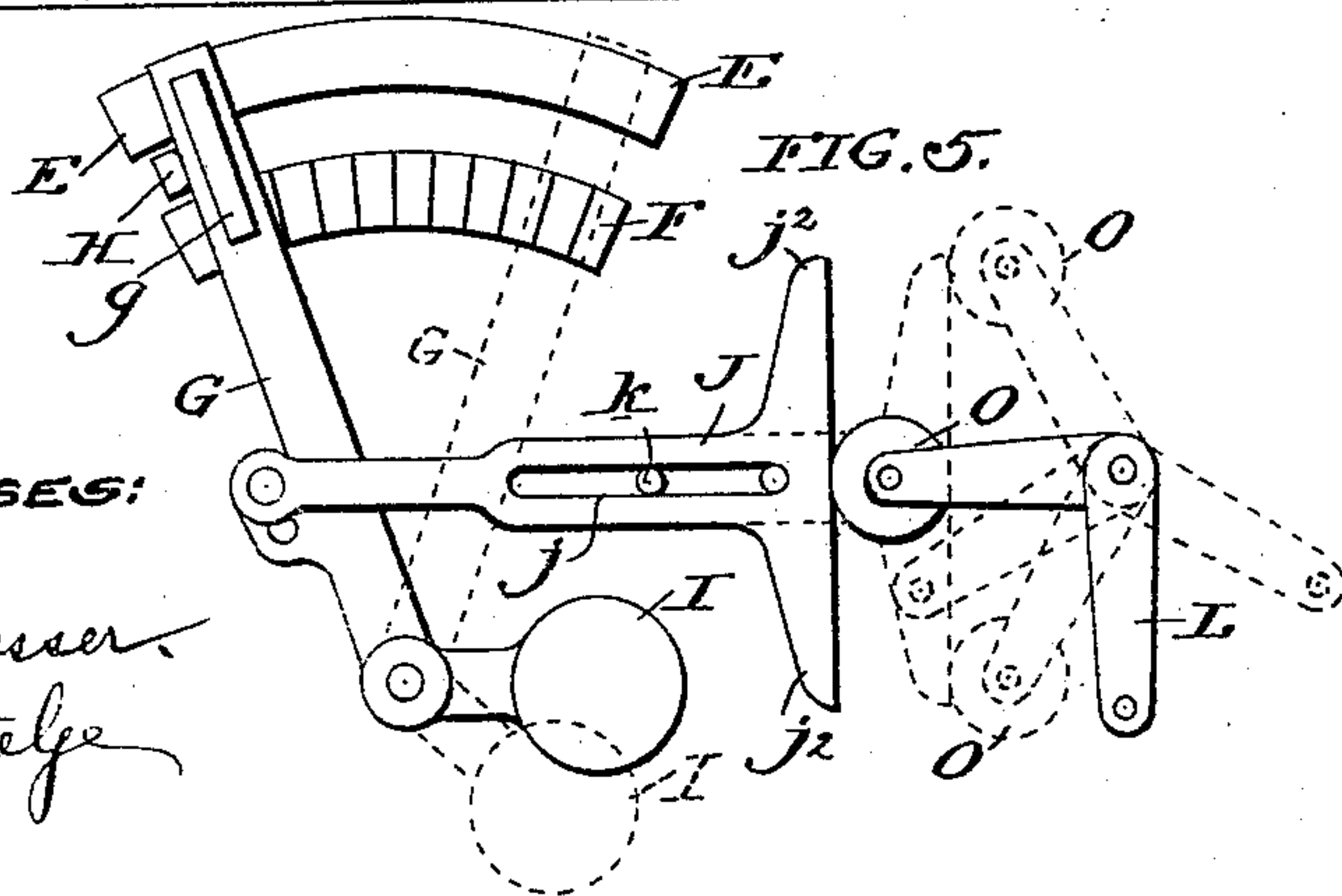
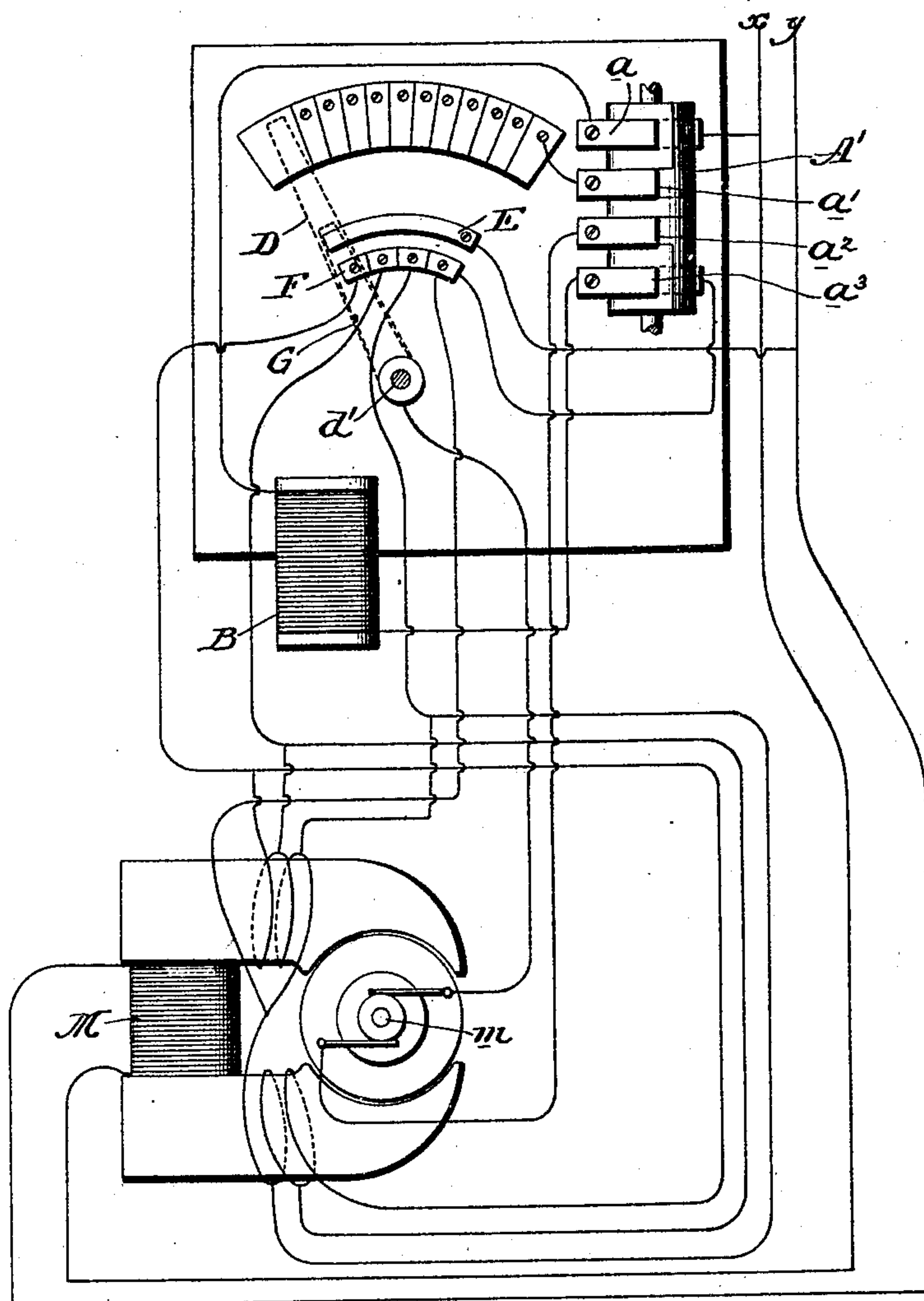


F. E. HERDMAN.
ELECTRIC MOTOR.

No. 551,633.

Patented Dec. 17, 1895.

Fig. 1.



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Philip Bontelge

INVENTOR:

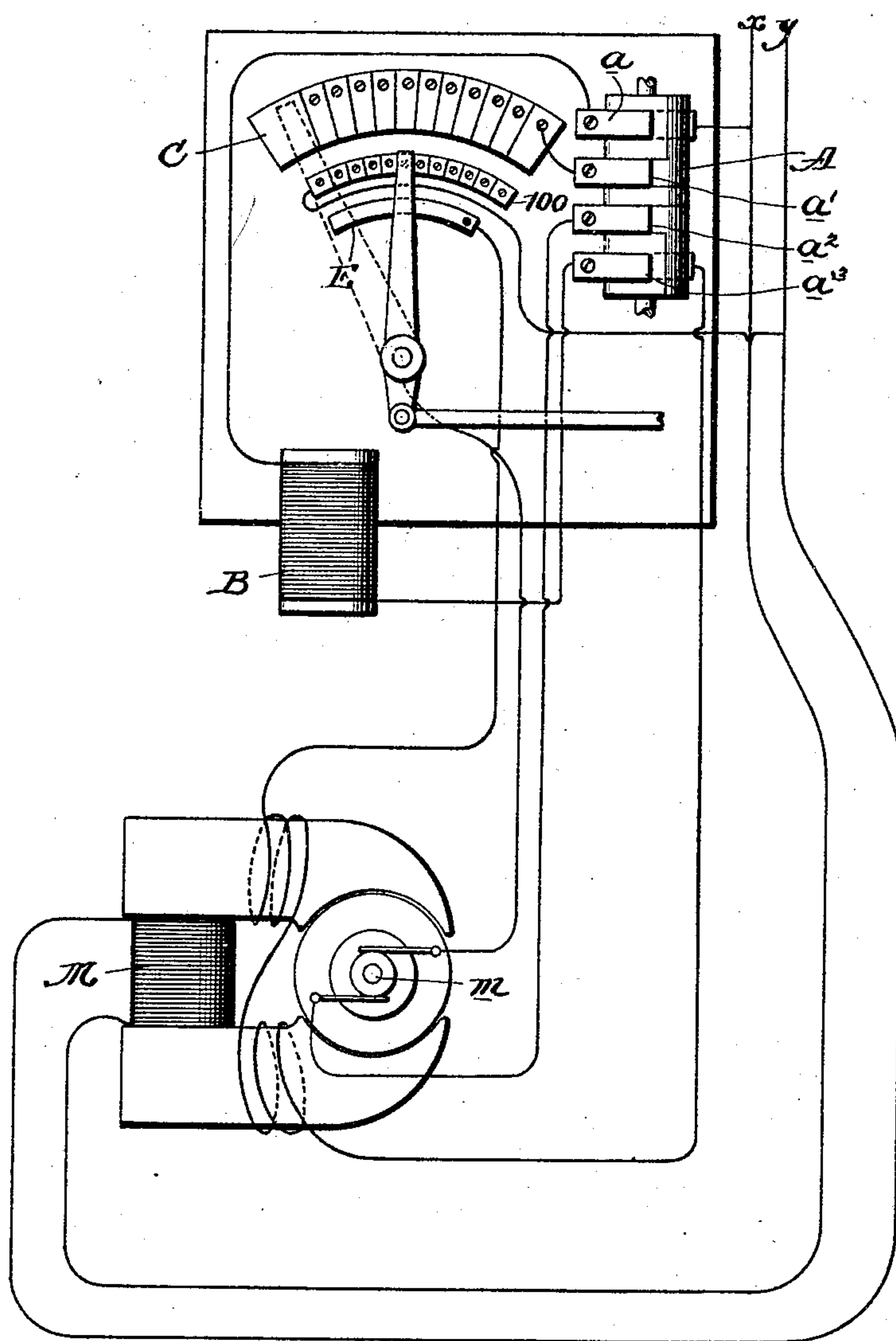
Frank E. Herdman
by his atty.
J. P. Harding

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ELECTRIC MOTOR.

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Fig. 2.



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(No Model.)

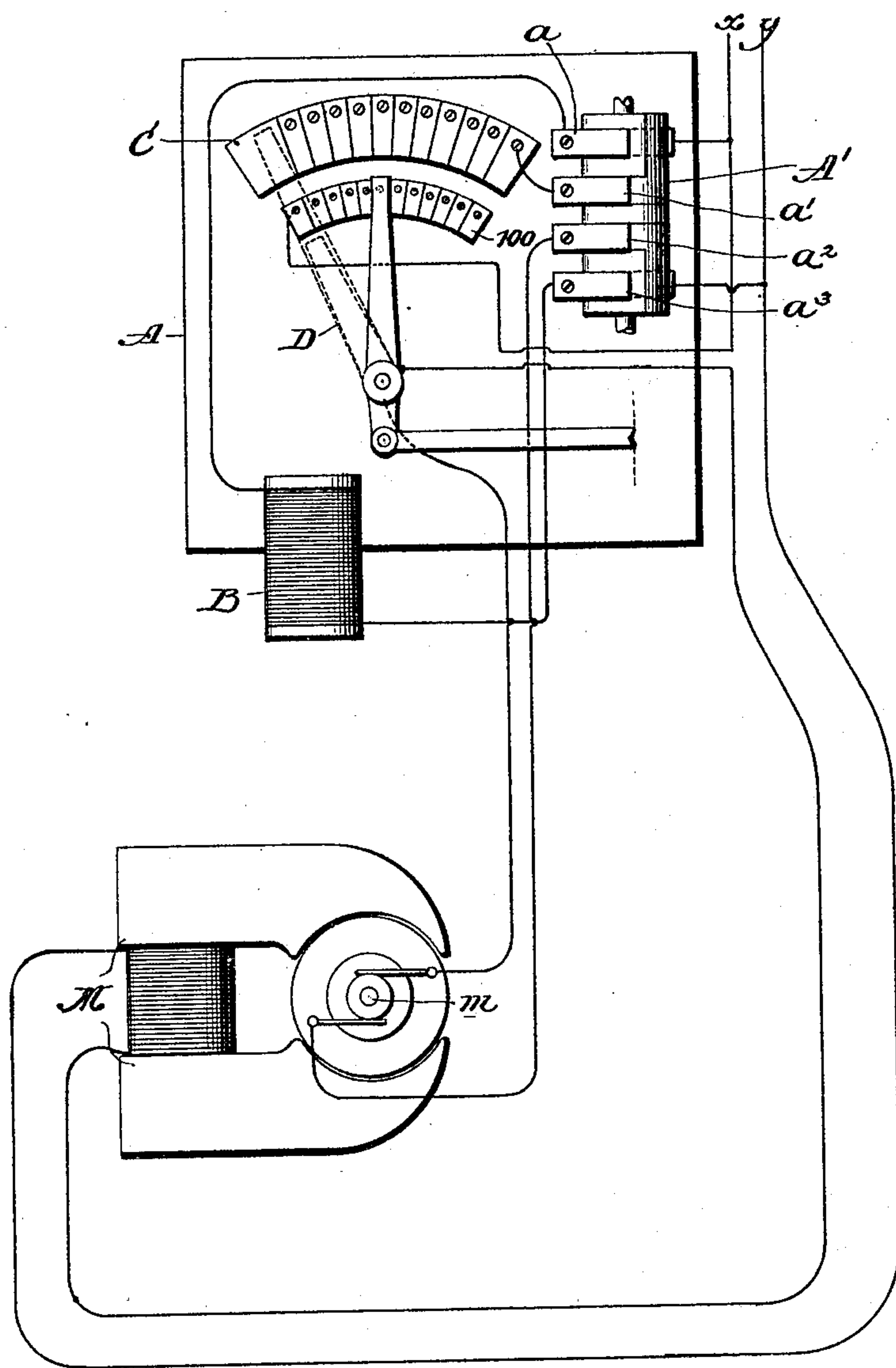
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Fig. 3.



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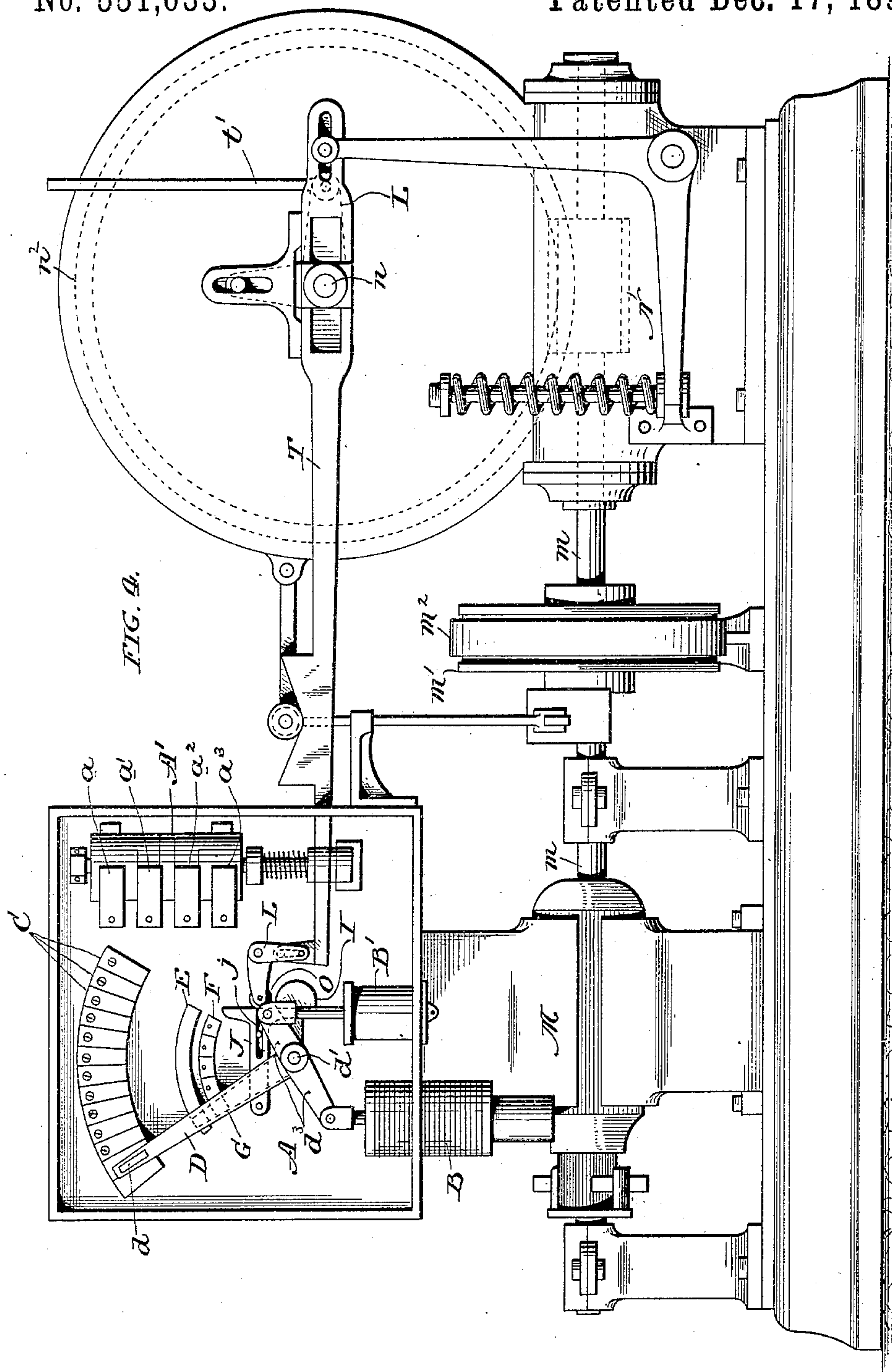
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UNITED STATES PATENT OFFICE.

FRANK E. HERDMAN, OF WINNETKA, ILLINOIS.

ELECTRIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 551,633, dated December 17, 1895.

Application filed August 6, 1894. Serial No. 519,572. (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 Electric Motors, 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.

My invention has particular reference to certain improvements in electric motors whereby the strength of the field can be varied at the will of the operator, thereby increasing or decreasing the speed of the motor, and thus give better control and greater efficiency in the consumption of the current by the operation of the electric motor.

I will describe my improvement as adapted for use with the elevator; but I do not intend to limit myself to its use, as it can be used where the motor is used for purposes other than operating an elevator.

In the drawings, Figure 1 is a diagrammatical view showing path of current. Fig. 2 is a diagrammatical view of modified form, showing the path of the current. Fig. 3 is a diagrammatical view of another modified form, showing the path of the current. Fig. 4 is a front elevation of elevator apparatus with my invention applied. Fig. 5 is a modified form showing a part of the mechanism in different positions drawn to a larger scale.

Referring first to Figs. 1, 4, and 5, M is the motor on the shaft m . On this shaft is the brake-wheel m' , provided with the strap brake m^2 . Connected to the shaft m is the worm N, which operates the worm-wheel on the drum-shaft n , upon which shaft is also the operating-drum n^2 .

A is the rheostat-box in which is contained the motor controlling switch A', having the brushes a a' a^2 a^3 .

X and Y are the wires leading from the source of current-supply, the wire being in electrical connection with the switch A'.

B is the solenoid in electrical connection with the brushes a^3 and a .

C are the resistances in electrical connection with brush a' . D is an arm having the brush d , adapted to travel over said resistance.

d' is the axis of arm D and is in electrical connection with the armature of the motor,

the armature of the motor being also in electrical connection with the brush a^2 .

d^3 is an arm, one end connected to the core of the solenoid B, the other end being connected to the dash-pot B'. The main-line circuit goes directly to the field of the motor.

E is a contact in electrical connection with the wire Y from the source of current supply, and F are a series of contacts in electrical connection with the switch A'. Under the arm D is a brush g of such size as to be in contact with contact E and contacts F. This brush g is attached to an arm G, (shown in detail, Fig. 5,) this arm being provided with the finger H extending upward on one side of the arm D. Connected to the arm G is the weight I, this weight being sufficient to move the arm G to the right when so desired.

The contacts F are in electrical connection with additional coils to the field-magnets. As the arm D passes over the resistance-contacts C, the arm G also passes over the contacts E and F by means of the action of the weight I, and when the arm D returns to the left, cutting the current out of the armature, by reason of said arm striking the finger H on the arm G, the arm G is also carried to the left. The extreme left position of this arm G places in circuit all of the additional coils to the field-magnet, and, consequently, at the moment of starting, the fields have their greatest strength. This strength of the fields being reduced as the arm passes to the right, as in its passage to the right it will cut out, one by one the extra coils from the circuit until it passes to the extreme right contact when all of the extra coils are cut out of circuit. In order that the position of the arm G may be controlled at the will of the operator, I attach to the arm G the bar J, provided with the slot j , in which slot works the guide-pin k . At the end of this bar J are the flanges j^2 .

T is the operating-bar, which is connected to the switch A' and is operated by the operator in the car by means of the lever t' , and to this operating-bar is attached the bell-crank L, carrying at its end the roller O, which, when the arm G is in its extreme left position, will be in contact with the flanged portion j^2 of the bar J. The weight I, tending to force the bar to the right, holds the bar

and roller in contact. As the operator moves the operating-bar T to the right or left, the bell-crank L is also moved and, in consequence of the roller O moving in a circle, it is carried
 5 to the right, and as it moves away from the flanged portion j^2 the weight I will cause the arm G to move, and thus the arm J also moves until the flanged portion j^2 again is in contact with the roller O.

10 In starting up, the operator throws the bar sufficient to close the circuit through the solenoid B by permitting the arm D to travel over the resistance-contacts C and admit current to the armature of the motor. At the
 15 same time, the roller O having moved away from the flanged portion j^2 of the bar J, the weight I causes the arm G to move to the right, cutting out, one by one, the additional coils through the fields. The amount of this
 20 movement of the arm G can be controlled by the operator by moving the operating-bar in either direction the desired amount, and by so doing he can regulate the strength of the current, so as to have a strong or weak field,
 25 as desired, and thereby corresponding speed. By this construction the operator has the means of controlling the speed of the motor, and by it the speed of the device operated by the motor, at his option. While he has this
 30 control of the fields during the operation, yet the motor must be started with the greatest strength upon the fields, and this cannot be reduced faster than the movement of the arm D will permit, for the finger H will prevent
 35 the arm G moving beyond the arm D, and thus he cannot interfere with the arrangement of the fields for starting.

Fig. 2 shows a modification. In place of having several separate coils I have one extra winding, and reduce the field strength by
 40 means of the resistances 100 in the circuit to the extra winding, the greatest resistance being in the extra winding of the field, when the arm G is farthest to the right, and the
 45 operator, by moving the operating-bar T, can vary the current strength in the field, and by this, as in the prior description, regulate the speed of the motor.

In Fig. 3 I discard the use of extra coils, and
 50 regulate the current strength in the field, by including resistances in the circuit to the field-coil, and by regulating the position of the arm G, through which the current passes to the field, upon the resistance, I increase or
 55 decrease the current strength in the field, and thereby regulate the speed of the motor. The position of the arm G with relation to the arm D is the same as in Figs. 1 and 2.

I do not intend to limit myself to the exact
 60 construction of mechanism hereinbefore described, except wherein the same is specifically claimed.

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

1. The combination of a motor provided with field winding, a source of current supply,

electrical connection with the armature of the motor, resistance in said circuit, electrical connection with the field of the motor, a device adapted in its movement in one direction
 70 to decrease the amount of current in the field, and in the other direction to increase the current in the field, an arm for controlling the resistance in the armature circuit, the field
 75 device being moved in one direction by the armature regulating arm, and its movement in the other direction being limited by said arm, and means to move said field regulating device independent of the movement of the
 80 armature regulating arm.

2. In combination, an electric motor, a source of current supply, direct electrical connection between the fields and current supply, extra coils upon the field magnets, con-
 85 tacts in electrical connection with one pole of the source of current supply, contacts in electrical connection with the other pole of current supply and with extra coils, an arm adapted to pass over said contacts, a bar connected
 90 to said arm provided with flanged ends, an operating bar and a bell-crank, one end connected to the operating bar, the other end being provided with a roller adapted to rest adjacent to said flange of said bar.
 95

3. In combination an electric motor, a source of current supply, direct electrical connection between the fields and current source, extra coils upon the field magnets, contacts
 100 in electrical connection with one pole of the source of current supply, contacts in electrical connection with the other pole of current supply and with extra coils, a weighted arm adapted to pass over said contacts, an operating bar and intermediate connection be-
 105 tween said weighted arm and said bar.

4. In combination, an electric motor, a source of current supply, direct electrical connection between the fields and current source, extra coils upon the field magnets, contacts
 110 in electrical connection with one pole of the source of current supply, contacts in electrical connection with the other pole of current supply, and with extra coils, a weighted arm adapted to pass over said contacts, a bar con-
 115 nected to said weighted arm provided with flanged ends, an operating bar and a bell-crank, one end connected to the operating bar, the other end being provided with a roller adapted to rest adjacent to said flange of said
 120 bar.

5. The combination of a motor provided with field winding, a source of current supply, electrical connection with the armature of the motor, resistance in said circuit, electrical con-
 125 nection with the field of the motor, a device adapted in its movement in one direction to decrease the amount of current in the field, and in the other direction to increase the current in the field, an arm for controlling the
 130 resistance in the armature circuit, the field device moving in one direction in the movement of the armature arm, and means to move said field regulating device independent of

the movement of the armature regulating arm.

6. The combination of a motor provided with field winding, a source of current supply, electrical connection with the armature of the motor, resistance in said circuit, electrical connection with the field of the motor, a device adapted in its movement in one direction to decrease the amount of current in the field, and in the other direction to increase the current in the field, an arm for controlling the resistance in the armature circuit, the field device moving in one direction in the movement of the armature regulating arm, and its movement in the other direction being limited by the movement of said arm, and means to move said field regulating device independent of the movement of the armature regulating arm.

7. The combination of a motor provided with field winding, a source of current supply, electrical connection with the armature of the motor, resistance in said circuit, electrical connection with the field of the motor, a device adapted in its movement in one direction to decrease the amount of current in the field, and in the other direction to increase the current in the field, an arm for controlling the resistance in the armature circuit, the field device being adapted to move in unison with the movement of the armature arm in either direction, and means to move said field regulating device independent of the movement of said armature regulating arm.

8. In combination, an electric motor, a source of current supply, electrical connection between the fields and current supply, an arm adapted in its movement in one direction to decrease the amount of current in the field and in the other direction to increase the current in the field, a bar connected to said arm provided with flanged ends, an operating-bar and a bell-crank, one end con-

nected to the operating bar, the other end being provided with a roller adapted to rest adjacent to said flange of said bar.

9. In combination, an electric motor, a source of current supply, electrical connection between the fields and current source, an arm adapted in its movement in one direction to decrease the amount of current in the field and in the other direction to increase the current in the field, an operating bar and intermediate connection between said arm and said bar, mechanism independent of the operating bar to move said arm in the direction to decrease the current in the field.

10. In combination, an electric motor, a source of current supply, electrical connection between the fields and current source, an arm adapted in its movement in one direction to decrease the amount of current in the field, and in the other direction to increase the current in the field, an operating bar, intermediate connection between said arm and said bar, and means independent of said operating bar to move said arm in both directions.

11. In combination, an electric motor, a source of current supply, electrical connection between the fields and current source, a weighted arm adapted in its movement in one direction to decrease the amount of current in the field, and in the other direction to increase the current in the field, a bar connected to said weighted arm provided with flanged ends, an operating bar and a bell-crank one end connected to the operating bar, the other end being provided with a roller adapted to rest adjacent to said flange of said bar.

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

FRANK E. HERDMAN.

Witnesses:

W. W. DOOLITTLE,
HENRY E. TURNER.