(No Model.)

2 Sheets—Sheet 1.

J. D. IHLDER.

ELECTRIC CONTROL DEVICE FOR ELEVATORS.

No. 598,097. Patented Feb. 1, 1898.

Fig. 1.

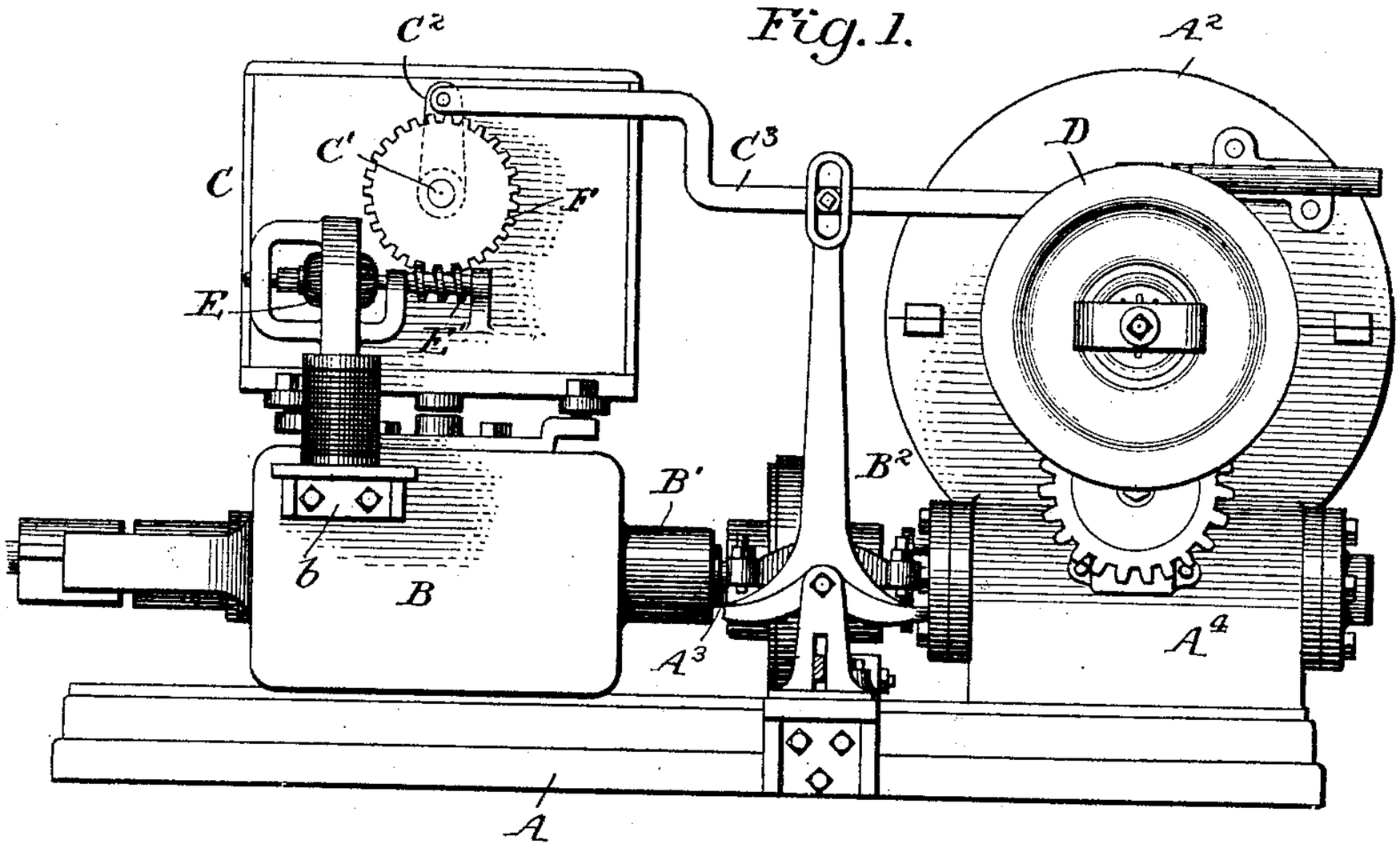


Fig. 2.

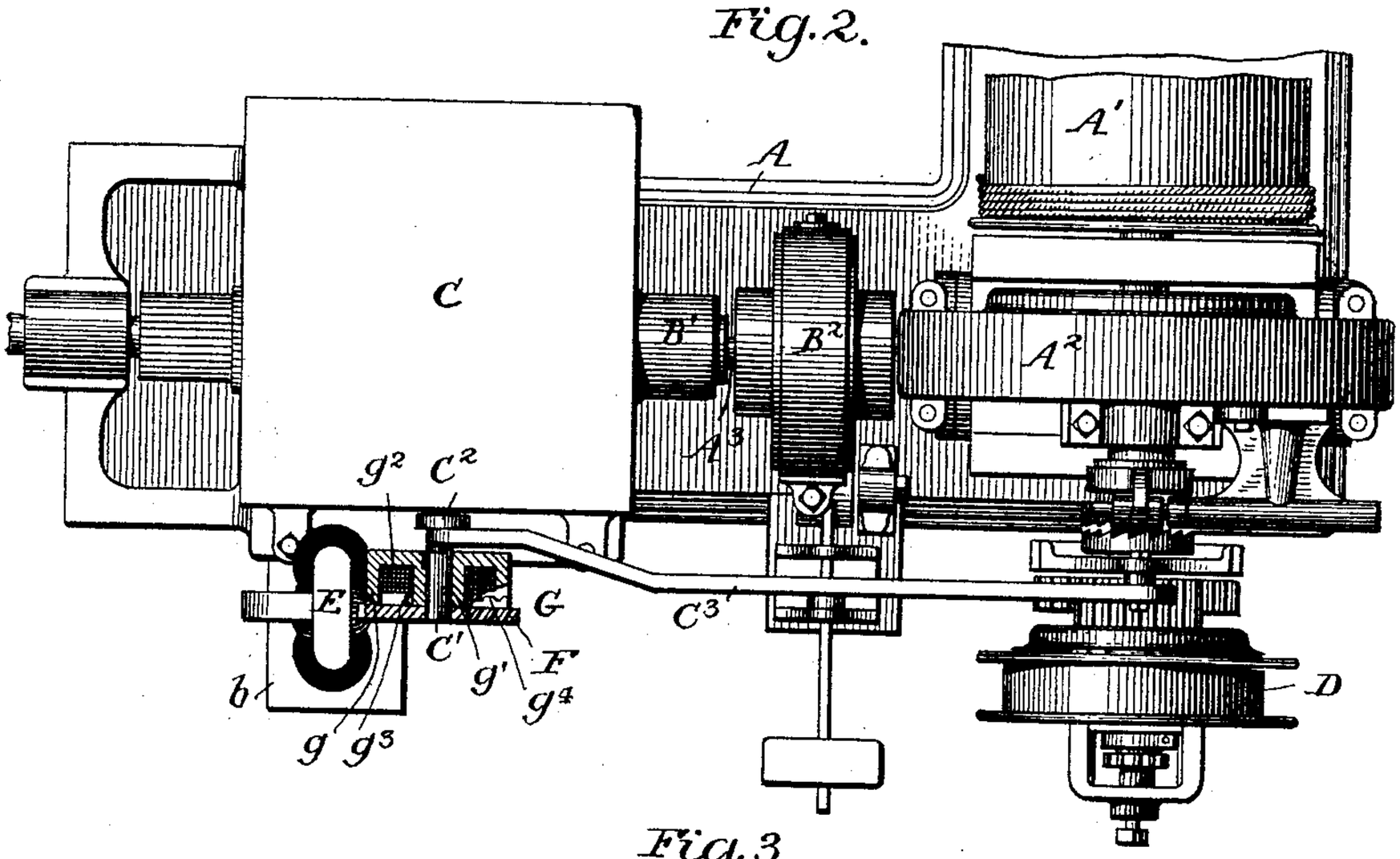
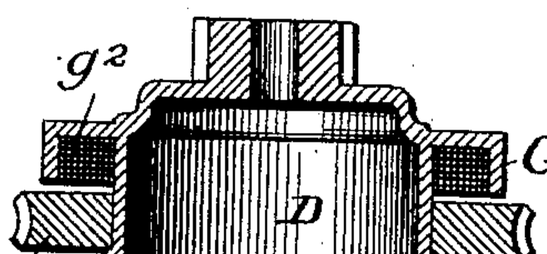


Fig. 3



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(No Model.) 2 Sheets—Sheet 2.

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ELECTRIC CONTROL DEVICE FOR ELEVATORS.

No. 598,097. Patented Feb. 1, 1898.

Fig. 4.

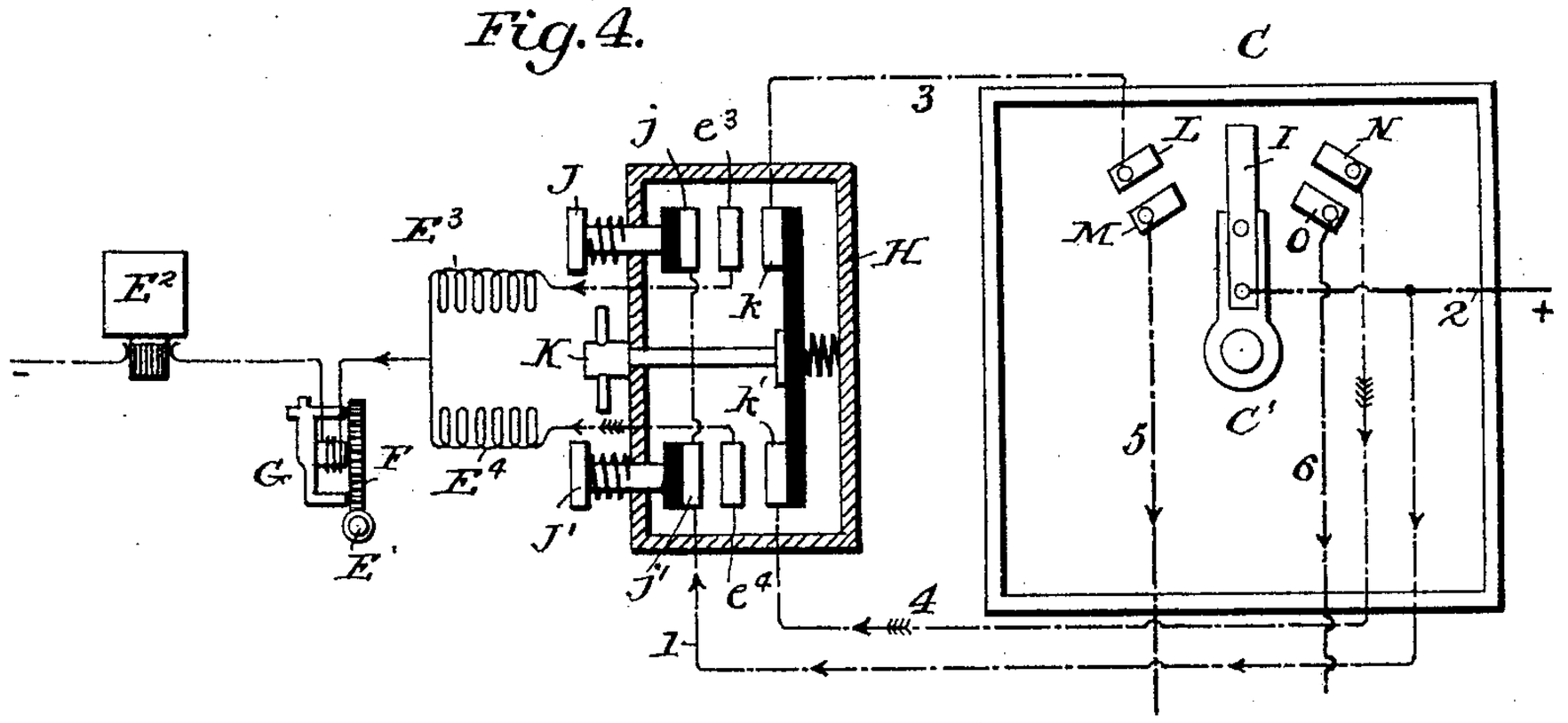


Fig. 5.

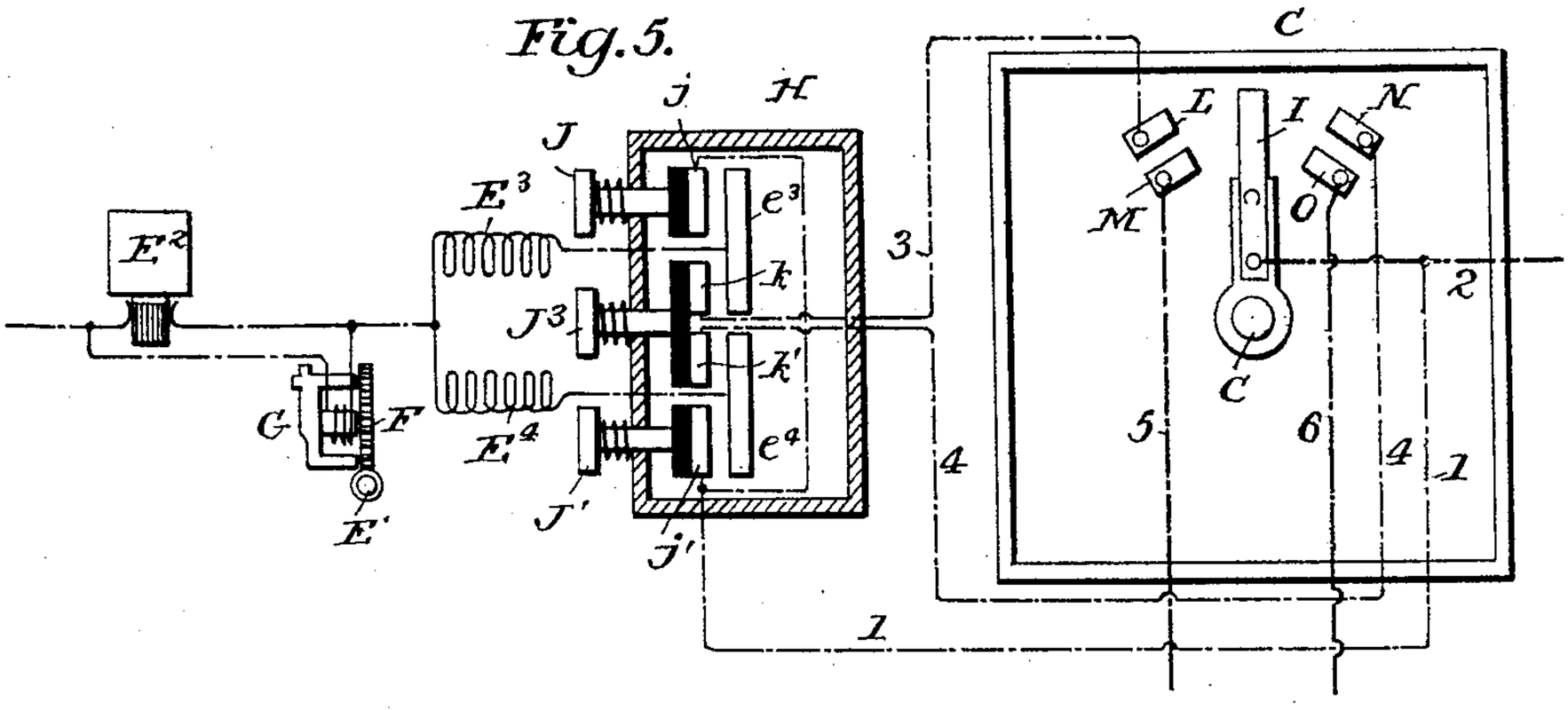
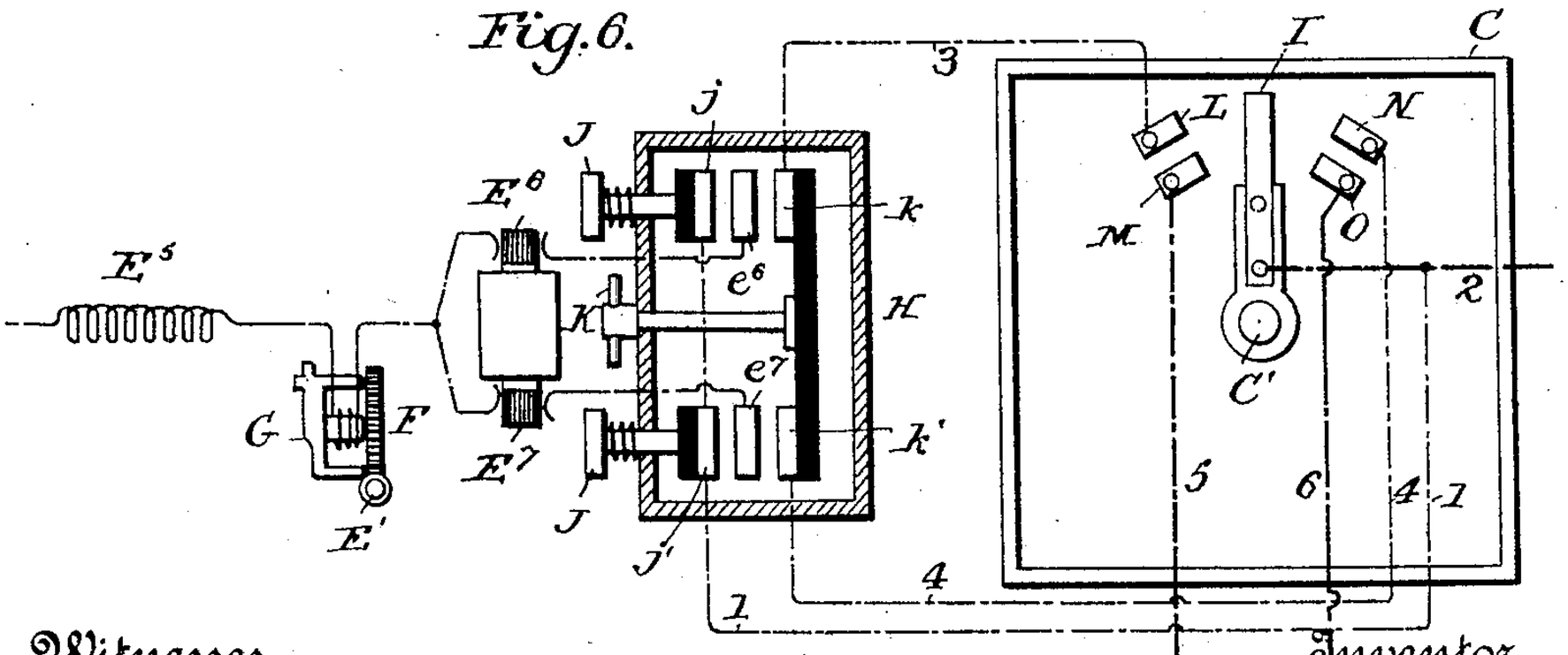


Fig. 6.



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UNITED STATES PATENT OFFICE.

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ELECTRIC CONTROL DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 598,097, dated February 1, 1898.

Application filed April 18, 1896. Serial No. 588,159. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. IHLDER, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Electric Control Devices for Elevators, of which the following is a specification.

My invention relates to electric control devices for operating elevators, and it has for its object to improve and simplify the construction and mode of operation of said devices; and to these ends it consists in the various features of construction and arrangement of parts having the mode of operation substantially as hereinafter more particularly set forth.

Referring to the accompanying drawings, wherein I have illustrated the general principles of my invention sufficiently to enable those skilled in the art to make and use the same, Figure 1 is a side view of an electric elevator machine, showing the hoisting-drum, worm-gear, electric motor, brake and control device. Fig. 2 is a plan view of the same, partly in section. Fig. 3 is a sectional detail showing a modification. Figs. 4, 5, and 6 are diagrammatic views showing the arrangement of circuits.

While my invention is applicable to many and various purposes, and more especially to elevators of all kinds, I have shown it as applied to an electric elevator, and have illustrated sufficient of a conventional form of elevator to explain the construction and general mode of operation of my device, and it will be understood, of course, that my invention is not limited to the specific form and arrangement of parts herein set forth, but that they may be varied by those skilled in the art to adapt the invention to the various purposes for which it is intended.

In operating electric elevators it is common to provide means connected with or operated from the elevator-car to operate or control the devices of the electric or other motor, and it is usual to provide hand-ropes extending from the car to the elevator-machine, as well as to provide electric connections on the car which shall operate the elevator mechanism. In my present invention, broadly stated, I make use of what I have termed a "control-motor," arranged to operate the usual or ordinary controlling device of the elevator—in this instance an electric elevator—and I also provide an electromagnetic clutch, which is interposed between the control-motor and the controlling device, and this motor and clutch are arranged to be controlled in any desired way, preferably by electric connections mounted on the car, and with this general description I will now proceed to describe more in detail the construction and arrangement of parts illustrated.

Without describing in detail the construction of all the features, it is sufficient to say that Figs. 1 and 2 illustrate what may be termed a "conventional form of electric elevator device," in which there is a base A, on which is mounted a winding or hoisting drum A′, a worm-gear case A^2, a shaft A^3, having a worm in the worm-case A^4 engaging the worm-gear, and an electric motor B, the armature B′ of which is mounted on the shaft A^3 to operate the same, a brake device B^2, and the ordinary electric controlling device or switch-box C. This switch-box C is provided with a shaft C′, which is shown extending outside of the switch-box and which operates the switching and controlling devices inside the box, (not shown,) and mounted on this shaft is an arm C^2, connected to the ordinary shipper-bar C^3, which is connected with the hand-rope wheel D through intermediate connections not necessary to be specifically described, it being understood that in the ordinary operation the hand-rope from the car is connected to the hand-rope wheel D, and by moving it in one or the other direction the shipper-bar C^3 is moved to operate the controlling devices of the electric motor and at the same time to operate the brake device B^2, and all these elements may be of any ordinary and usual construction, such as are well known in the art and which require no specific and detailed description herein, as no claim is made for any particular description of devices of this character, those shown being typical in order to illustrate the application of my present invention to an electric elevator device of this general character.

In my present invention I dispense with

the ordinary hand-rope connected with the hand-rope wheel D and provide electrical means for operating the elevator-controlling device C, and I provide what I have termed a "control-motor" E, which may be of any well-known construction and may be mounted on the main motor B or on a platform or bracket *b*, projecting therefrom. This motor is connected to the shaft C′ of the control device by any suitable means, and I have shown a worm E′, connected to and operated by the armature of the motor E, and a worm-wheel F, loosely mounted on an extension of the shaft C′ and engaging the worm. This worm-wheel F or other equivalent portion of the connecting mechanism between the control-motor E and the controlling device C is connected to and controlled by an electromagnetic clutch G, which, as shown in Figs. 1 and 2, is rigidly mounted on the shaft C′ of the controlling device C and is arranged in the manner hereinafter more particularly set forth to connect the control-motor with the controlling device. This clutch G may be of any desired form, it being shown in an annular form having projecting annular poles $g\,g'$, with an interposed coil g^2, and a spring g^3 is preferably interposed between the clutch and the worm-wheel F to separate them, and in order to insure the operation of the clutch I may provide its face with low teeth g^4, engaging corresponding notches in the worm-wheel F, and these teeth are preferably beveled, as shown in Fig. 2, so as to make a combined friction and electromagnetic clutch, although the friction-clutch is often entirely satisfactory without the friction devices. The friction-clutch when used is provided with low teeth, so that if perchance the worm-gear is not thrown out of connection with the control-motor when the circuit is broken and the controlling device is operated—as, for instance, when the elevator reaches its extreme movement at the top or bottom of the well or otherwise—the teeth of the friction-clutch can be disengaged or forced past each other without undue strain on the worm-gear. Of course this would only happen in case of emergency, as when the automatic stop mechanism usually employed in such elevators operates to prevent an accident due to the carelessness of the operator or otherwise. While this form of electromagnetic clutch is preferred, other forms may be used which will accomplish the same general result. Further, instead of mounting the clutch on the shaft C′ of the control device the clutch may be mounted in connection with the hand-rope wheel D, as indicated in Fig. 3, where F is the worm-wheel, mounted on the hand-rope wheel D, it being provided with an extension forming an electromagnetic clutch G. In this case, of course, instead of connecting the wheel D with the hand-rope it is operated by the control-motor through the medium of the clutch G, and this, through the shipper-bar, operates the control device of the motor in the usual way. This modification is only shown to illustrate the fact that the clutch and control-motor may be differently arranged in connection with different parts of the elevator mechanism to accomplish the purposes desired in substantially the same way.

It will be seen that instead of using the ordinary hand-rope for operating the control device of the electric motor the control-motor E, taken in connection with the electromagnetic clutch G, performs the same function and takes the place of the hand-rope. The control-motor is connected to be operated from the cage or car from the same circuit which operates the electric motor for the elevator or from an independent source, although the former is preferred and the control-motor is preferably included in the same circuit with the electromagnetic clutch, so that the clutch and control-motor will be operated together and in unison, so that as soon as the circuit is closed and the control-motor energized the clutch is also energized, and, vice versa, when the circuit is broken, both the control-motor and clutch are out of circuit, so that the controlling mechanism or shipper-bar of the elevator mechanism will come to a rest in its proper position, and even if the armature of the control-motor by its momentum continues to rotate after the circuit is broken the control device would not be operated, as the clutch would be disengaged from the control-motor, and if, as above intimated, the circuit of the motor remained closed when the elevator reached its extreme limit of motion, and through the medium of an automatic stop or other devices the shipper-bar should be moved to operate the elevator-control device the friction between the clutch and its armature or worm-wheel is such that the control device can be moved without serious strain upon the control-motor.

As above intimated, various means and circuits may be provided for operating the control-motor and clutch, and in Figs. 4, 5, and 6 I have illustrated diagrammatically some ways which I have found practicable to accomplish this purpose, and in these figures C represents the control device of the elevator-motor before described, and H represents a contact device preferably carried by the car, although of course in certain forms of elevators it may be otherwise arranged and be connected with the control-motor E and clutch G. In these diagrams C′, as in the other figures, is the shaft of the control device, while I is a knife-switch (shown in the conventional form) adapted to control the current to the elevator-motor B, and + and − are the mains of the supply-circuit.

The control-motor is shown as being series wound, and it may be provided with a double field-circuit, as indicated in Figs. 4 and 5, or with a double armature-circuit, as indicated in Fig. 6, and the clutch G is in series with the motor, or it may be of course otherwise arranged—for instance, in parallel connection

to the armature, as in Fig. 5, but preferab included in the circuit of the motor, so as to be energized when the motor is energized. Thus in Figs. 4 and 5 E^2 represents the armature of the motor, and E^3 E^4 the divided or double field, while in Fig. 6 E^5 is the single field, and E^6 E^7 the double armature of the control-motor E.

The contact device H may be variously constructed and is illustrated diagrammatically, and it will be seen that the contacts e^3 e^4 are connected, respectively, with the double field-coils of the motor in Figs. 4 and 5, while in Fig. 6 the contacts e^6 e^7 are connected with the double armature-coils E^6 E^7, respectively. The contact device is also provided in Fig. 4 with push-buttons J J', having contacts j j', which are connected together by a conductor 1, leading to the main feed-line 2, outside of the knife-switch I, and there is also shown in Fig. 4 a handle K, having contacts k k', the former of which is connected by a conductor 3 with a contact L, arranged adjacent the main contact M of the knife-switch, while the contact k' is connected by a conductor 4 with the contact N, arranged adjacent the main contact O on the knife-switch. The main contact M is connected to the conductor 5, leading to the elevator-motor, while the main contact O is connected by a conductor 6, also leading to the elevator-motor, and the main conductor 2 is connected to the knife-switch I, so that when it is moved into contact with M or O, respectively, the current is sent to the elevator-motor in a direction to operate it to raise or lower the elevator, as may be desired.

To describe the operation of the device illustrated in Fig. 4, if the operator on the car or other position after depressing the handle K, separating contacts k k', then presses, for instance, the push-button J, making contact between j and e^3, there is a circuit from the main feed-wire 2 through the conductor 1, contacts j e^3, the field-magnet coil E^3, the magnetic clutch G, and the armature E^2 of the control-motor, and the clutch is energized and the control-motor operated in a direction to bring the knife-switch I onto the contacts N and O. This, it will be seen, completes the circuit to the elevator-motor through the main conductor 2, knife-switch I, contact O, and conductor 6, so that said motor will be operated in a certain direction, for instance, to raise the elevator. As soon as this contact is made the pressure on the spring push-button J may be removed, and the contacts j e^3 will be broken and the clutch G and control-motor deënergized, and the elevator will proceed in its upward passage. If now it is desired to stop the elevator, the handle K is operated to bring the contacts k k' into engagement with the contacts e^3 e^4, respectively. As the contact k is connected by the conductor 3 with the contact L no current will pass, the knife-switch I being in engagement with the contacts N and O, but it will be seen that the circuit from the main conductor through the knife-switch I, contacts O and N, conductor 4, contacts k' and e^4 will be closed, and the current will flow through the field-magnet coils E^4 of the control-motor through the clutch G and armature E^2 to energize the same, but owing to the opposite winding of the field-coils the control-motor will operate in an opposite direction and will break the connection between the knife-switch I and contacts N and O, bringing the knife-switch to its normal position, and as soon as it breaks the contact the circuit of the clutch and control-motor is broken and the elevator stopped. If now it is desired to descend, pressure on the push-button J' through the connections, as will readily be seen, produces the same mode of operation except that the control-motor will first operate in a direction to move the knife-switch into engagement with the contacts L and M, and the elevator-motor will then operate in a direction to lower the elevator. When this is done and it is desired to stop, the handle K is operated as before, when the circuit is completed through the contacts k and e^3, causing the control-motor to operate in the opposite direction and to withdraw the knife-switch from the contacts L and M, stopping the elevator-motor as well as the control-motor. It will thus be seen that simply pressing one or the other of the push-buttons J or J' will automatically energize the clutch and control the motor, which will operate to close the knife-switch of the main circuit and energize the elevator-motor, and when this is once energized the motor will continue to operate until the handle K is operated to reverse the control-motor and break the main circuit.

In Fig. 5 the circuits are practically the same except that instead of a handle K there is a push-button J^3, having contacts k k' arranged in the same relation as in Fig. 4, and instead of drawing upon the handle to stop the elevator-car the push-button J^3 is pressed by the operator. In Fig. 6 the circuits are practically the same except that instead of reversing the control-motor by means of a doubly-wound field the armature is doubly wound, and the mode of operation is substantially the same as in Fig. 4. These modifications go to show that the general principles of the invention can be applied in various ways.

Having thus described the general construction and arrangement of my invention and set forth the mode of operation, what I claim is—

1. The combination with an elevator-operating mechanism and a control device therefor, of a control-motor, and an electromagnetic clutch, the clutch being provided with teeth, substantially as described.

2. The combination with an elevator-operating mechanism and a control device therefor, of a control-motor, a clutch, contacts comprising push-buttons to direct the current through said control-motor to start the ele-

vator mechanism, and a handle to direct the current through said control-motor to stop the elevator mechanism, substantially as described.

3. The combination with an elevator-operating mechanism and a control device therefor, of a control-motor having a doubly-wound armature-circuit, a clutch, and contact devices for controlling the circuit through said doubly-wound armature, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN D. IHLDER.

Witnesses:
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O. B. WARING.