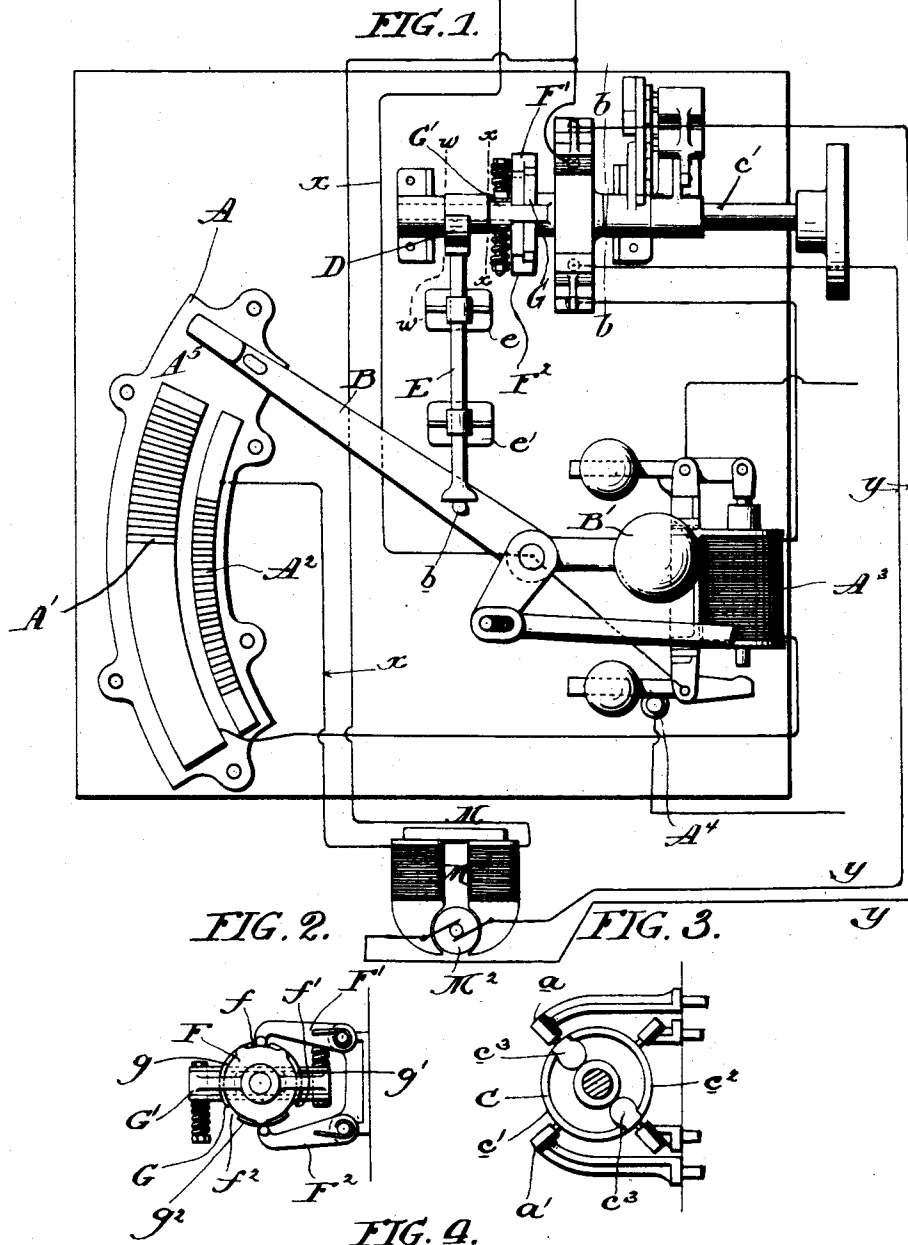


(No Model.)

F. E. HERDMAN.
ELECTRIC MOTOR.

No. 541,544.

Patented June 25, 1895.



WITNESSES:

M. Frances Ellis.
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UNITED STATES PATENT OFFICE.

FRANK E. HERDMAN, OF WINNETKA, ILLINOIS.

ELECTRIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 541,544, dated June 25, 1895.

Application filed November 27, 1894. Serial No. 530,092. (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 relates to that class of electric motors wherein the current is initially admitted to the armature through resistances which are gradually cut out of the armature circuit as the motor gains its speed, and this is accomplished by providing resistances and an arm adapted to travel over said resistances in the armature circuit, the arm being so placed in reference to the resistance that when the current is initially admitted to the armature with the greatest resistance in the armature circuit, and this arm is caused to automatically travel over the resistances cutting said resistances gradually out of the armature circuit until the full current strength is admitted to the armature.

My invention specifically relates to certain improvements to be used with a resistance arm whose brush rests upon insulation when the current is cut off, to enable the arm to be moved off the insulation when the current is turned on, and consists in a device connected with the switch mechanism whereby when the operating bar is moved so as to throw on the current, the arm will be moved by said device from the insulation to the resistances, but the device will not move said arm farther.

In the drawings, Figure 1 is a diagrammatic view. Fig. 2 is a section on the line xx , Fig. 1. Fig. 3 is a section on the line vv of Fig. 1. Fig. 4 is a section on the line ww of Fig. 1.

M is an electric motor; M' being the field magnets and M^2 the armature.

A is the rheostat or resistances.

A' is the armature resistance, and A^2 , the field resistances.

A^3 is the magnet in series with the armature, and A^4 a contact.

B is the resistance arm adapted to be operated in one direction when the current is admitted to the armature and fields, by mechanism such as is shown in an application

filed by me the same day as this application and adapted to be operated in the other direction by means of the weight, B' . Attached to said shaft C is the reversing switch (see detail Fig. 3) consisting of a cylinder c having two sections, C' and C^2 , separated by insulation, c^3 . The sections c' — c^2 are connected to the poles of current supply and brushes, a — a' , adapted in the movement of the cylinder c , in either direction to be brought in contact with the sections c' — c^2 , a being brought in contact with c' or c^2 , and a' with c^2 or c' , dependent upon the direction of movement of roller, C , the brushes a , a' , being connected by wiring with the armature, the switch C being a reversing switch, the brushes a , a' , resting on the insulation when the switch is central.

I have shown the wiring to the armature and to the field, the field wiring being denoted by letter x , and the armature wiring by y .

The circuit to the armature includes the resistance, A' , and the circuit to field the resistances, A^2 .

A^5 is insulation upon which the brush of the arm B rests when the motor is at rest. As it is necessary for the arm B to move from the insulation A^5 to resistance A' , before current is admitted to the armature even if the switch C , be operated so as to admit current to it, I provide the following means: D is the cam, shown in detail Fig. 4, resting against one end of the arm E , said arm being suitably supported in guides, e , e' , so as to be adapted to slide. The other end of the arm E rests against a pin, b , on the arm B , the pin being held against the arm when the arm is on the insulation, A^5 , by means of the weight, B' . The cam D as shown in Fig. 4, is a double faced cam, so that in the movement of the cam in either direction from the center, the arm E is moved forward. This cam D is provided with a hub loose on the shaft or prolongation of the shaft, c , of switch roller, C . This hub is connected to a disk F , also loose on said shaft. This disk is provided with three notches, f , f' , f^2 . On each side of this disk are pivoted spring fingers, F' , F^2 , held against it by the springs. Frictionally connected with this disk F , is the disk G , fixed to the shaft and carrying the spring clutch, G' , the disk plates of which rest on the flat

surface of the hub on the cam, D. On the disk G are three elevations, g, g', g^2 , in position intermediate to the notches, f, f', f^2 , when the switch C is central. When the motor is at rest, the finger, F', rests the notch, f , so that when the operator moves the cylinder, c, (which may be done by any well known means) the disk, F, moves without moving the disk, G, the finger, F', preventing it moving, but causes the clutch plates to open and release the cam, D, until one of the elevations upon disk G comes in contact with the finger F', forcing the finger out of the notch in disk, F, and the disk, F, then moves with disk G, and the cam D is given a sudden movement, forcing the arm E against pin b, moving arm B to the resistance and closing the circuit to the armature. This lifting the finger, F', from the notch, f , allows the clutch G' to go into action, and the plates close on the flat surface of the hub of cam D, stopping its movement. The movement of disk, F, before the clutch closes on the hub of cam D, is sufficient to allow the finger F², on opposite side, to enter the notch f' or f^2 . When the switch is operated to bring it to a central position, the disk F and cam D are held in the last mentioned position, the projection on disk G lifts the finger F² from notch f' or f^2 , and the weight B', returns the arm quickly from the last resistance to the insulation. The movement of the arm E does not occur in the movement of the switch in either direction until it has been sufficient to give a full and sudden throw to the cam, and thus insures a quick movement of the arm B, to close the circuit, causing no spark, and in breaking the circuit it causes the current to be cut off quickly.

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

1. In combination with a translating device, a reversing switch, a source of current supply, electrical connection between the source of current supply and electric switch and between the switch and translating device, resistances in said last mentioned circuit, an arm for controlling the amount of resistance in said circuit, an insulation upon which said arm is adapted to rest at one end of its travel, mechanism to operate said switch and connection between said mechanism and the resistance arm, the connection being such, as, in the movement of the switch in either direction from the center, will move said arm from the insulation to the resistance contacts and no farther.

2. In combination with a translating device, a reversing switch, a source of current supply, electrical connection between the source of current supply and electric switch and between the switch and translating device, resistances in said last mentioned circuit, an arm for controlling the amount of resistance in said circuit, an insulation upon which said arm is adapted to rest at one end of its travel,

mechanism to operate said switch and connection between said mechanism and the resistance arm, the connection being such, as, in the movement of the switch in either direction from the center will, move said arm from the insulation to the resistance contacts and no farther, and in the movement of the switch to the center to allow said arm to return to the insulation.

3. In combination with a resistance arm adapted to pass over resistances and vary the resistance in the circuit of a translating device, an insulation upon which said arm is adapted to rest at the end of its movement in one direction, a reversing switch interposed between said translating device and the source of current supply, and switch operating mechanism supported and adapted to slide, an arm one end resting against but not connected to said resistance arm, when said arm is in insulation, and connection between said arm and the switch operating mechanism, the connection being such that in the movement of the switch in either direction from central, the arm resting against the resistance arm is moved in one direction and said resistance arm is forced off of said resistance.

4. In combination with a resistance arm adapted to pass over resistances and vary the resistance in the circuit of a translating device, an insulation upon which said arm is adapted to rest at the end of its movement in one direction, a reversing switch interposed between said translating device and the source of current supply, and switch operating mechanism supported and adapted to slide, an arm one end resting against but not connected to said resistance arm, when said arm is in insulation, and connection between said arm and the switch operating mechanism, the connection being such that in the movement of the switch in either direction from central the arm resting against the resistance arm is moved in one direction, and said resistance arm is forced off of said resistance, and in the movement of the switch to the center said arm is moved in the other direction so that said resistance arm can return to insulation.

5. In combination with a resistance arm adapted to pass over resistances and vary the resistance in the circuit of a translating device, an insulation upon which said arm is adapted to rest at the end of its movement in one direction, a reversing switch interposed between said translating device and the source of current supply, and switch operating mechanism, of an arm supported and adapted to slide, one end of said arm resting against but not secured to said resistance arm when said resistance arm is upon the insulation, a cam having two cam faces, the other end of the arm resting against resistance arm resting against said cam, said cam being loose upon the shaft or extension of the shaft of the switch, a disk having notches secured to said cam, spring fingers adapted to rest in said notches, a disk fixed upon said shaft, and elevations

on said disk intermediate to the notches in notched disk, and adapted in the movement of said disk to strike the fingers of the notched disk, said last mentioned disks being in frictional contact, and a spring clutch connected to the disk fixed to shaft and adapted to rest upon and hold the cam.

6. In combination with a translating device, a reversing switch, a source of current supply, electrical connection between the source of current supply and electric switch and between the switch and translating device, resistances in said last mentioned circuit, an arm for controlling the amount of resistance in said circuit, an insulation upon which said arm is adapted to rest at one end of its travel, mechanism to operate said switch, a device connected with said mechanism, but disconnected with said resistance arm, the arrangement being such that in the movement of the switch in either direction from the center the device will move the resistance arm.

7. In combination with a translating device,

a reversing switch, a source of current supply, electrical connection between the source of current supply and electric switch and between the switch and translating device, resistances in said last mentioned circuit, an arm for controlling the amount of resistance in said circuit, an insulation upon which said arm is adapted to rest at one end of its travel, mechanism to operate said switch, a device connected with said mechanism, but disconnected with said resistance arm, the arrangement being such that in the movement of the switch in either direction from the center the device will move the resistance arm and in the movement of the switch to the center allow said arm to return to the insulation.

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

FRANK E. HERDMAN.

Witnesses:

C. D. HOYT,
JOB FISH, Jr.