the coils of the electro-magnetic shifter, as and for the purpose set forth.

3. The combination, with a suspended car moving in a hoistway, of a rotating motor-shaft, a hoisting pulley and rope for elevating the car, reversible coupling mechanism connecting the motor-shaft with the hoisting-pulley, an electro-magnetic shifter for actuating such reversible mechanism, an electric circuit connected with the coils of the electro-magnetic shifter, and landing-switches located upon the landings of the hoistway and connected with the said circuit and adapted when operated to reverse the course of the current in the coils of the electro-magnetic shifter, as and for the purpose set forth.

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

WILLIAM BAXTER, JR.

Witnesses:

D. J. JUVENAL,

A. NEUS, Jr.