(No Model.) 2 Sheets—Sheet 1.

S. S. WHEELER.

CONTROLLING SWITCH FOR ELECTRIC MOTORS.

No. 460,076. Patented Sept. 22, 1891.

Fig. 3.

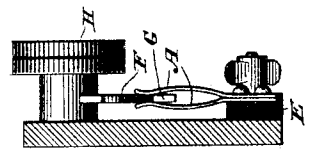


Fig. 2.

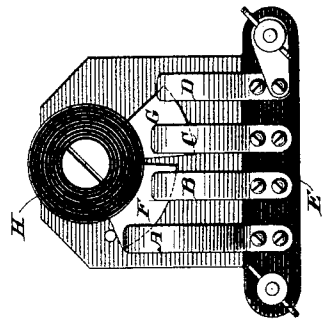
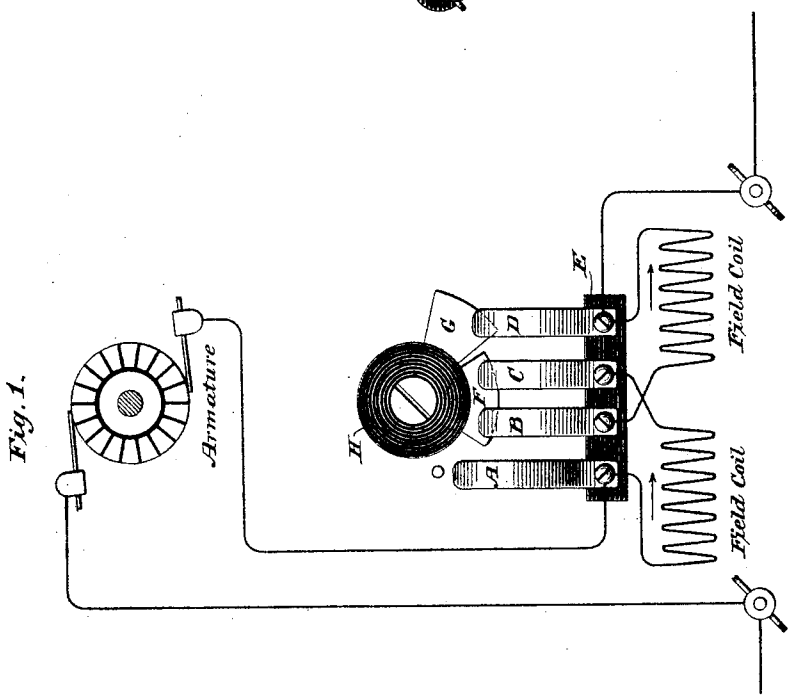


Fig. 1.



Witnesses
Geo. W. Breck.
Edward Thorpe.

Inventor
S. S. Wheeler
By his Attorney
Chas. G. Curtis

(No Model.) 2 Sheets—Sheet 2.

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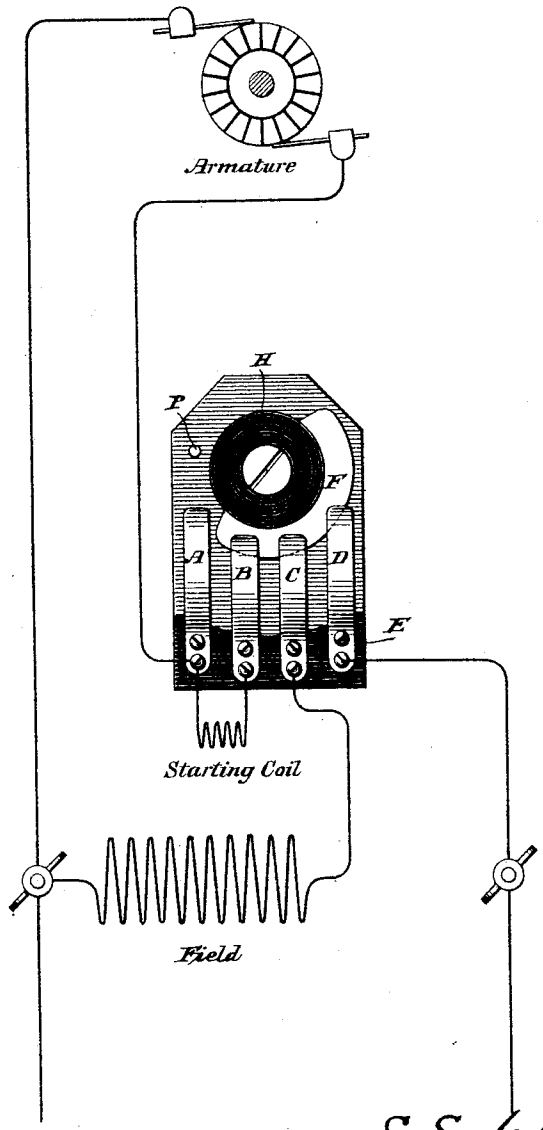
Fig. 4.



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By his Attorney
Chas. H. Curtis

UNITED STATES PATENT OFFICE.

SCHUYLER S. WHEELER, OF NEW YORK, N. Y., ASSIGNOR TO THE CROCKER-WHEELER ELECTRIC MOTOR COMPANY, OF SAME PLACE.

CONTROLLING-SWITCH FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 460,076, dated September 22, 1891.

Application filed September 13, 1890. Serial No. 364,909. (No model.)

To all whom it may concern:

Be it known that I, SCHUYLER S. WHEELER, of the city, county, and State of New York, have invented certain new and useful Improvements in Switches and Means of Controlling Electric Motors, of which the following is a specification.

One of the objects of my invention is to provide a suitable and simple means of starting an electric motor from a condition of rest without turning on the full current suddenly; and another object of my invention is to provide simple and effective means for attaining two speeds from the same machine—a full speed and a less or half speed—without the use of an additional or dead resistance external to the machine.

My invention will be understood from the accompanying drawings, in which—

Figure 1 represents in diagram the arrangement of connections and the general operation of my invention. Figs. 2 and 3 are front and side views of my switch, showing its construction in detail; and Fig. 4 shows a modified form of my invention, in which the field-magnet and armature are in multiple-arc relation and a "starting-coil" supplants one of the field-magnet coils shown in Fig. 1.

The switch itself I prefer to construct as follows: Four metal strips or tongues A B C D are rigidly fixed to a suitable base or support E, of insulating material, and these strips are preferably made of two parts or tongues of springy material and shaped, as shown in Fig. 3, so as to grasp a metal strip F, which comes between them. Upon the same base or support that holds the strips A B C D is mounted a knob or handle H, so as to revolve in the plane of the strips, and attached to this revolving portion or knob are two thin sectors or pieces of metal F and G, which are mounted so as to be insulated from each other and so as to occupy the positions shown in Fig. 2 when the knob is turned to its extreme position in one direction. In this position the sector F serves to connect the springs A and B electrically, and the sector G acts to connect the springs C and D. When the knob is turned part way around in the other direction, so as to occupy the position shown in Fig. 1, for example, the sector F acts to connect the strips B and C; and if it be turned around farther in the same direction the strips become disconnected from each other. (The strip D is made sufficiently short, so that it cannot come in contact with the sector F.)

I will now describe the connections and mode of operation of my switch. One of the terminal strips D is connected with one terminal of the source of current and the other terminal strip A is connected with the armature, the other terminal of the armature being connected with the other terminal of the source of current, as shown. The field-coils or winding, whatever form it may be, is divided into two parts or sections, and the four terminals of these two field-sections are connected with the strips, as clearly shown. The first effect of turning the switch-handle H to the position shown in Fig. 1 is to connect the strips B and C together. The result is that the two field-sections are thrown into series, the current entering at the strip D, passing through the first coil to the strip B, then by the strip C through the second coil, and thence through the armature. This makes the resistance of the field four times as great as if its two sections were connected together in multiple arc, and this is proportioned so that under these circumstances the desired current is obtained and the motor runs at only one-half or something less than its full speed. It also forms a convenient means of starting, enabling only a portion of the full current strength to be turned on at first until the motor has acquired some speed and developed a proper counter electro-motive force.

By turning the switch into the position shown in Fig. 2 the springs A and B and C and D are respectively connected together and the two field coils or sections are thrown into multiple arc, the current passing through both sections in the same direction as when they were in series, so that both coils always operate to magnetize the field. This of course reduces the resistance of the field to one-fourth of what it was with the switch in its first position, and, the resistances of the parts being properly proportioned, the motor runs at its full speed.

In Fig. 4, which represents a modified application of my improved switch for the purpose of starting the motor from a condition of rest, the switch is provided with only one metal sector F, which by turning the knob can be made to connect with one, two, three, or all of the strips A B C D. In this arrangement the armature and field are in multiple-arc relation, one end of the armature being connected with the strip A and one end of the field being connected with the strip C. Between the strips A and B, I insert an extra or "starting" coil, with its resistance properly proportioned to the requirements of the case. The first effect of turning the switch is to connect together the strips C and D. The current then flows through the field alone and charges that. The next movement of the switch connects the strip B with the strips C and D, as shown in the drawings, and a portion of the current also flows through the resistance or starting coil and then through the armature, giving it sufficient current to start and, if desirable, to run at one-half or a certain definite proportion of its full speed. The fourth position of the switch connects the strip A with the others and cuts out the starting-coil entirely, leaving the armature running with its full normal current in multiple arc with the field.

I am aware of patents Nos. 271,042 and 271,175, granted to Curtis and Crocker by the United States Patent Office on the 23d day of January, 1883, for improvements in electric motors, and I make no claim hereinafter broad enough to include any portion of the apparatus disclosed in said patents. The switching apparatus described and claimed in the patents above referred to is designed to connect a series of independent field-magnet coils and independent armature coils, either in series, multiple, or multiple series relation, and embraces connections which extend to two or more independent switching devices, which are independently operated, while my invention is designed to connect two independent field-magnet coils either in series or in multiple arc and through the agency of a single hand-operated switching device, and my claim hereinafter made is directed to such a construction.

What I claim as my invention, and desire to secure by Letters Patent, is—

An electric motor having its armature connected in series with its field-magnets, there being one coil for each field-magnet, in combination with a switch having four fixed terminals connected, respectively, to the ends of the two field-magnet coils, and two movable terminals located in the path of the free ends of the fixed terminals and carried by a rotary switch-handle, substantially as described.

SCHUYLER S. WHEELER.

Witnesses:

FRANCIS B. CROCKER,

BELLE HAMILTON.