

(No Model.)

2 Sheets—Sheet 1.

J. E. STANTON.

ELECTRIC MOTOR CONTROLLING DEVICE.

No. 513,213.

Patented Jan. 23, 1894.

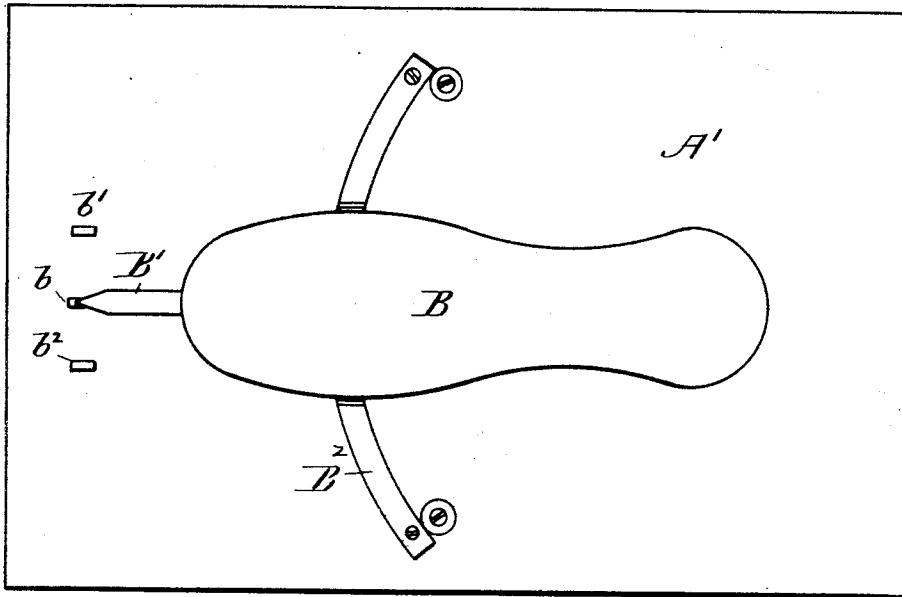


Fig. 1.

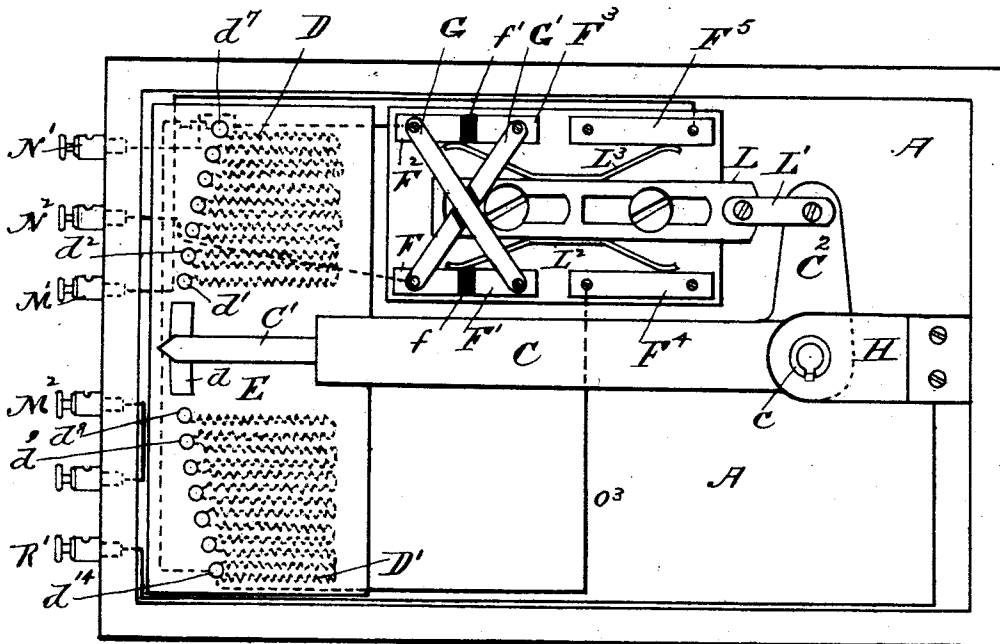


Fig. 2.

WITNESSES

Charles P. Norrist
M. T. Leach.

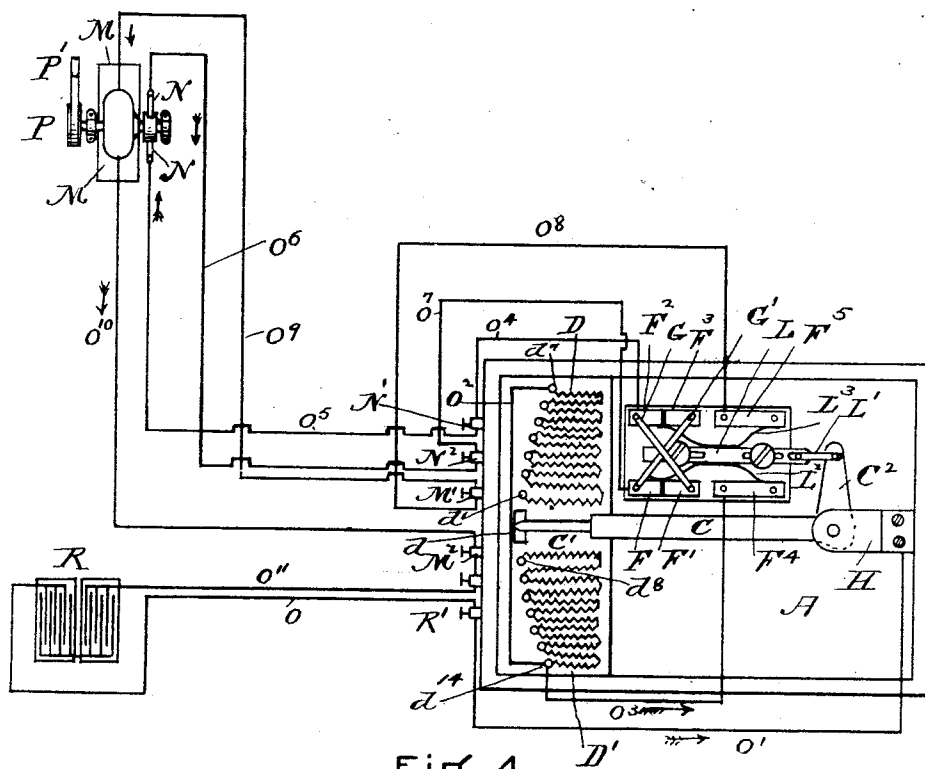
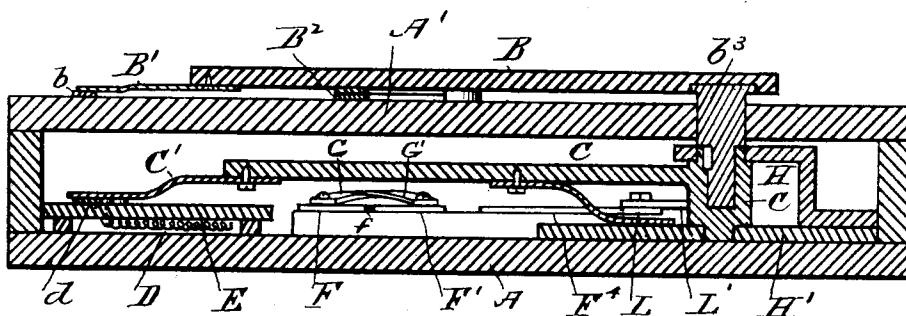
INVENTOR

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UNITED STATES PATENT OFFICE.

JERE E. STANTON, OF BOSTON, MASSACHUSETTS.

ELECTRIC-MOTOR CONTROLLING DEVICE.

SPECIFICATION forming part of Letters Patent No. 513,213, dated January 23, 1894.

Application filed June 19, 1893. Serial No. 478,063. (No model.)

To all whom it may concern:

Be it known that I, JERE E. STANTON, of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Electric-Motor Controlling Devices, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention consists of an improved controlling device for electric motors whereby the motor may be instantly started, stopped reversed or varied in speed in either direction by the foot of the operator.

There are various machines to which electric motors are applicable for furnishing the motive power in which it is desirable to have the speed either direct or reverse not only under immediate control, but capable of being controlled in such a manner that the operator has both hands free at all times for the particular manipulation of the machine; such for instance is a dental engine which it is often desirable to vary greatly in speed and sometimes to quickly reverse without using either hand for the purpose.

It is with special reference to dental and surgical engines that my improved motor controlling device has been contrived, though it is equally applicable to a great variety of uses wherein the electric motor supplies the power.

The device consists of a pivoted pedal capable of being moved to the right or left by a turn of the foot. Connected with the pedal and movable therewith is an arm which is adapted to traverse a series of contact posts, throwing into circuit varying sections of resistance coil, on either side of the central or neutral point of the arm. This arm also operates a peculiarly contrived switch, the construction being such that when the pedal is in its central position the circuit is open; and when moved to one side, the arm, working in connection with the switch, brings into circuit through the motor, coils of varying resistance, thereby varying the speed at will.

Referring to the accompanying drawings Figure 1 is a top plan view of a controlling device embodying my invention. Fig. 2. is a plan view of the interior mechanism, the top

of the inclosing case being removed. Fig. 3. 50 is a transverse sectional view through the center of the apparatus and Fig. 4. is a plan view in the nature of a diagram showing the method of connection between the battery, the motor and the various working parts of the controller. 55

A is the base board of the controller case and A' is the top which is adapted to be screwed or otherwise attached to the sides of the case. 60

B is the operating pedal secured to the pivotal arbor b^3 which turns easily within the top A'.

C is an arm within the case connected with the pedal in such a manner as to be movable 65 conjointly therewith. As herein shown the inner end c of the arm C has bearings between the bracket H and the plate H' secured to the bottom of the case, and the downwardly projecting arbor b^3 interlocks with the part c in 70 such a manner that both the pedal and the arm are movable together about the same axis which is preferably in the center of the heel of the operator's foot as it rests upon the pedal. The pedal B at a point beneath the ball of 75 the foot preferably has a bearing upon the arc shaped piece B^2 as the pedal is moved to the right or left about its axis by a turn of the foot.

The arm C is virtually a bell crank lever 80 the shorter arm C^2 being pivotally connected through the link L' with the sliding switch consisting of the slotted piece L of non-conducting material (guided to move back and forth over screws set in the base) and of the 85 spring contact pieces L^2 L^3 secured to the sides of the movable non-conducting piece L.

F^1 F^4 are plates along which the contact piece L^2 is adapted to slide as the switch moves, while F^2 F^3 and F^5 are corresponding 90 plates for the contact piece L^3 , the parts being so arranged that the spring pieces L^2 and L^3 are always in contact with the plates F^4 and F^5 respectively whatever the position of the arm C; if the arm C is moved to the right 95 said plates F^4 and F^5 are connected through the contact pieces with the plates F^1 and F^3 respectively. If the arm C is moved to

the left, the plates F^4 and F^5 are connected through the contact pieces with the plates F and F^2 respectively. The insulation f separates the plates F and F' while the insulation

5 f' separates the plates F^2 and F^3 . Conducting cross strips G and G' serve to connect in pairs the plates F' , F^2 and F^3 , said conducting strips being carefully insulated from each other.

10 When the arm C is in its central position the forward end C' thereof rests upon the neutral plate d . When moved to the right the part C' of the arm traverses a series of contact posts d' , d^2 — d^7 at various stages along a resistance coil D . d^8 , d^9 — d^{14} are correspond-

15 ing series of contact pieces to the left of the central or neutral point d , connected at various points with the resistance coil D' . The coils D , D' are preferably arranged on

20 the under side of the non-conducting plate E between it and the bottom A of the inclosing case.

B' is an index on the front of the pedal B , which in connection with the plates b , b' and

25 b^2 indicate to the operator when the arm C is on the neutral point d or in the contact posts d^8 or d' . The generator or source of electrical supply is in the present case a storage battery,

30 represented by R in the diagram in Fig. 4, while M is the field and N the brushes of the motor to be controlled. The wires o , o' — o^{11} connect the various parts of the mechanism of the controller with

35 the motor and battery through the binding posts along the side of the case, the particular arrangement of the connecting wires being obvious from the operation of the mechanism which will now be described. Suppose

40 the motor to be driven with a direct or right handed motion by turning the pedal to the right. When the pedal is on the central or neutral point the motor is stopped since in that position the circuit is broken. By turning

45 the pedal to the left the current is turned in the opposite direction through the motor which is thus reversed. The speed either direct or reverse is at its minimum when the part C' of the arm C is on the posts d' or d^8

50 and its maximum when the part C' is on the posts d^7 or d^{14} . Suppose the pedal to be moved to the right with the part C' on the contact post d' . In

55 this position the sliding switch by means of the spring contacts L^2 , L^3 connect the plates F' and F^4 on one side and the plates F^3 and F^5 on the other. The track of the current from the storage battery is then traced as follows:—from the battery along wire o ,

60 through binding post R' to bracket H , arm C , C' to contact post d' through coil D to d' , through wires o^2 and o^3 to plate F^4 , thence through contact spring L^2 to plate F' , and from there through strip G to plate F^2 , then

65 through wire o^4 to binding post N' , to wire o^5 ,

to brushes N on the motor, to wire o^6 , binding post N^2 , wire o^7 to plate F , through strip G' to plate F^3 , through contact piece L^3 to plate F^5 , through wire o^8 to binding post M' , wire o^9 through field M of motor, wire o^{10} binding post M^2 and wire o^{11} back to battery.

If the pedal be turned to the extreme right with the part C' on the contact post d^7 the resistance coil D will be cut out of the above circuit and the speed will of course be greatest, the speed being proportional to the amount of the resistance coil put in circuit, or, in other words, with the angular position of the pedal.

With the pedal B to the left of the neutral point, say with the part C' of the arm C on the contact post d^8 , the switch L is moved forward and the track of the current is thus traced:—from battery R along wire o to binding post R' , wire o' , bracket H , arm C , C' , contact post d^8 , coil D' , wire o^3 , plate F^4 , contact piece L^2 , plate F' , wire o^7 , binding post N^2 , wire o^6 , motor brushes N , wire o^5 , binding post N' , wire o^4 , plate F^2 contact piece L^3 , plate F^5 , wire o^8 , binding post M' , wire o^9 , motor field

90 M , wire o^{10} , binding post M^2 , wire o^{11} back to battery. P represents the pulley of the motor from which through the belt P' power is transmitted to the dental engine or other machine

95 to be driven. The inclosing case with the controller therein rests preferably upon the floor near the machine to be operated, in such a position that the operator by a very slight movement of the foot upon the pedal may at will instantly vary the speed and direction of movement in accordance with the particular work to be done and in a very simple manner, having both hands free for the manipulation of

100 the machine. I claim—

1. In combination, an electric circuit through a motor and generator, a pedal operated pivoted arm forming a terminal of the circuit, a resistance coil on each side of the arm, each coil being provided with contact posts at various stages of said coil adapted to be traversed by said arm, a sliding switch operated by said arm, and suitable contacts for said switch whereby a greater or less portion of either coil may be thrown into circuit and the current sent through the motor in one direction or the other and in varying intensity according to the positions of the arm and switch substantially as described.

2. In combination, an electric circuit through a motor and generator, the laterally movable pivoted pedal B , the bell crank lever C , C' movable with, and about the same axis as the pedal, resistance coils D , D' having contact posts adapted to be traversed by the long arm of said lever, the sliding switch L , L^2 , L^3 movable by said lever, contact plates F , F' , F^2 , F^3 , F^4 , F^5 , and suitably arranged conduc-

tors between coils, plates, and lever, all constructed arranged and operated substantially as set forth.

3. In a motor controlling device a reversing
5 switch consisting of the combination of the
fixed plates F F', F² F³, F⁴ F⁵, the connecting
strips G G' insulated from each other, the
movable suitably guided piece L of non-con-
ducting material provided with the spring
10 contact pieces L² L³ adapted to engage with
said plates and suitable connections to form

part of a circuit through a motor and generator substantially as described.

In testimony whereof I have signed my
name to this specification, in the presence of 15
two subscribing witnesses, on this 10th day of
February, A. D. 1893.

JERE E. STANTON.

Witnesses:

ALBERT E. LEACH,
M. T. LEACH.