

(No Model.)

G. A. HAMILTON.
DYNAMO ELECTRIC MACHINE.

No. 319,578.

Patented June 9, 1885.

Fig. 1,

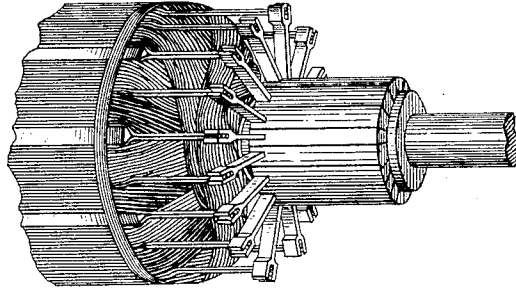


Fig. 2,

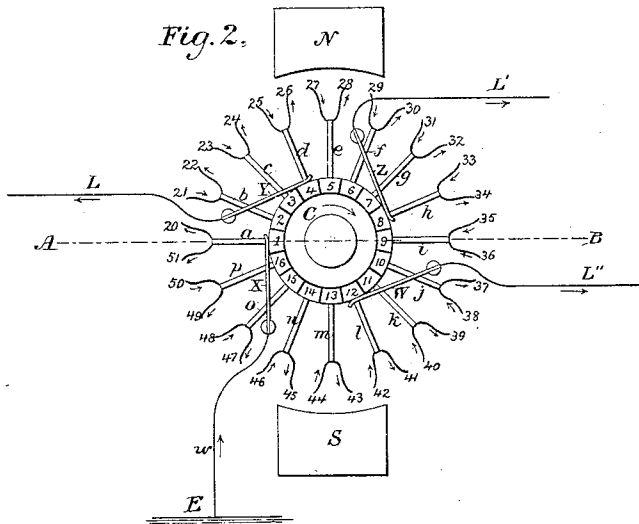
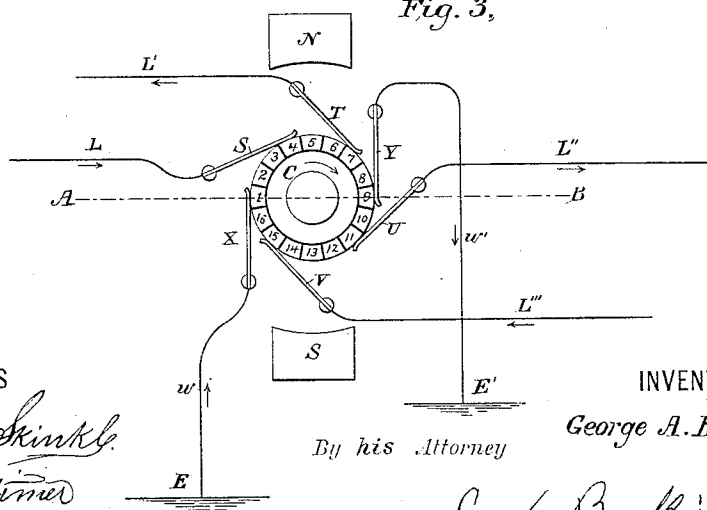


Fig. 3,



WITNESSES

Wm A. Skink
Jos. B. Latimer

By his Attorney

INVENTOR

George A. Hamilton,

C. L. Bucklin

UNITED STATES PATENT OFFICE.

GEORGE A. HAMILTON, OF NEW YORK, N. Y., ASSIGNOR TO THE WESTERN UNION TELEGRAPH COMPANY, OF SAME PLACE.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 319,578, dated June 9, 1885.

Application filed December 21, 1882. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. HAMILTON, of the city, county, and State of New York, and a citizen of the United States, have made a new and useful Improvement in Dynamo-Machines for Electric Telegraphy, of which the following is a specification.

This invention is particularly designed to enable a single dynamo-machine armature to feed many independent telegraph-lines each of a different resistance from the others, and to therefore enable the procurement of currents of a strength proportionate to the resistance of the lines to be fed. I am also enabled to procure from the same machine different strengths of current of either polarity. To the end of procuring many different strengths of current from a single dynamo-machine I employ an armature having a series of coils, the beginning and terminal ends of adjoining ones being respectively connected together, and a series of insulated commutator-strips. There are thus as many commutator-strips as there are coil-sections upon the armature, and the coil-sections are connected together in an unbroken metallic circuit. In diametrically-opposite positions, in respect to the axis of the armature, are two field-magnets, respectively of opposite polarity.

Instead of employing two main or primary commutator-brushes, forming a part of the entire machine-circuit, adjusted to be in immediate connection with those armature-coils which are in a neutral position, or in a plane nearly at right angles to the plane joining the poles of the field-magnets, I employ only one such main or primary brush, which is immediately connected to earth through a low resistance. In addition to the single main brush I employ as many other secondary or line brushes as different strengths of current are required, and these secondary or line brushes are given different circumferential positions of contact around the commutator. From a line-brush in one position of adjustment only a weak current may be obtained, while, from one in a different position, any intermediate strength of current up to the maximum that the machine is capable of developing can be obtained. I will now describe my inven-

tion by reference to the accompanying drawings.

Figure 1 is a perspective view of an armature, such as may be employed in carrying out my invention. Fig. 2 is a diagram of a commutator and armature coil-sections, and a series of commutator-brushes for procuring currents of different strengths, though of the same polarity. Fig. 3 represents an arrangement by means of which different strengths of current may be procured of either polarity.

In Fig. 2, C is a commutator having a cylindrical series of insulated metallic strips 1 2 3, &c., to which are attached metallic bars *a b c*, &c. To each of said bars *a b c*, &c., are attached the terminating extremity of one armature-coil and the beginning extremity of a succeeding one. Thus the beginning extremity of an armature-coil is attached by wire 20 to bar *a*, while the terminating extremity of the same coil is attached by wire 21 to bar *b*. In the same manner extremities of the second armature-coil, 22 23, are attached to bars *b c*. The extremities of the third armature-coil, 24 25, are attached to the bars *c d*. In like manner all of the armature-coils are connected together in a closed metallic circuit, while at those points at which they are connected together a loop-connection is respectively formed with the insulated metallic strips of the commutator. N and S are poles of the field-magnets set in diametrically-opposite positions in respect to the axis of the armature. Each coil of the armature when rotated in the direction of the arrow will have a current of one polarity induced therein in one-half of its rotation, and of an opposite polarity in its other half rotation. Taking coil 20 21, after passing line A B, a current will be established in the direction indicated by the arrows, and the currents generated in these coils will grow stronger as the coil is rotated toward the pole of the field-magnet N, and will gradually diminish until it again reaches the neutral line A B, when the polarity of current generated in said coil will be reversed, and will, in turn, increase to a maximum as it passes the pole S, when it will again diminish to zero upon returning to said neutral line.

When the coil 20 21 is in position of rotation shown in the drawings, only a weak current will be generated therein. In the coil 22 23 a stronger current will at the same time be developed, while the current of coil 24 25 will be still stronger. The several currents of variable strength generated by the different coils, according to their position of rotation, are superposed, and conspire together to form a common current; and those armature-coils, as shown in the drawings, whose commutator-sections are above the neutral line A B and those whose sections are below said line generate currents in the same manner as two batteries connected together in multiple are; and, as is well known, a current is generated in coils connected to commutator-strips above the neutral line, running in one direction, while in the coils connected to strips below said line a current is generated flowing in the opposite direction.

If a circuit were established from brush X to earth, and thence through the armature-coil from bar *a*, a maximum current would be derived from a brush making contact with that commutator-section diametrically opposite to section 1. A current, however, of much less and any desired strength can be obtained by placing a brush in any required position—as, for instance, brush Y in contact with the commutator-section 4. In this case the current furnished line L will be due to the electro-motive force set up in coils 20 21, 22 23, and 24 25. In like manner, to procure a still stronger current line L' may be attached to a brush, Z, placed in contact with commutator-section 8; and in this case electro-motive force due to seven coils of the armature is employed. In fact, one-half as many different strengths of current may be procured as there are commutator-sections or armature-coils for the machine.

As shown in Fig. 2, there are sixteen commutator-sections and sixteen armature-coils; and, having the brush X in contact with section 1, as many different strengths of current may be obtained as there are commutator-sections upon each side of the neutral line A B. Thus in this instance eight different strengths of current may be procured. If there is practically no resistance between brush X and the earth, a current derived from any brush—as Y, Z, or W—will be that produced by the electro-motive force of those coils connected to those commutator-strips between the respective metallic contact-bars *a* and *d*, *a* and *h*, and *a* and *l*. It is to be observed, however, if the resistance between brush X and the earth E were equal to the resistance, for instance, of line L', there would be a point of zero potential in those armature-coils between bars *a* and *h*, and that therefore if line L were joined by its brush Y to the armature-coils at such point of zero potential no current would be set up in line L; and from the fact that a resistance may be inserted between brush X and earth E, and that a point of zero poten-

tial in the coils of the armature may be thereby produced, it is obvious that the current produced upon line L may be varied in strength not only by shifting brush Y from one commutator-section to another, but by increasing or decreasing the resistance between brush X and earth E.

In practice, the neutral line A B is not at right angles to the line joining the field-poles, though for convenience of illustration I have shown the two lines as being at right angles.

Fig. 3 represents a commutator and electrical connections joining the strips of said commutator and coils of the armature, substantially as shown in Fig. 2, having two brushes, X and Y, in contact with the neutral commutator-sections 1 and 9. By this means it is obvious that not only can currents of different strength be derived from secondary brushes differently positioned, but that currents of either polarity may be obtained. For example, if the resistance of wires *w w'* is equal, a current will be established in line L toward the commutator, as indicated by the arrow, while in line L' a current will be generated flowing from the commutator, as indicated by arrow.

Currents will be produced which flow toward the commutator in those lines whose brushes are in contact with commutator-sections at the left of the line joining the field-poles of the machine, while currents of an opposite polarity will be set up in all those lines whose brushes are in contact with those commutator-sections at the right of said line. The current established in line L is a resultant of a current generated by those coils attached to commutator-sections 1 2 3 4 and those coils attached to commutator-sections 4 5 6 7 8 9. The coils of the armature attached to sections 1 2 3 4 tend to produce a current in line L whose direction is opposite to that of the arrow of line L, while those armature-coils attached to sections 4 5 6 7 8, and 9 set up a current whose direction is indicated by the arrow. A current therefore flowing in line L is less than that which would otherwise be produced by those coils connected to commutator-sections 4 5 6 7 8 9. In like manner a current set up in line L' is the difference between the current generated by those coils of the armature attached to sections 1 2 3 4 5 6 7 and those coils attached to the commutator-sections 7 8 9.

Instead of employing an armature whose coils are wound entirely upon its periphery and across its ends, I may employ the ordinary Gramme armature; or, in fact, any other form where the coils are all connected together, and which at their junctions are connected, respectively, with a series of commutator-strips.

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

1. As a means for procuring from one dynamo-machine several strengths of current, the combination of an armature whose coils are electrically connected together and to a series

of commutator-strips, a commutator-brush connected to earth by a conductor of low resistance, and a series of auxiliary brushes situated in different circumferential positions
5 about the commutator, to which independent conductors are respectively connected, and upon each of which conductors a different potential of current may be obtained.

2. The combination of a series of armature-
10 coils which are electrically connected together and to a series of commutator-strips substantially as described, two field-magnets respectively in diametrically-opposite positions about the armature-axis, a commutator-brush, X,
15 connected by low resistance to earth, and a series of main-line commutator-brushes, Y, Z, and W, to which are connected lines L L' L''.

3. The combination of an armature whose coils are electrically connected together and to a series of commutator-strips, substantially as
20 described, two field-magnets of opposite polarity located in diametrically-opposite positions in respect to the axis of the armature, two commutator-brushes, X, Y, connected to earth by
conductors W W', and a series of commuta- 25 tor-brushes, to which are respectively connected a series of main lines, whereby currents of either polarity, as well as of different strength, can be procured from a single dynamo-machine.

GEORGE A. HAMILTON.

Witnesses:

WM. B. VANSIZE,
WM. ARNOUX.