

(No Model.)

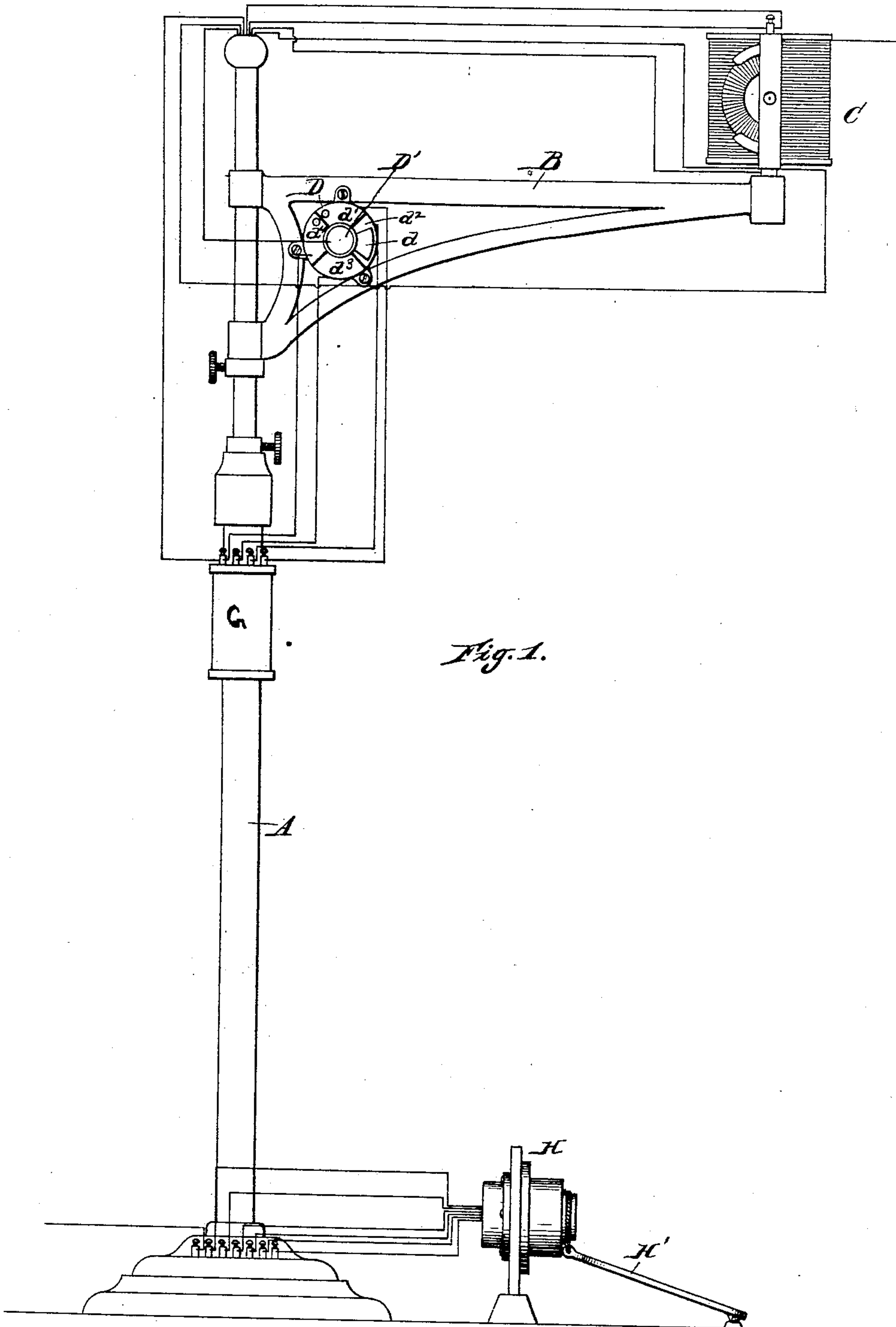
2 Sheets—Sheet 1.

H. H. BLADES.

DEVICE FOR CONTROLLING ELECTRIC MOTORS.

No. 396,725.

Patented Jan. 29, 1889.



WITNESSES

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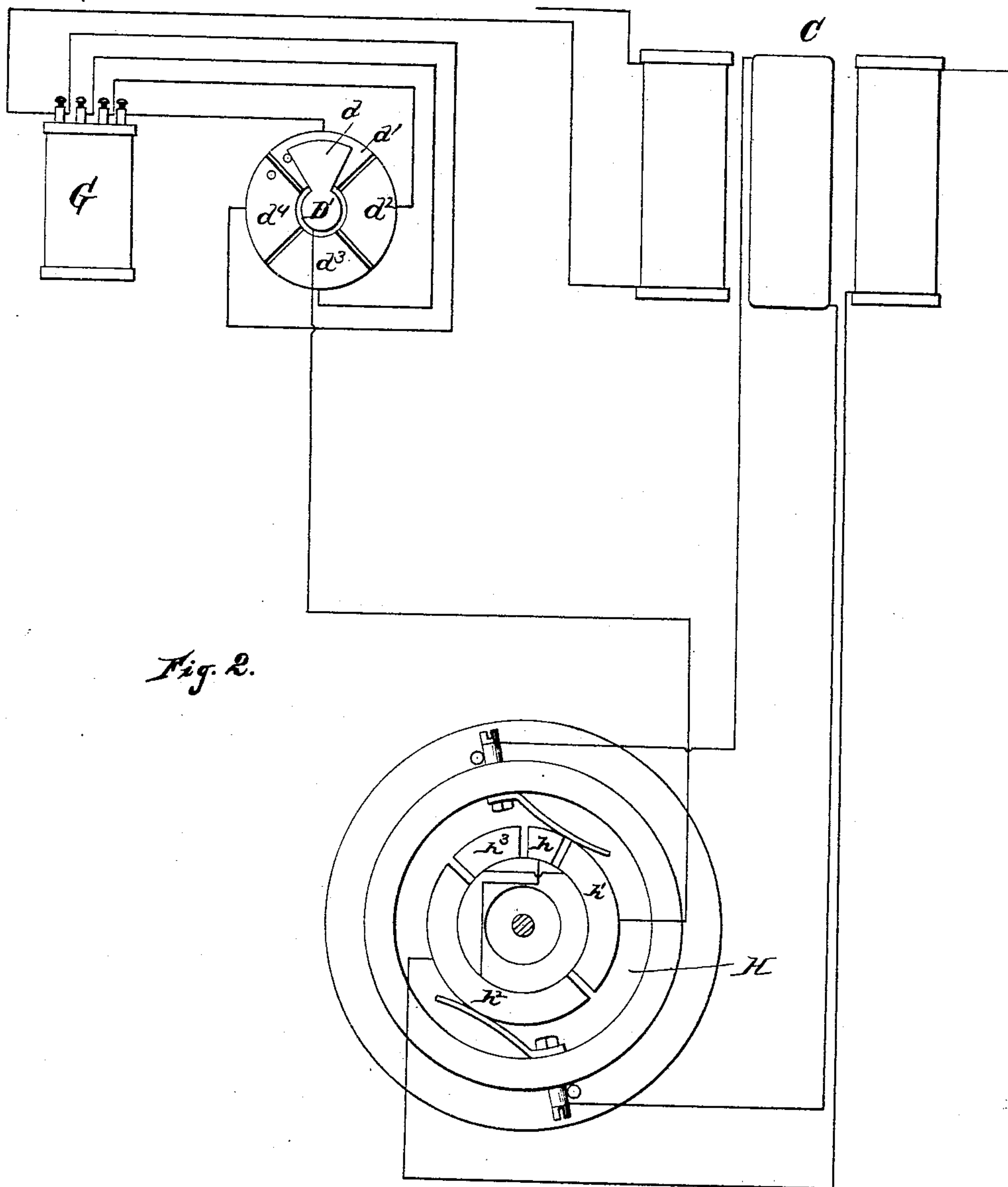


Fig. 2.

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UNITED STATES PATENT OFFICE.

HARRY H. BLADES, OF DETROIT, MICHIGAN.

DEVICE FOR CONTROLLING ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 396,725, dated January 29, 1889.

Application filed March 23, 1888. Serial No. 268,223. (No model.)

To all whom it may concern:

Be it known that I, HARRY H. BLADES, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented certain new and useful Improvements in Switch Mechanism for Electric Motors; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

In the drawings, Figure 1 is a view in elevation of a dental motor and its stand with my improvements attached. Fig. 2 is a separate diagrammatic view of the mechanism for starting, reversing, and stopping.

It is the purpose of my invention to combine, with an electric motor, mechanism to be operated by hand for regulating the amount of the current, and through that the speed of the motor, and in connection therewith mechanism to be operated by the foot for starting, reversing, and stopping the motor.

The drawings are made diagrammatic in form to show the different circuits; but it will of course be understood that the wires will in use be trained either within or upon the stand which supports the motor.

In carrying out my invention, A represents the upright of the motor-stand. B is its bracket-arm, which supports the motor C.

D is a switch mechanism operated by hand, and it has several terminals so connected with a resistance-regulator, G, that by adjusting the switch into one position a large resistance will be thrown into the motor-circuit and a correspondingly small amount of current be deflected through the motor, giving to it a low rate of speed; or by adjusting the switch to another set of terminals a smaller resistance may be thrown into the main circuit and a correspondingly larger amount of current directed through the machine, resulting in greater speed.

H is a switch at the floor, adapted for operation by a foot-treadle, H'. This switch is provided with a series of terminals, the first in the order of its operation serving to short-circuit either the fields or the armature, thus holding the machine inert. The next terminals

serve to turn on the current through both fields and armature, and so start the machine. By further depressions of the treadle the switch is connected with another set of terminals, which operate to reverse the current through the machine, thus reversing its motion. Having started the machine, by first depressing the treadle, if he desires to stop the machine instantly when at full speed, the operator by simply pressing with his foot farther down first reverses the current while at its maximum, which operates as a powerful brake, and by then releasing his foot the switch instantly resumes its normal position and short-circuits the fields or armature.

I will now describe more definitely the particular construction of the switches which accomplish these results. The switch D is of any usual type—as, for instance, the sweep or lever d is arranged to travel past and engage several contacts, d' , d^2 , d^3 , &c. d' is so connected with the resistance-regulator that when the switch-lever is upon it the current on the motor-line is compelled to travel through the highest resistance, thus admitting a correspondingly small current through the motor. The next contact, d^2 , is so arranged and connected with the resistance-regulator that when the switch-lever rests upon this contact the current in the motor-line is obliged to travel through a smaller resistance, thus deflecting a greater current through the motor, and so on. The switch-lever is provided with any suitable handle, D' , whereby it may be operated by hand. The switch H may likewise be of any convenient construction. Thus, for instance, it may be provided with a contact, h , so arranged that when the switch-lever is upon it the current is short-circuited through the field-magnets or armature, leaving the machine inert. Next in order are contacts h' h^2 , which operate to direct the current through both the fields and armature. Following this is a contact, h^3 , which, in connection with contact h^2 , is so connected with the motor as to reverse the current, and so operate to reverse the motion of the motor.

It is quite essential in some systems that the resistance on the main line be altered as little as possible, in order to prevent too great a disturbance at other points upon the line where the current is to be utilized. It is for

this reason that the said contacts *h* are arranged to cut out either the field-magnets or the armature, but not both. This arrangement, whereby the resistance is regulated by hand, while the starting, reversing, and stopping are effected by the foot, may be exactly reversed, if desired, so that the resistance may be regulated by foot and the current be turned on or reversed or cut off by hand. This construction is a very convenient one for a great many purposes—as, for instance, with dental motors, where it is desirable to first adjust the regulator by hand to yield a suitable speed or power, and then to control the direct motion, the reversal, or instant stopping of the motor by the foot while both hands may be employed. It, moreover, enables the operator, while he governs the direction of the current and its application by foot, to instantly adjust his speed by hand and maintain it precisely at that point—a matter which would be quite inconvenient to accomplish with accuracy by the foot when operating upon a patient or when doing other work with his hands. This is equally well adapted for any of the large variety of similar tools which are operated by electric motors—as, for instance, sewing-machines, fret-saws, jewelers' lathes, &c.

The foregoing has been described and the claims framed on the supposition that the current employed is the incandescent current and the resistance-regulator connected in series with the motor. If, however, the arc current is employed, or any other current which renders it desirable to employ the resistance-regulator in the main line to shunt more or less current through the motor, the switches and contacts may be adjusted therefor. In that event the switch *D* would be so arranged that as its lever is turned the resistance thrown into the main current would be increased from contact to contact, and so shunt a correspondingly greater current each time through the motor, and the switch *H* might have its contacts so arranged that the first set would turn on the current, the next reverse the current, and the last short-circuit the armature or field-magnets, and I would have the claims construed to embrace as equivalent constructions such changes, as above indicated, as would be necessary simply to adapt the apparatus to an arc-circuit or shunt-connected mechanism.

What I claim is—

1. The combination, with an electric motor, of a switch mechanism governing a current-regulator and another switch mechanism whereby the current may be short-circuited around the field magnets or armature, turned on through both, or reversed, one of said switches adapted to be operated by the hand and the other by the foot, substantially as and for the purposes described.

2. The combination, with an electric motor, of a switch connected with a resistance-regulator for governing the amount of current admitted through the motor and another switch constructed to short-circuit the current from the field magnets or armature, turn on or reverse the current, one of said switches adapted for operation by hand and the other by the foot, substantially as and for the purposes described.

3. The combination, with an electric dental motor, of one switch located upon the stand and adapted for operation by hand and another switch located adjacent thereto at the floor and adapted for operation by the foot, one of said switches governing the short-circuiting, the turning on, and direction of the current, and the other governing the resistance-regulator, which determines the amount of current admitted through the motor, substantially as and for the purposes described.

4. The combination, with an electric dental motor, of a switch located upon the stand adjacent to the hands of the operator, said switch adapted to govern the resistance-regulator, whereby is regulated the amount of current admitted through the motor, the same adapted for operation by hand, and in connection therewith another switch located at the floor adjacent to the foot of the operator for short-circuiting and regulating the direction of the current and adapted to be operated by the foot of the operator, substantially as and for the purposes described.

In testimony whereof I sign this specification in the presence of two witnesses.

HARRY H. BLADES.

Witnesses:

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SAMUEL E. THOMAS.