(No Model.)

G. H. REYNOLDS.

MEANS FOR ELECTRICALLY CONTROLLING THE OPERATION OF ELEVATORS.

No. 361,779. Patented Apr. 26, 1887.

Fig. 1.

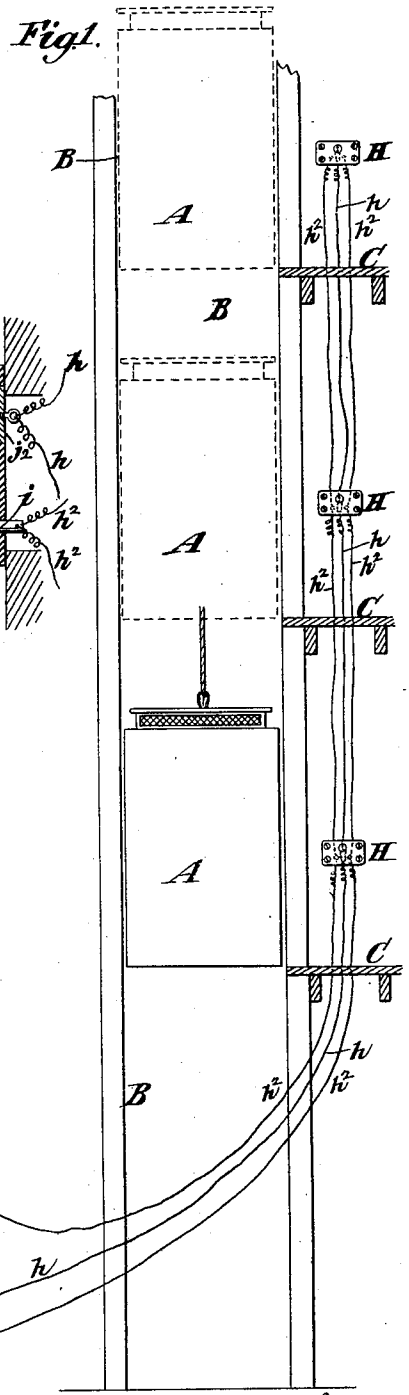


Fig. 2.

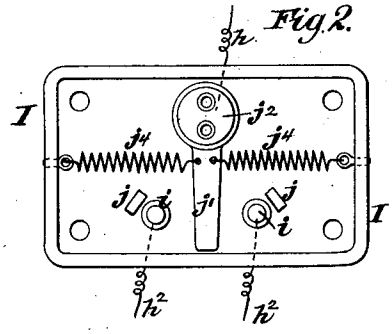


Fig. 3.

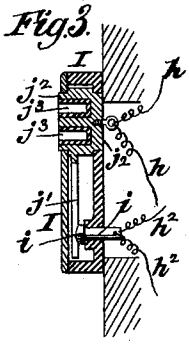
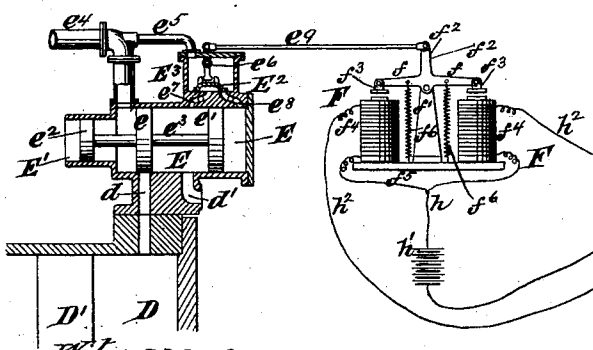


Fig. 1.



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UNITED STATES PATENT OFFICE.

GEORGE H. REYNOLDS, OF NEW YORK, N. Y., ASSIGNOR TO THE CRANE ELEVATOR COMPANY, OF CHICAGO, ILLINOIS.

MEANS FOR ELECTRICALLY CONTROLLING THE OPERATION OF ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 361,779, dated April 26, 1887.

Application filed November 23, 1886. Serial No. 219,584. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. REYNOLDS, of the city and county of New York, in the State of New York, have invented a new and useful Improvement in Means for Controlling the Operation of Elevators from Different Landings or Floors of Buildings, of which the following is a specification.

In the operation of elevators, particularly those which are employed in dwelling or private buildings where the permanent residents of the building may desire to employ the elevator, a means for properly controlling the operation of the elevator from any floor or landing of the building, so as to produce the rise and fall of the car from the outside thereof and without the necessity of an attendant, would be a great desideratum. It is of course desirable that the means employed should be of such character that access cannot be had to them by children or servants to tamper with the elevator; and the object of my invention is to provide means or mechanism whereby the desired result can be accomplished by any person having a properly-constructed key for the purpose in the same manner that any person having a proper key can open an inclosure provided with a lock. I accomplish the desired result by the employment of electricity and a valve apparatus which controls the admission of motive fluid to an operating-cylinder and its exhaust therefrom, said valve apparatus comprising a main valve and a motor or controlling piston or pistons, on which the pressure of fluid acts to shift the main valve, and an auxiliary or pilot valve which controls the operation of the controlling piston or pistons and main valve. It is advantageous to employ a valve apparatus of such character, because to shift the auxiliary or pilot valve will require but a small fraction of the power which would be necessary to shift the main valve. I also employ an electric motor or electro-magnetic apparatus, by the operation of which the auxiliary valve is directly shifted, and an electric circuit which includes in it the electric motor or electro-magnetic apparatus, and also includes at each of one or more floors or landings a circuit-closing device or switch, which is preferably inclosed within a case to prevent tampering therewith, but has a portion exposed for the proper engagement of a key with it.

The invention consists in novel combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a partly-sectional elevation of an elevator shaft and car, a valve apparatus, and means embodying my invention for shifting the auxiliary or pilot valve from any one of the several landings or floors past which the car moves. Fig. 2 is a front view, upon a larger scale, of a switch or circuit-closing device which I may employ, the front of the inclosing-case being removed in order to show the internal mechanism; and Fig. 3 is a vertical section of such switch or circuit-closing device, together with a portion of the wall or other support to which it is secured.

Similar letters of reference designate corresponding parts in all the figures.

A designates an elevator-car, which is arranged to ascend and descend in the elevator shaft or well B past the several floors or landings C. I have here shown three floors or landings C past which the car moves, and obviously there may be one or any greater number, varying according to the height of the building and stories.

In the present example of my invention the car is supposed to be operated by the movement of the main piston in a hydraulic operating-cylinder in a well-understood manner. I have only shown a small portion, D, of such cylinder and its piston D′ and the valve apparatus whereby the flow of motive fluid to the cylinder D and its exhaust therefrom are controlled.

The valve apparatus which I have shown is similar to that illustrated in my application No. 219,583, filed herewith, and but a brief description thereof is necessary. Such apparatus comprises a main valve-cylinder, E, wherein are fitted two pistons, e e', and a smaller or supplemental cylinder, E′, forming an extension of the main cylinder, in which is fitted a piston, e^2. The several pistons are on a common rod, e^3, and the piston e constitutes the valve proper, while the pistons e' e^2 are con-

trolling-pistons, on which the pressure of water or other motive fluid under pressure acts to shift the main-valve piston *e*.

e^4 designates the main supply-pipe for water or fluid under pressure, and the movement of the main-valve piston *e* serves to place the supply or inlet pipe e^4 in communication with the main operating-cylinder D through the supply port or passage *d*, or to place said main operating-cylinder in communication with the atmosphere through the port or passage *d* and the exhaust port or passage *d'*.

The movements of the main valve *e* and its controlling pistons or motor e' e^2 are controlled by the auxiliary or pilot valve E^2, arranged within the auxiliary valve-chest E^3, to which water or motive fluid under pressure is supplied by a branch, e^5, from the supply-pipe e^4. By means of a rock-shaft, e^6, having arms within and without the valve-chest E^3, the auxiliary valve may be moved to control the ports or passages e^7 e^8, leading to the main valve-cylinder E, and with one of the arms of the rock-shaft e^6 is connected a rod, e^9, whereby the auxiliary or pilot valve may be moved. The construction and operation of this valve apparatus are more fully described in my pending application, and no other description thereof seems here necessary.

F designates an electric motor or electro-magnetic apparatus whereby the shifting of the auxiliary valve E^2 is accomplished. As here represented, it consists of an armature-lever, *f*, fulcrumed to a suitable support, *f'*, and having an upwardly-extending arm, f^2, with which the valve-operating rod e^9 is connected. At opposite ends of the armature-lever *f* are armatures f^3, and f^4 are the magnet-coils whereby they are operated, and which are mounted upon a suitable base, f^5.

It will be obvious that when either magnet-coil is energized the corresponding end of the armature-lever will be drawn down and the rod e^9 will be pushed or pulled to move the valve E^2. In order to return the armature-lever *f* and the valve E^2 to neutral or central position after operation in either direction, I employ balancing devices, here shown as consisting of springs f^6, connected with the armature-lever *f* on opposite sides of its fulcrum.

The electric motor or electro-magnetic apparatus is included in the electric circuit, which extends to the several floors or landings C of the building, or to as many as may be desired of such floors or landings. With one terminal of each electro-magnet f^4 is connected a wire, *h*, including a battery, *h'*, and with the other terminals of said two magnets are connected wires h^2.

At each of the one or more floors or landings at which it is desired to control the operation of the valve apparatus I place a switch or circuit-closing device, H, which may be secured to the wall or other suitable support, and which may be of any desired construction. I preferably employ a switch or circuit-closing device having its operative parts inclosed within a case, and having only such a portion exposed beyond the case as is necessary to provide for the engagement with it of a suitably-constructed key. In this way I provide for the operation of the switch or circuit-closing device in the same manner as a lock is operated by a key, and prevent tampering with the device by children, servants, or other unauthorized persons.

On a larger scale in Figs. 2 and 3 I have represented one form of circuit-closing device or switch which I may employ with advantage. It has its operative parts arranged within an inclosing-case, I, which may, if desired, be of insulating material, and in which are metallic contacts *i*, with which the wires h^2 are connected. The case has also stops or projections *j*, which limit the swinging movement of a pivoted contact spring or arm, *j'*, fulcrumed at its upper end and adapted to swing in a vertical plane from the central position shown in Fig. 2 into contact with either of the metallic pins or contact-points *i*. As here represented, the contact spring or arm *j'* extends from a hub, j^2, which is journaled within the case I, and with this hub is connected the wire *h* of the electric circuit. The end of this hub j^2 is the only portion of the operating or moving parts of the switch which is exposed beyond the case I, and this should be constructed for the engagement of a proper key. I have represented it as having in its face two holes, j^3, which are lined with suitable insulation, and with which a key having two pins or studs arranged at a certain distance apart may be engaged. By such a key the contact arm or spring *j'* may be swung in either direction from the central or neutral position shown in Fig. 2 and into contact with either of the metallic pins or contact-points *i*, according to whether it be desired that the elevator shall ascend or descend to the landing from which its movement is controlled. This switch or circuit-closing device is operated to properly control the ascent and descent and stopping of the car in the manner described in my above-referred-to application. In order to insure the return of the contact-spring *j'* to its neutral or central position after operation, I have represented balancing-springs j^4, which are connected with it on opposite sides, and which are also connected with the case I.

It will be understood that whenever the contact spring or arm *j'* is swung in one direction by a key engaged with it the spring which extends from it in the opposite direction will be extended or put under greater tension, and as soon as pressure is no longer applied through the key such extended spring will return the contact spring or arm *j'* to its central position.

It will be understood that the wire *h* includes the fulcrum-points or is in metallic connection with the contact springs or arms *j'* of the switches on all the landings C where they are placed, and that the wires h^2 include or are in metallic connection with the contacts *i* of the several switches or circuit-closing devices H.

By my invention I provide a safe and convenient means whereby any authorized person of a family residing within the dwelling containing an elevator may, from any landing or floor of the building, produce the ascent or descent of the elevator to the landing or floor where he is, and may then, by unlocking the door, enter the elevator-car and ascend or descend, as he may desire.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with an elevator-car, the shaft or well wherein it is movable, and one or more landings or floors past which the car moves, of a valve apparatus for controlling the operation of the car, and which comprises an auxiliary valve, an electric circuit including an electric motor for operating said auxiliary valve, and a circuit-closing device or switch upon each landing or floor and included in the electric circuit, substantially as herein described.

2. The combination, with an elevator-car, the shaft or well wherein it is movable, and one or more landings or floors past which the car moves, of a valve apparatus for controlling the operation of the car, and which comprises an auxiliary valve, an electric circuit including an electric motor for operating said auxiliary valve, and a circuit-closing device or switch upon each landing or floor included in the electric circuit and inclosed within a case to prevent tampering therewith, but having a portion exposed for the engagement of a proper key, substantially as herein described.

3. The combination, with the inclosing-case I, containing contacts *i* and stops *j*, of a pivoted contact spring or arm, *j'*, having a portion constructed for the engagement of a key and exposed outside the case, and balancing-springs *j''*, for returning said contact spring or arm to neutral position, substantially as herein described.

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