(No Model.) 7 Sheets—Sheet 1.

F. E. HERDMAN.

MECHANISM FOR OPERATING ELEVATOR CONTROLLING MECHANISM.

No. 551,820. Patented Dec. 24, 1895.

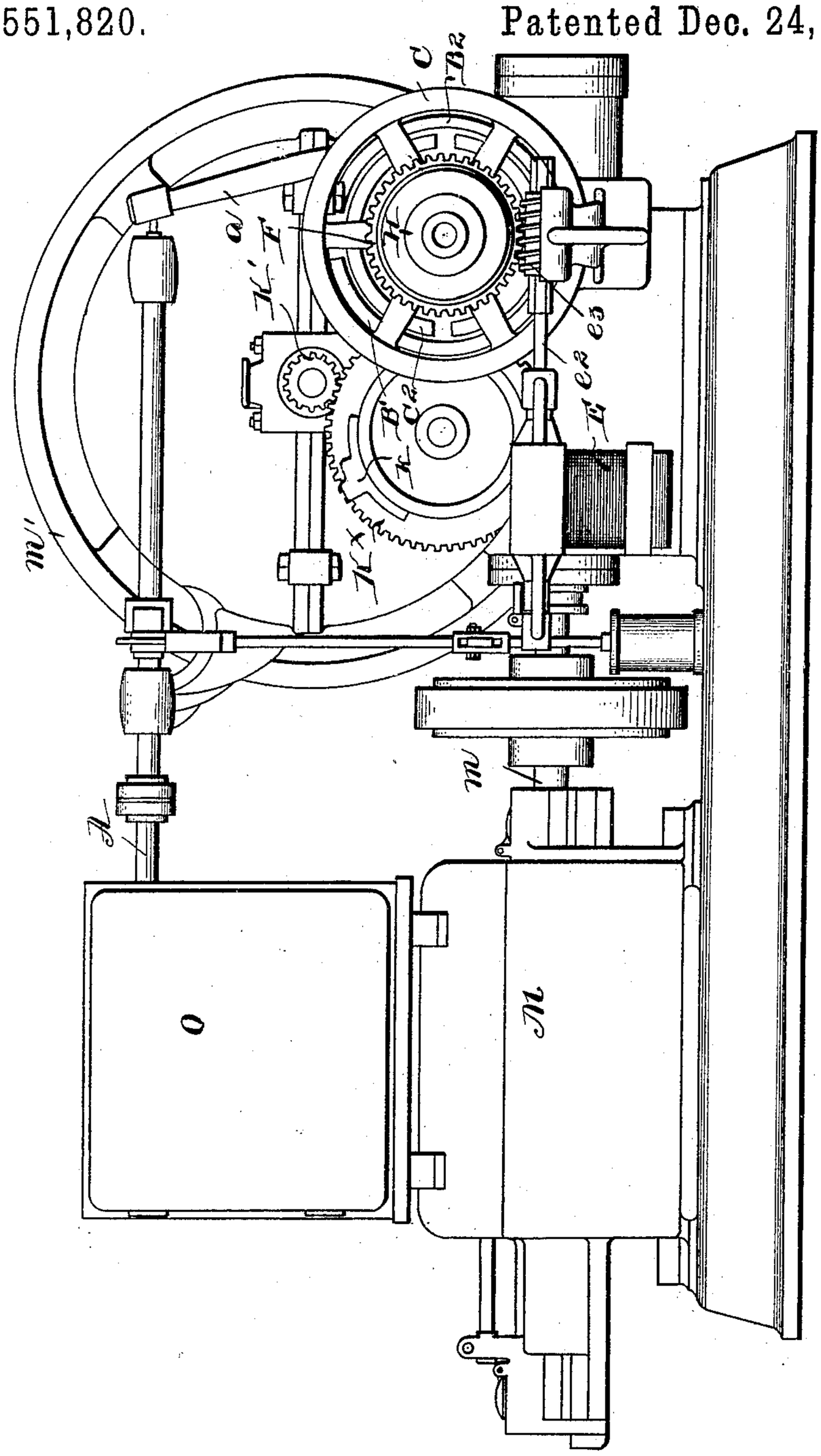

Fig. 1.

Witnesses.
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(No Model.) 7 Sheets—Sheet 2.

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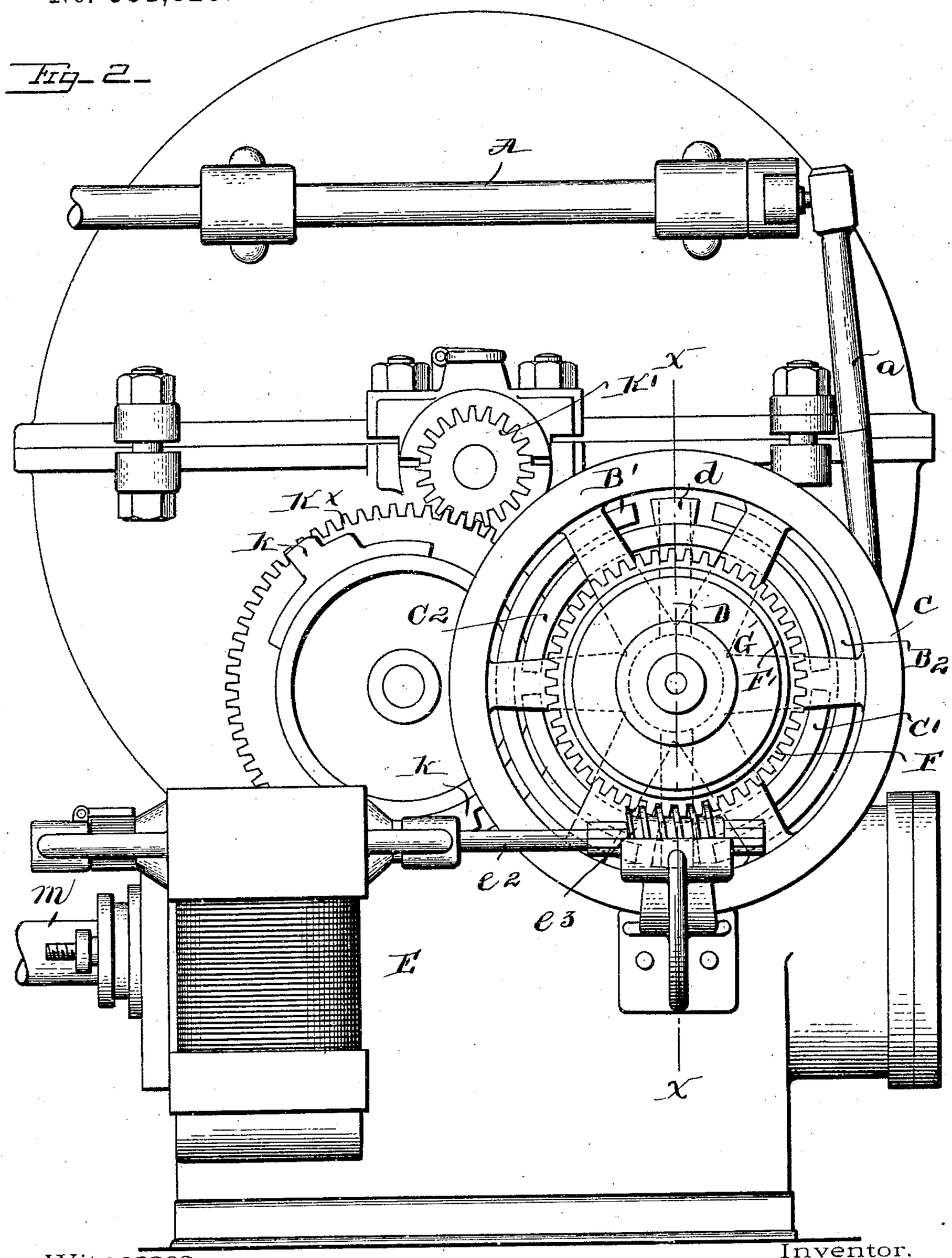
MECHANISM FOR OPERATING ELEVATOR CONTROLLING MECHANISM.

No. 551,820. Patented Dec. 24, 1895.

Fig. 2.



Witnesses.
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(No Model.) 7 Sheets—Sheet 3.

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MECHANISM FOR OPERATING ELEVATOR CONTROLLING MECHANISM.

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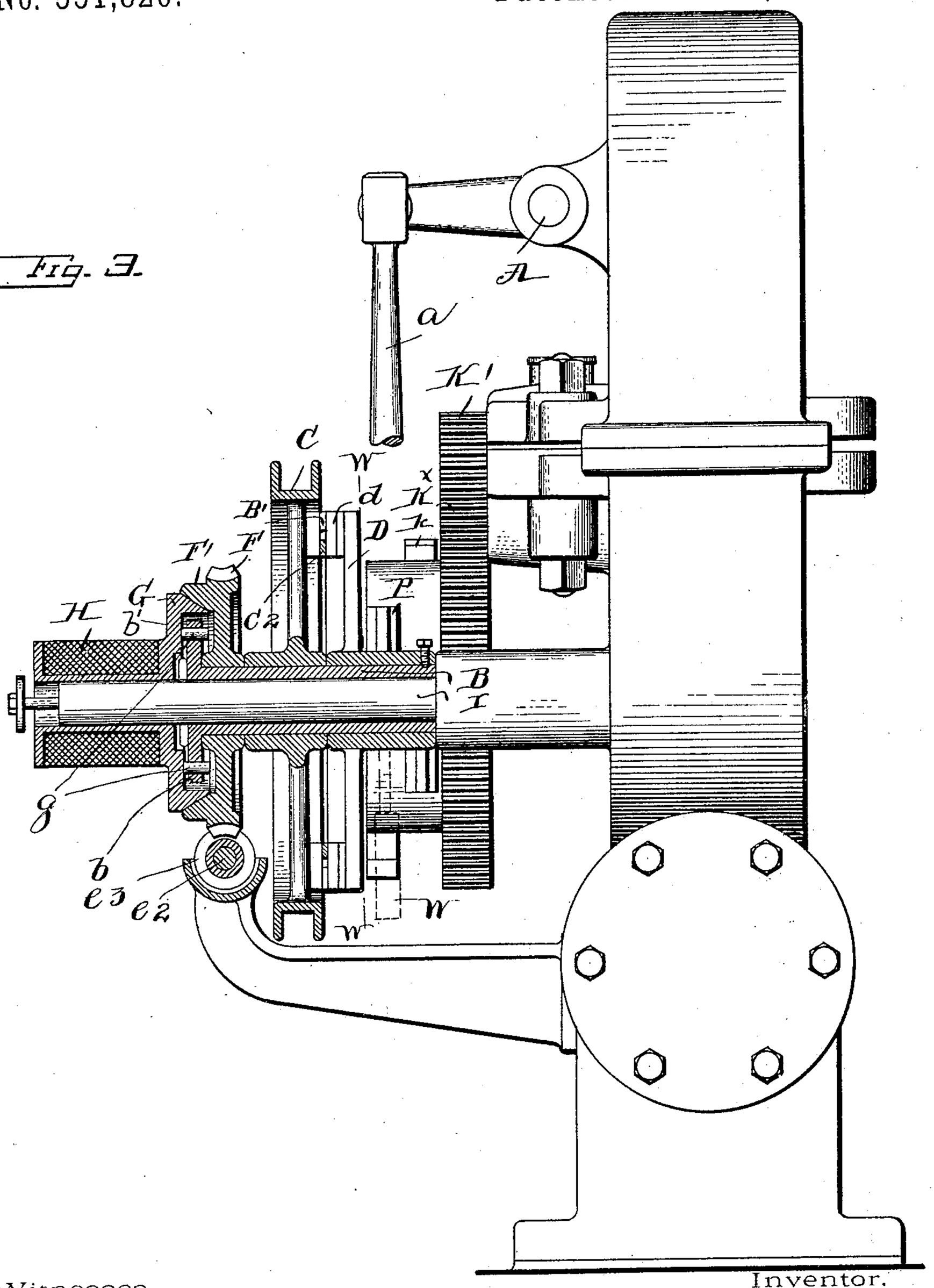
Fig. 3.



Witnesses.
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(No Model.) 7 Sheets—Sheet 4.

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MECHANISM FOR OPERATING ELEVATOR CONTROLLING MECHANISM.

No. 551,820. Patented Dec. 24, 1895.

Fig. 4.

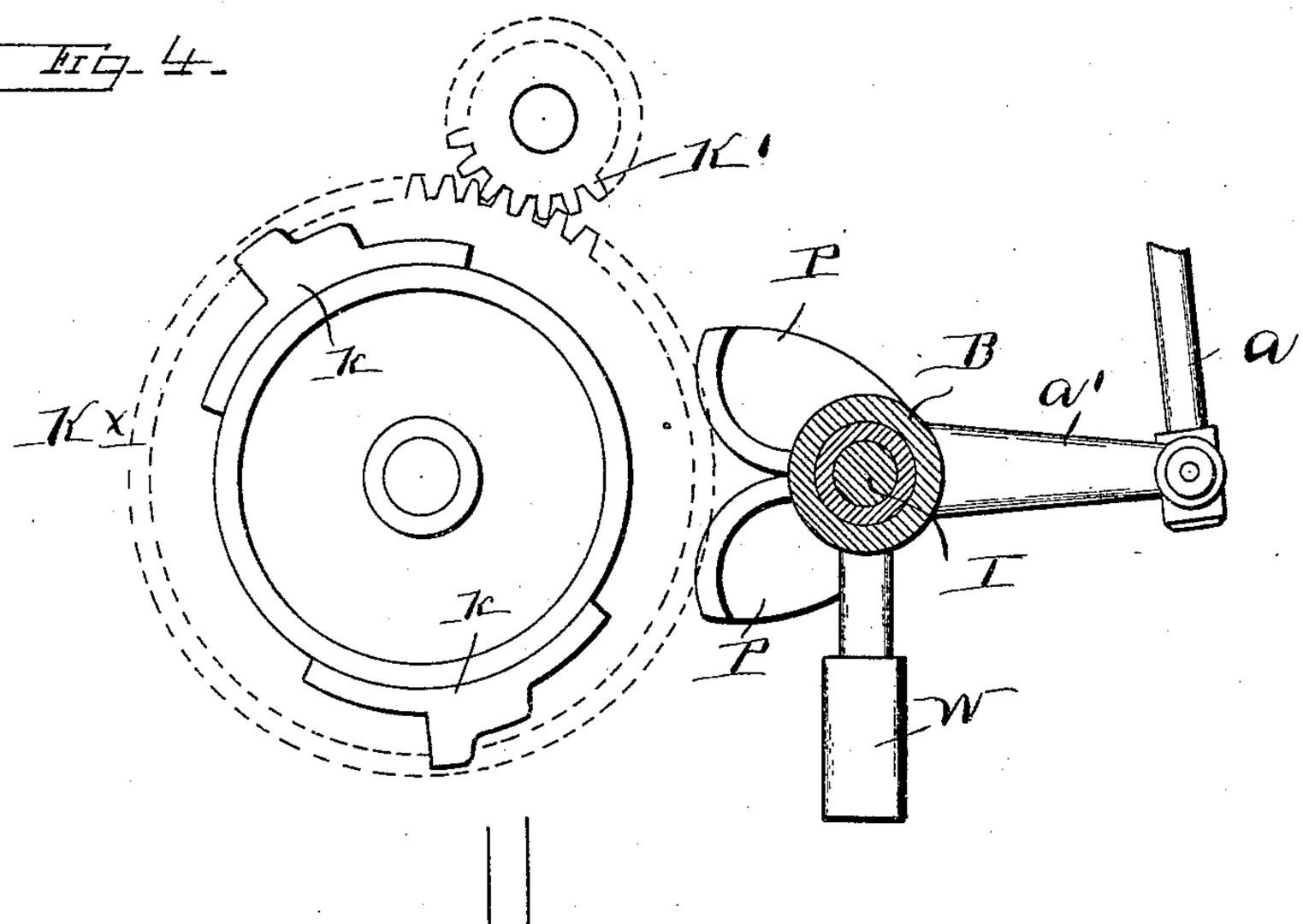
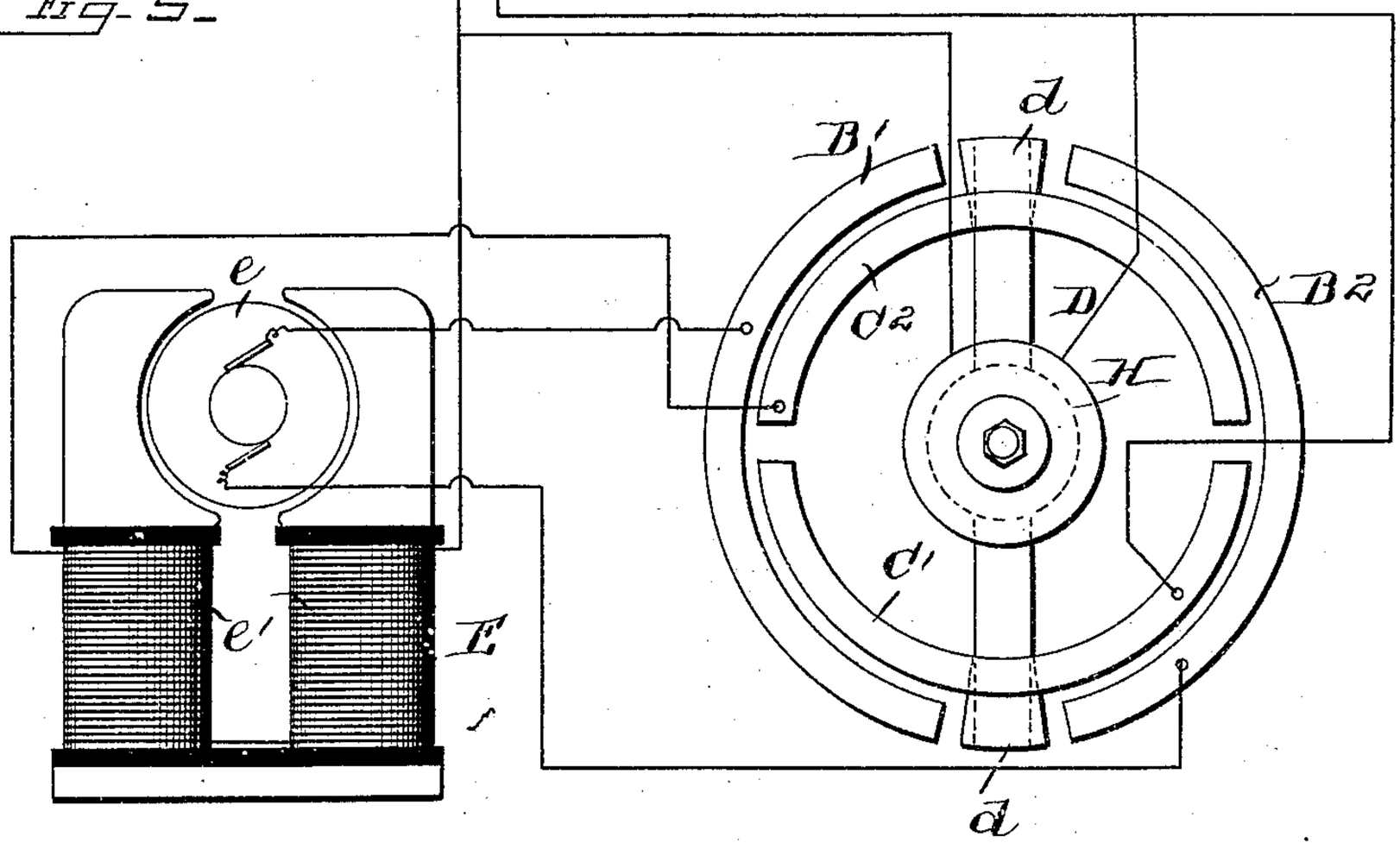


Fig. 5.



Witnesses.

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(No Model.) 7 Sheets—Sheet 5.

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MECHANISM FOR OPERATING ELEVATOR CONTROLLING MECHANISM.

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Fig. 9.

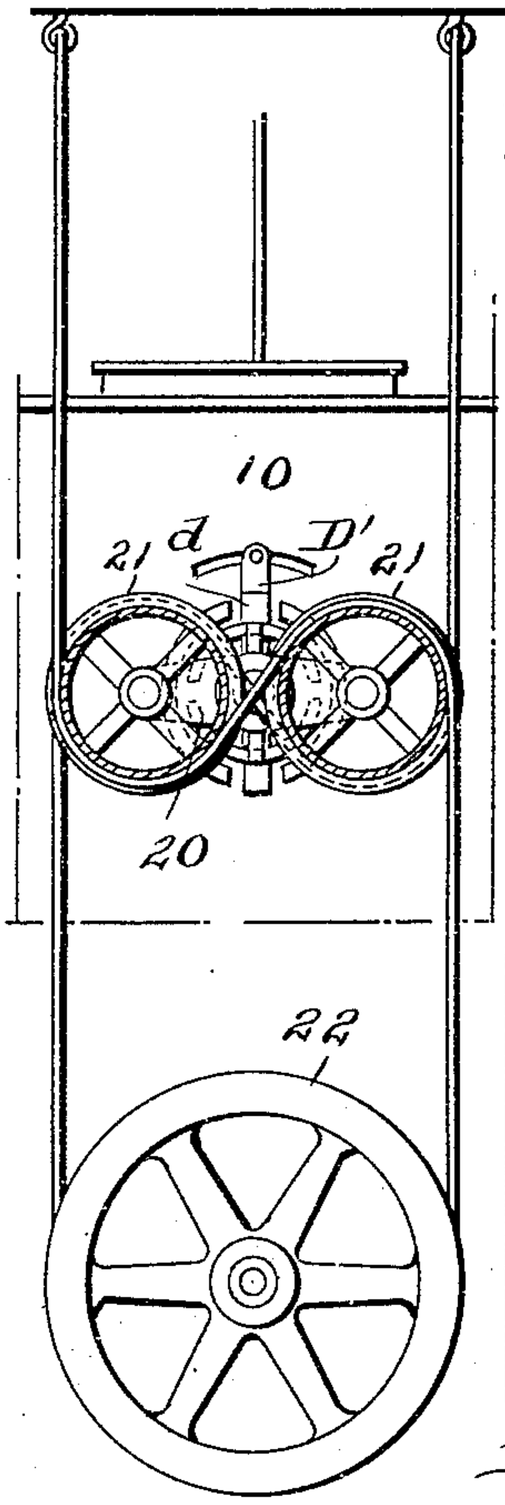


Fig. 7.

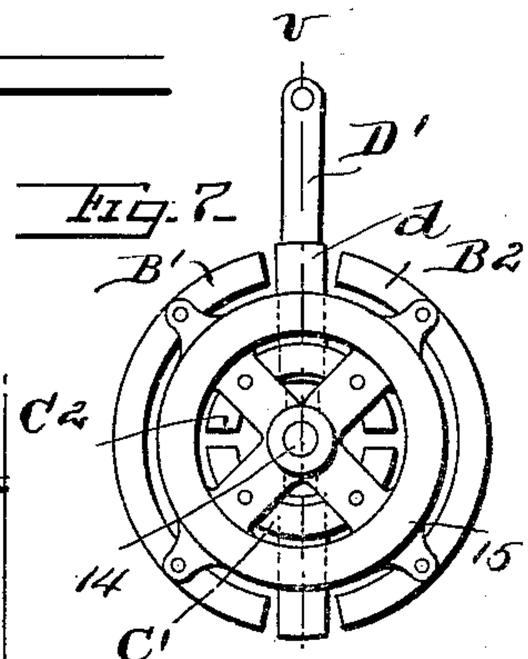


Fig. 8.

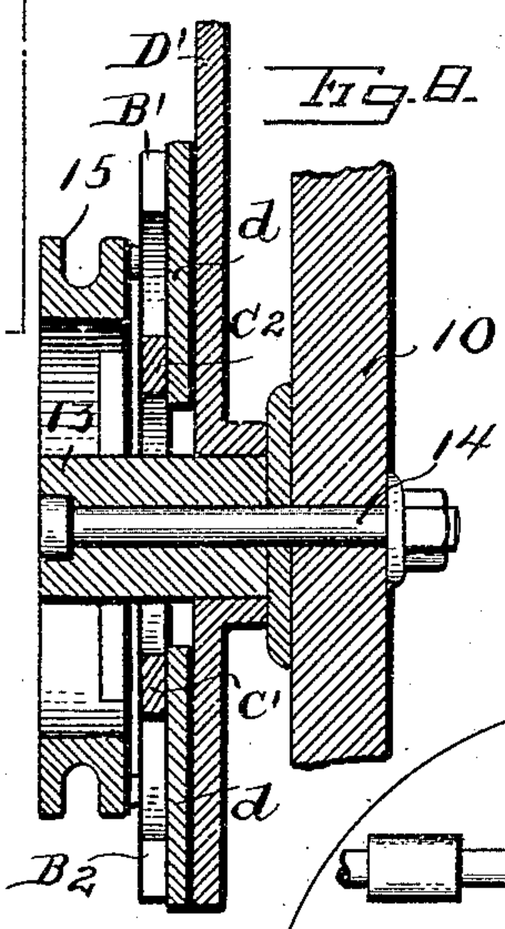


Fig. 6.

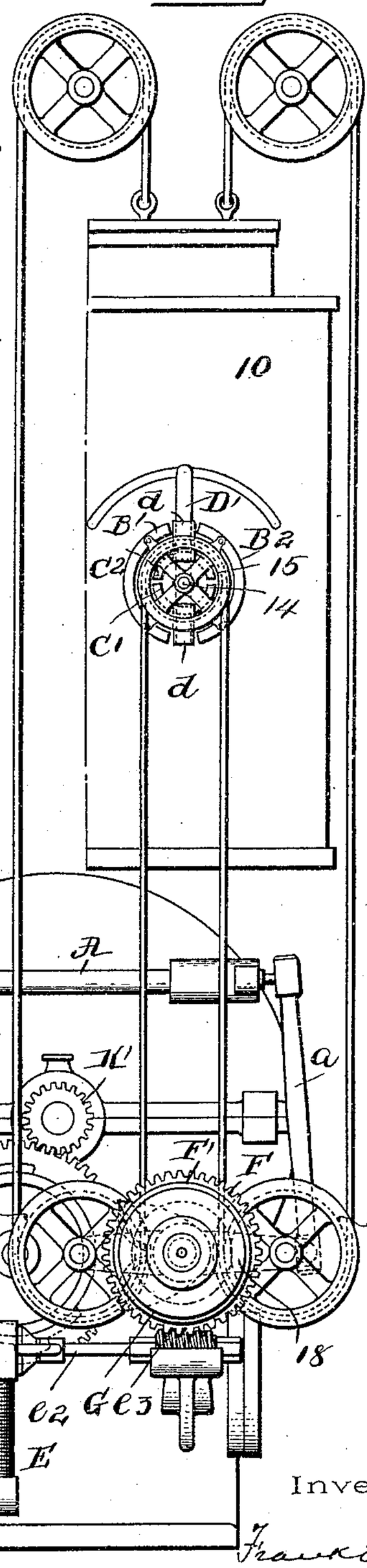
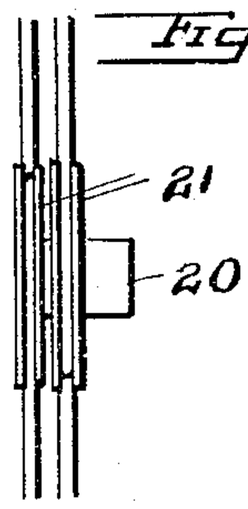


Fig. 13.



Witnesses.
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(No Model.) 7 Sheets—Sheet 6.

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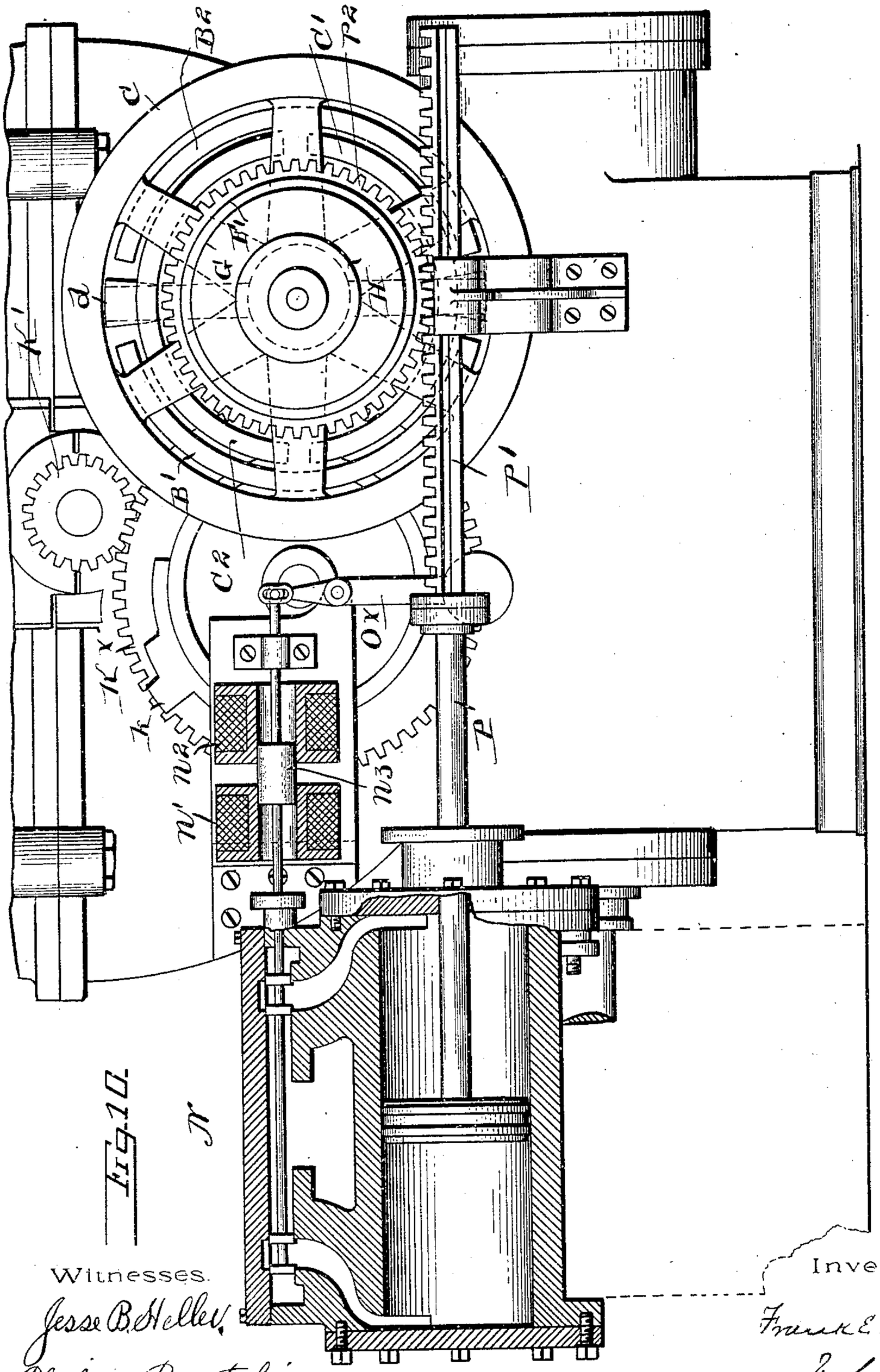
MECHANISM FOR OPERATING ELEVATOR CONTROLLING MECHANISM.

No. 551,820. Patented Dec. 24, 1895.



Witnesses.
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MECHANISM FOR OPERATING ELEVATOR CONTROLLING MECHANISM.

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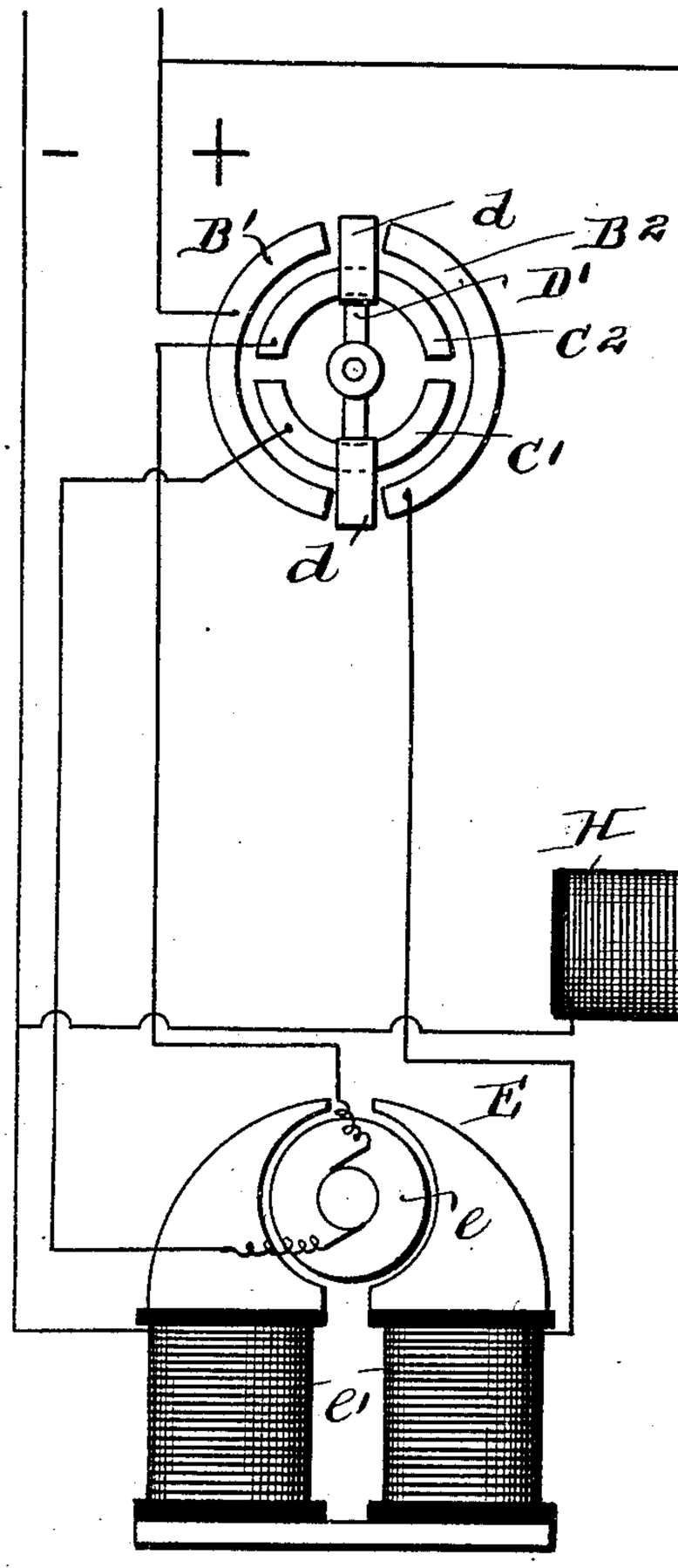

Fig. 11.

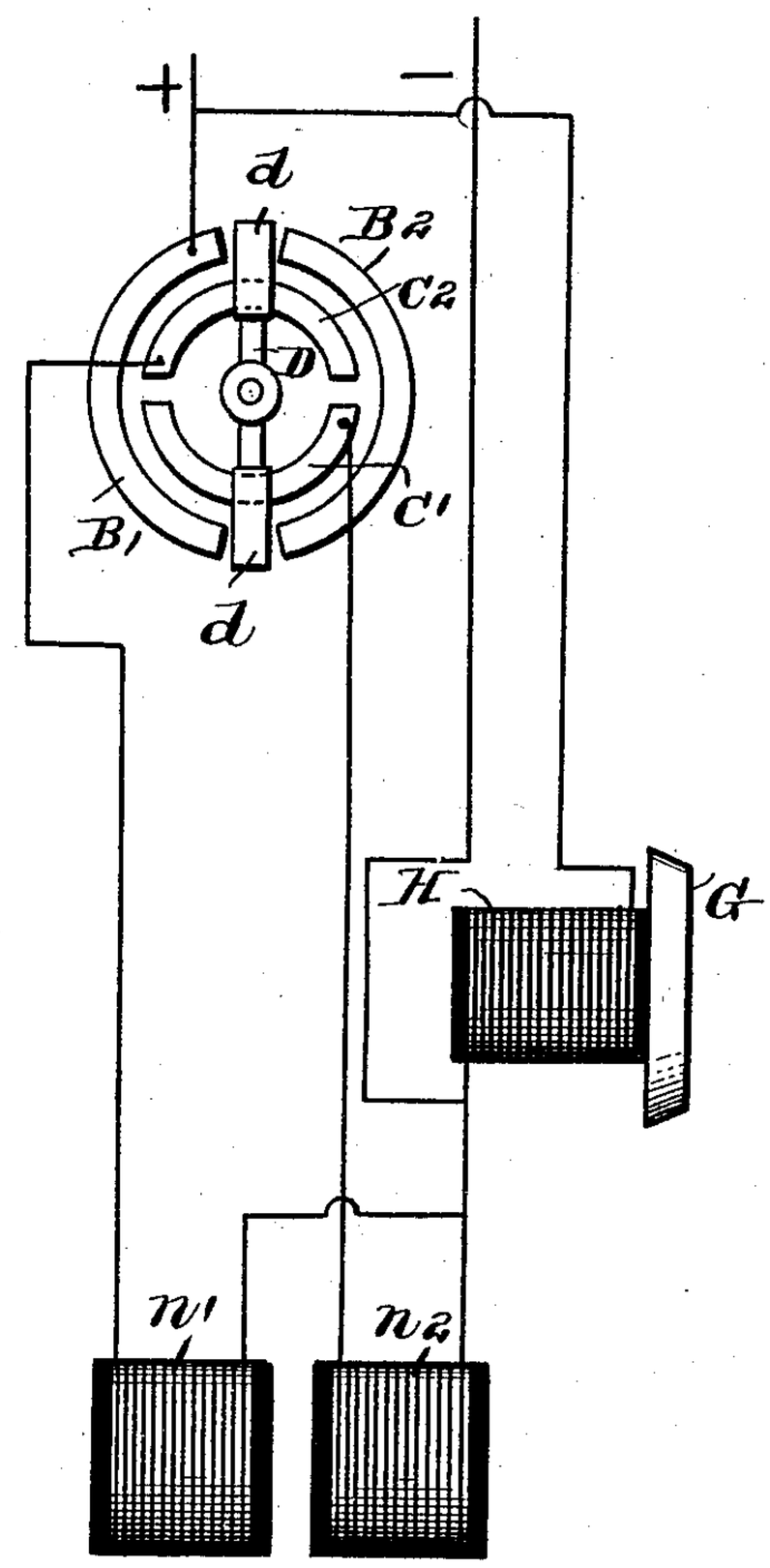

Fig. 12.

Witnesses.
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UNITED STATES PATENT OFFICE.

FRANK E. HERDMAN, OF WINNETKA, ILLINOIS.

MECHANISM FOR OPERATING ELEVATOR-CONTROLLING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 551,820, dated December 24, 1895.

Application filed July 10, 1895. Serial No. 555,525. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. HERDMAN, a citizen of the United States, residing at Winnetka, county of Cook, and State of Illinois, have invented a new and useful Improvement in Mechanism for Operating an Elevator-Controlling Mechanism, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

Speaking generally, my invention consists in operating the elevator-controlling mechanism by means of an auxiliary motor.

In the operation of the operating mechanism of elevators, whether the same be a water-motor, a steam-motor, or an electric motor, they have always been controlled directly from the car, and, while my invention is especially adapted to elevating mechanism which is driven or operated by an electric motor, still it can be adapted for use with any other character of motor.

I will first describe my invention as used in a case where the elevator is driven by an electric motor.

In the drawings, Figure 1 is a front view of an elevator-machine. Fig. 2 is an enlarged front view of the auxiliary motor and its connection. Fig. 3 is a section on line *x x* of Fig. 2. Fig. 4 is a detail view on line *w w* of Fig. 3, showing the automatics and their connections with the winding-drum shaft. Fig. 5 is a diagram showing the wiring. Fig. 6 is a front view of a modified form. Fig. 7 is an enlarged front view of the switch shown in Fig. 6. Fig. 8 is a section on line *v v* of Fig. 7. Fig. 9 is a front view of another modified form. Fig. 10 is a front view of another modified form. Fig. 11 is a diagram showing the wiring of Figs. 6 and 9. Fig. 12 is a diagram showing the wiring of Fig. 10. Fig. 13 is an end view of sheaves and rock-arm of Fig. 9.

M is a main driving-motor. *m*, its shaft, connects with the winding-drum *m'* of an elevating apparatus. O is the switch mechanism for said motor connected to the operating-bar A, which switch controls the operation of the motor M, which drives the elevating apparatus.

a is a connecting-rod, one end being connected to said operating-bar and the other end to a crank *a'*, which crank is connected to a sleeve B loose upon the shaft I. C is the operating-sheave, also loose upon the shaft I. Connected to this sheave C are the contacts B' B^2 C' C^2. D is an arm having a brush *d* at each end. This arm D is also connected to the sleeve B loose upon the shaft I. E is an auxiliary motor, in which *e* is the armature, and *e'* the field, and e^2 is the shaft of said motor, having the worm e^3, which meshes with the worm-wheel F loose upon said sleeve B. This worm-wheel F is provided with the female jaw F' of a friction-clutch. G is the male jaw of the friction-clutch. This male jaw G is loose on the shaft I. The end of the sleeve B has a flange *b* provided with orifices *b'*, and the friction-jaw G has pins *g* entering said orifices, thus causing the sleeve B to revolve with the male friction-jaw G, but permitting the friction-jaw G to have an end movement independent of the sleeve B.

H is a solenoid, the core of which is the shaft I. When the magnet is excited, it tends to draw the shaft I into it, thereby causing the friction-jaws F and G to lock, and when the motor E is operated the friction-wheels F and G revolve, and the sleeve B also revolves due to the pins *g*. One wire from the source of current-supply passes directly to the field of the motor and by a shunt-circuit to solenoid H, and after passing through the field is connected to the plate c^2, the other wire passing directly to the solenoid H, and also to the plate C'. The armature of the motor is connected with the plates B^2 and B'. (See Fig. 5.)

The motor E is a series-wound motor, with sufficient resistance in the field-coils to admit of the current to be thrown directly onto the motor without any intervening rheostat resistance.

The sheave C is connected to the car by any means—such, for instance, as cables—and when turned in one or the other direction, according to which way it is desired to move the car, is thrown an amount according to the speed desired for the car to move. This movement of the sheave to the right or to the left moves the corresponding contacts carried by said sheave the corresponding distance, the arm D not being moved by the movement of

the sheave. For instance, the sheave is moved to the right. That brings the contact at the upper end of the arm D in connection with the plate B′ and the plate C^2, and the contact at the lower end of the arm in connection with the plate B^2 and C′. As a result the circuit is closed through the motor E, and also through the solenoid H. Through the medium of the magnet the friction-wheels F and G are brought in connection with each other, and with the revolution of the motor the friction-wheels F and G revolve together. This movement revolves the sleeve B, and through the medium of the crank a' and connecting-rod a moves the operating-arm A in one direction. This also causes the arm D to be moved.

The wiring is such that the motor revolves so that the arm D is moved in the same direction as that which the sheave was moved to make the contact, and it will move until it passes off of the contacts. The extent of its movement, and thus the extent of the movement of the bar A, is determined by the extent which the sheave C was moved. As soon as the contact on arm D passes off of the contacts carried by the sheave the circuit is broken and the motor E stops. Thus the distance the operating-bar A is thrown in either direction depends entirely upon how far the sheave C has been moved by the operator in the car, and thus the extent which the operating mechanism is thrown into action is directly determined. If the operator desires to move in the same direction with a higher speed, he would merely move the sheave again in the same direction, which would throw the motor E again into action and cause the arm D and the operating-bar to move again an amount equal to the amount that the sheave was thrown over, and thus throw the elevator-operating motor so much the more into action.

As soon as it is desired to stop the operator moves the sheave to its central position, which would again admit current to the motor E, but in a reverse direction from that before described, and the motor E would revolve in the opposite direction, the distance which the sheave C was moved, and bring the arm D to the center, and thus the operating-bar A would be allowed to move in the direction opposite to that before described, a movement equal to that which it had been moved to throw the elevator-operating motor into action, and thus it would again be brought to a central position, and the elevator-operating motor would be cut out of action. The return movement of the operating-bar can take place by means of the brake-weight, which in the ordinary construction of elevators tends to operate to bring the operating-bar to its central position. However, where the brake is not so arranged as to bring it to its central position the following mechanism could be used: The weight W is attached to an arm connected to the sleeve B. In consequence if for any reason the friction-jaws F and G are released the operating mechanism would with certainty be brought to its central position on account of this weight. The use of either the brake-weight or this auxiliary mechanism of the weight W connected with the sleeve B is of importance where the motor driving the main elevator is an electric motor. For instance, if the current for any reason were cut off from both the operating-motor and the motor E the solenoid H would of course be released, and the weight W would cause the operating mechanism to come to its central position. It is necessary to provide for this latter condition, because if it were not provided for as above described the operating mechanism would be left in the position for the operating-motor to operate and might be in the condition in which the full power of the current was being received by the elevator-operating motor, and if the current were connected again without bringing the operating-bar to its central position too much current would be initially admitted to the elevator-operating motor and might cause the blowing of a fuse on account of the operating mechanism being in such position as to permit the current to rush into the armature without any intervening resistance. The friction wheels or jaws F and G have also another function. In elevators there is provided means for automatically stopping the elevator at the end of the travel. These means consist of having upon the shaft of the winding-drum m' of the elevator a gear-wheel K′ meshing with gear K, having a relative movement to the movement of the drum, and upon this gear-wheel are placed stops k, at proper position, in alignment with cams P, as shown in Fig. 4, attached to the hub B. When the stop strikes the cam it tends to move the sleeve B and move the operating mechanism, which movement, of course, is against the power of the motor E, and if it were not for the friction clutches or disks F and G the automatics would not operate, but the use of the friction-disks would cause the friction-faces to slip on each other, the catch in between them not being sufficient to prevent such movement, and thus by means of the automatics the operating-bar would be brought to a central position.

In Figs. 6, 7, 8, and 11 I have shown a modified arrangement in which the arm D and contacts B′ B^2 C′ C^2 are carried by the elevator-car 10. In this case the brushes d d are connected to but insulated from a lever D′, loose upon the hub 13 of the sleeve on the shaft 14, secured to the side of the car. The contacts are secured to the sheave 15 connected to the sleeve or hub 13. The cable passes around sheave 15, one end around sheave 16 and the other end around sheave 17, the free ends being connected to the top of the car, the sheaves 16 and 17 being at each end of a rock-arm 18, which rock-arm projects from the sleeve B.

The movement of the lever D′ moves the

brushes *d d* in relation to contacts, instead of the contacts being moved, as before described. The path of the current to the motor is shown in Fig. 11, and the motor when energized operates as in the other case, with the exception that it does not act upon the switch device directly through the sleeve B, but through the sleeve B acts upon the rock-arm 18, which, through the medium of the cables, moves the sheave 15, and through it the contacts, the result being the same as in the other case.

In Figs. 9 and 13 I have shown a slight modification over that shown in Figs. 6, 7, and 8. In this case the rock-arm 20 is fixed on the sleeve 13 to which the contacts are connected. This rock-bar carries and has at each end of this rock-arm twin sheaves 21, the cables being secured at one of their free ends to the top of the elevator-shaft, and pass around their respective sheaves 21 and are secured at their other free ends to sheave 22, secured to the sleeve B.

In Figs. 10 and 12 I have shown a modification in which the auxiliary motor is not an electric motor, but is shown as a steam or hydraulic motor N, the valve-stem *n* of which is controlled by the solenoids n' n^2, having a core n^3 central to both, the core being held normally in a central position by the weighted lever $O^{\times}$. The solenoid n' opens the ports to the cylinder in one direction, and the solenoid n^2 in the other direction. The piston-rod P is connected to the rack P′, which gears with the gear-wheel P^2, which wheel takes the place of the worm-wheel F of Fig. 2 and carries the friction-jaw F′. The brush D and contacts B′ B^2 C′ C^2 are operated either as in Figs. 1 to 5 or Figs. 6 to 8 or Fig. 9, and the connections are as shown in Fig. 12. When the switch device is operated to energize the solenoid n', the valves are operated in one direction, and the operating mechanism of the main motor moves in one direction, and when the switch device is operated to energize solenoid n^2 the valves are operated in the opposite direction, thus moving the operating mechanism in the opposite direction, the movement of the piston-rod P through rack P′ and gear P^2 cutting out the switch in the same manner as the motor-shaft and worm and worm-wheel of the devices of the previous figures.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is—

1. The combination with a driving motor and controlling mechanism for the same, of an auxiliary motor, connection between said auxiliary motor and the controlling mechanism of the driving motor, controlling mechanism for the auxiliary motor, connection between said auxiliary motor and said auxiliary motor controlling mechanism, means independent of the auxiliary motor, to move said auxiliary motor controlling mechanism, the extent of movement of said auxiliary motor controlling mechanism by the auxiliary motor being determined by the extent of movement of said auxiliary motor controlling mechanism by means independent of the motor.

2. The combination with a driving motor and controlling mechanism for the same, of an electric motor, connection between said electric motor and the controlling mechanism of the driving motor, a switch device for admitting current to the motor, connection between said electric motor and said switch device, means independent of the electric motor to move said switch device, the extent of movement of said switch device by the electric motor being determined by the extent of the movement of switch device by means independent of the motor.

3. The combination with a driving motor and controlling mechanism for the same, of an auxiliary motor, a gear on the shaft of said motor, a gear wheel meshing with the gear on said motor shaft, a friction clutch carried by said gear wheel, and a second friction clutch wheel adapted to connect with said first mentioned friction clutch, and connection between the last mentioned clutch and the driving motor controlling mechanism, and controlling mechanism for said auxiliary motor.

4. The combination with a driving motor and controlling mechanism for the same, of an auxiliary motor, a gear on the shaft of said motor, a gear wheel meshing with the gear on said motor shaft, a friction clutch carried by said gear wheel and a second friction clutch wheel adapted to connect with said first mentioned friction clutch, and connection between said last mentioned clutch and the driving motor controlling mechanism, and means to operate said auxiliary motor for a determinate time.

5. In combination with a driving motor and controlling mechanism for the same, of an auxiliary motor, a gear on the shaft of said motor, a gear wheel meshing with the gear on said motor shaft, a friction clutch carried by said gear wheel and a second friction clutch wheel adapted to connect with said first mentioned friction clutch and connection between the last mentioned clutch and the driving motor controlling mechanism, electric controlling mechanism for the auxiliary motor, connection between said auxiliary motor and said electric controlling mechanism, means independent of the electric motor to operate said electric controlling mechanism, the extent of operation of said electric controlling mechanism by the auxiliary motor being determined by the extent of movement of said controlling mechanism by means independent of the motor.

6. The combination with a driving motor and controlling mechanism for the same, of an auxiliary motor, a gear on the shaft of said motor, a gear wheel meshing with the gear on said motor shaft, a friction clutch carried by said gear wheel, and a second friction clutch wheel adapted to connect with said first men-

tioned friction clutch, and connection between the last mentioned clutch and the driving motor controlling mechanism, electric controlling mechanism for the auxiliary motor, a solenoid, the core of which solenoid is connected with the last mentioned friction clutch, the arrangement being such that when the solenoid is energized the said last mentioned clutch member makes connection with the controlling mechanism and severs connection when the solenoid is de-energized.

7. In combination with a driving motor and controlling mechanism for the same, of an auxiliary motor, a gear on the shaft of said motor, a gear wheel meshing with gear on said motor shaft, a friction clutch carried by said gear wheel, and a second friction clutch wheel adapted to connect with said first mentioned friction clutch, and connection between the last mentioned clutch and the driving motor controlling mechanism, electric controlling mechanism for the auxiliary motor, a solenoid, the core of which solenoid is connected with the last mentioned friction clutch, the arrangement being such that when the solenoid is energized the said last mentioned clutch member makes connection with the controlling mechanism and severs connection when the solenoid is energized, and means to operate said auxiliary motor for a determinate time.

8. The combination with a driving motor and controlling mechanism for the same, of an auxiliary motor, a gear on the shaft of said motor, a gear wheel meshing with the gear on said motor shaft, a friction clutch carried by said gear wheel, and a second friction clutch wheel adapted to connect with said first mentioned friction clutch, and connection between the last mentioned clutch and the driving motor controlling mechanism, electric controlling mechanism for the auxiliary motor, a solenoid, the core of which solenoid is connected with the last mentioned friction clutch, the arrangement being such that when the solenoid is energized the last mentioned clutch member makes connection with the controlling mechanism and severs connection when the solenoid is de-energized, a switch device for controlling the auxiliary motor controlling mechanism, connection between said auxiliary motor and said switch device, means independent of the auxiliary motor to move said switch device, the extent of movement of said switch device by the auxiliary motor being determined by the extent of movement of switch device by means independent of motor.

9. The combination with a driving motor and controlling mechanism for the same, of an auxiliary motor, a gear on the shaft of said motor, the gear wheel meshing with the gear on said motor shaft, a friction clutch carried by said gear wheel, and a second friction clutch wheel adapted to connect with said first mentioned friction clutch, and connection between the last mentioned clutch and the driving motor controlling mechanism, electric controlling mechanism for auxiliary motor, a solenoid, the core of which solenoid is connected with the last mentioned friction clutch, a sleeve, connection between said sleeve and the controlling mechanism, a clutch connection between said sleeve and the last mentioned friction clutch, the arrangement being such that when the solenoid is energized the friction clutch and sleeve are connected and the connection severed when the solenoid is de-energized, and means to operate the auxiliary motor controlling mechanism.

10. The combination with a driving motor and controlling mechanism for the same, of an auxiliary motor, connection between said auxiliary motor and the driving motor controlling mechanism, electric controlling mechanism for the auxiliary motor, a switch device for said auxiliary motor controlling mechanism, consisting of contacts, and a switch arm carrying brushes, means to move the brush and contacts in relation to each other and connection between the auxiliary motor and the switch device, the extent of movement of the switch device by the auxiliary motor being determined by the extent of movement by the means independent of the motor.

11. The combination with a driving motor and controlling mechanism for the same, of an auxiliary motor, connection between said auxiliary motor and the driving motor controlling mechanism, electric controlling mechanism for the auxiliary motor, a switch device for said auxiliary motor controlling mechanism consisting of contacts, and a switch arm carrying brushes, connection between the auxiliary motor and said switch arm, and means independent of the auxiliary motor to move said contacts in relation to the switch arm.

12. The combination with a driving motor and controlling mechanism for the same, of an auxiliary motor, a gear on the shaft of said motor, a gear wheel meshing with the gear on said motor shaft, a friction clutch carried by said gear wheel and a second friction clutch wheel adapted to connect with said first mentioned friction clutch, and connection between the last mentioned clutch and the driving motor controlling mechanism, electric controlling mechanism for the auxiliary motor, a switch device for said auxiliary motor controlling mechanism consisting of contacts, and a switch arm carrying brushes, means to move the brush and contacts in relation to each other and connection between the auxiliary motor and the switch device, the extent of movement of the switch device by the auxiliary motor being determined by the extent of movement of the device by the means independent of the auxiliary motor.

13. The combination with a driving motor and controlling mechanism for the same, of an auxiliary motor, a gear on the shaft of said motor, a gear wheel meshing with the gear on said motor shaft, a friction clutch carried by said gear wheel and a second friction clutch wheel adapted to connect with said first men-

tioned friction clutch, and connection between the last mentioned clutch and the driving motor controlling mechanism, electric controlling mechanism for the auxiliary motor, a solenoid, the core of which solenoid is connected with the last mentioned friction clutch, the arrangement being such that when the solenoid is energized the said last mentioned clutch member makes connection with the controlling mechanism and severs connection when the solenoid is de-energized, a switch device for the auxiliary motor controlling mechanism, consisting of contacts, a switch arm carrying brushes, means to move the brush and contacts in relation to each other, and connection between the auxiliary motor and the switch device, the extent of movement of the switch device by the motor being determined by the extent of movement of the switch device by the means independent of the motor.

14. The combination with a driving motor and controlling mechanism for the same, of an auxiliary motor, a gear on the shaft of said motor, a gear wheel meshing with the gear on said motor shaft, a friction clutch carried by said gear wheel, and a second friction clutch wheel adapted to connect with said first mentioned friction clutch, and connection between the last mentioned clutch and the driving motor controlling mechanism, electric controlling mechanism for the auxiliary motor, a solenoid, the core of which solenoid is connected with the last mentioned friction clutch, a sleeve, connection between said sleeve and the controlling mechanism, a clutch connection between said sleeve and the last mentioned friction clutch, the arrangement being such that when the solenoid is energized the friction clutch and sleeve are connected and the connection severed when the solenoid is de-energized, a switch device for the auxiliary motor controlling mechanism consisting of contacts, and a switch arm carrying brushes, connection between said sleeve and the controlling mechanism, and means independent of the auxiliary motor to move said contacts in relation to the switch arm.

In testimony of which invention I have hereunto set my hand.

FRANK E. HERDMAN.

Witnesses:

WM. J. KENNA,

A. K. ADLER.