No. 615,351. Patented Dec. 6, 1898.

J. E. FULLER.

DYNAMO ELECTRIO MACHINE.

(Application filed Mar. 24, 1898.)

(No Model.)

Fig. 1.

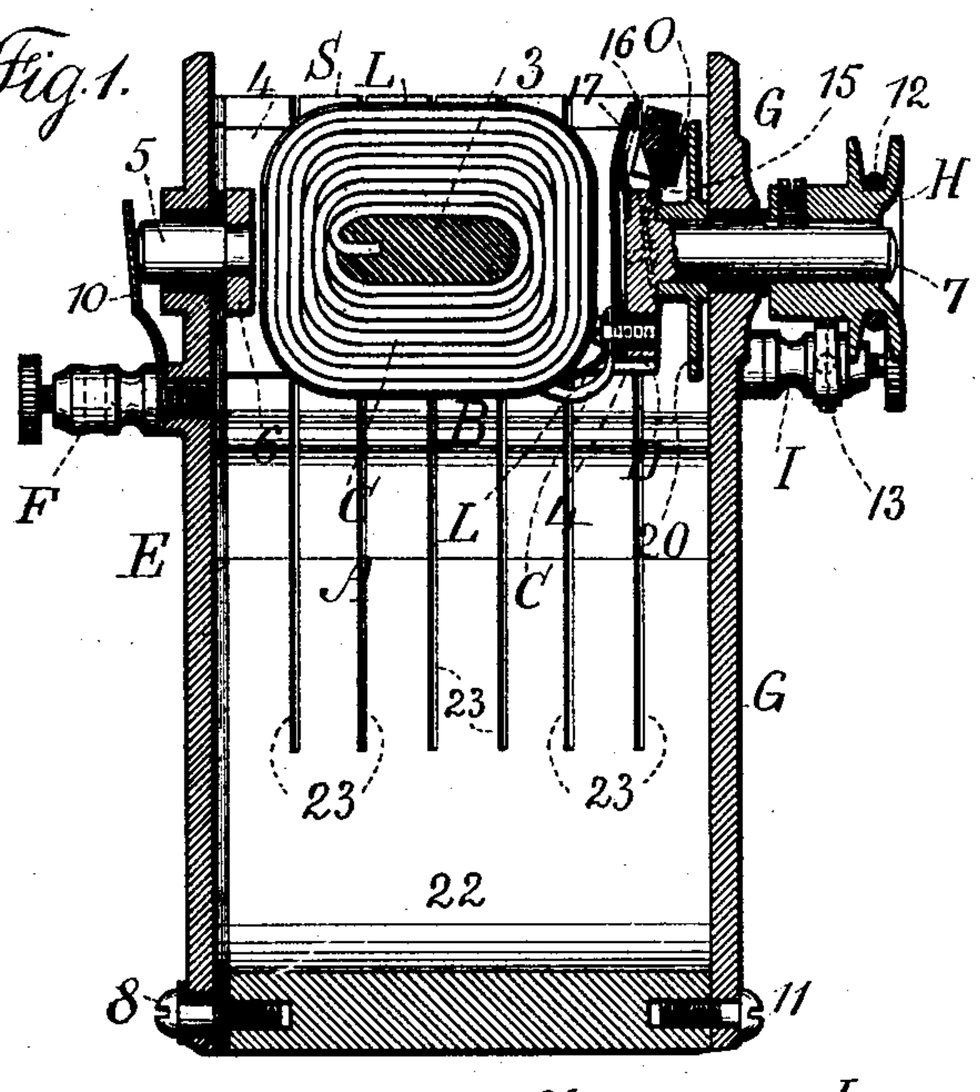


Fig. 3.

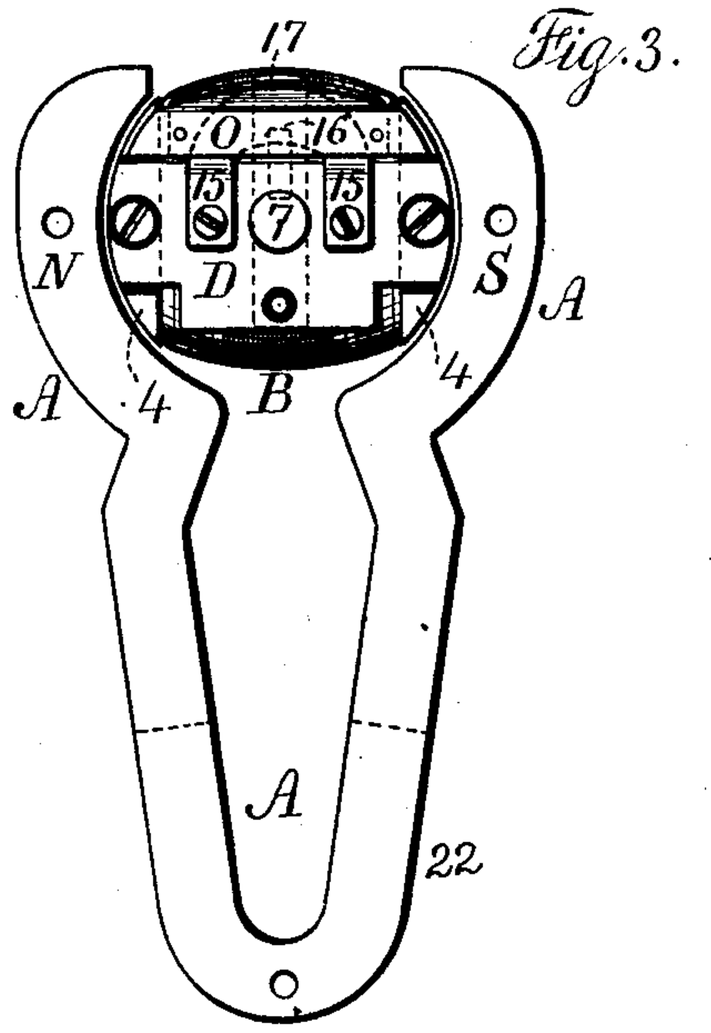


Fig. 2.

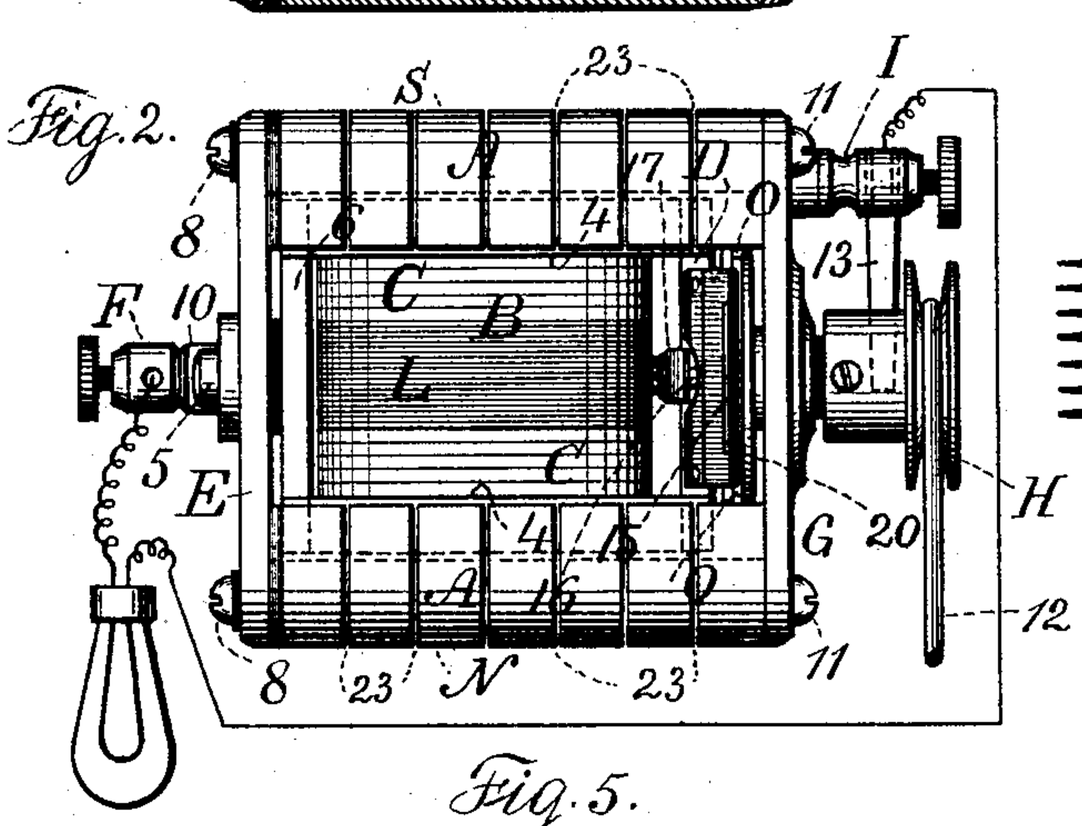


Fig. 4.

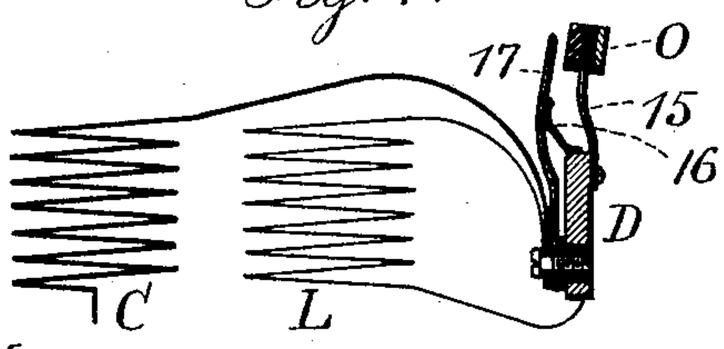
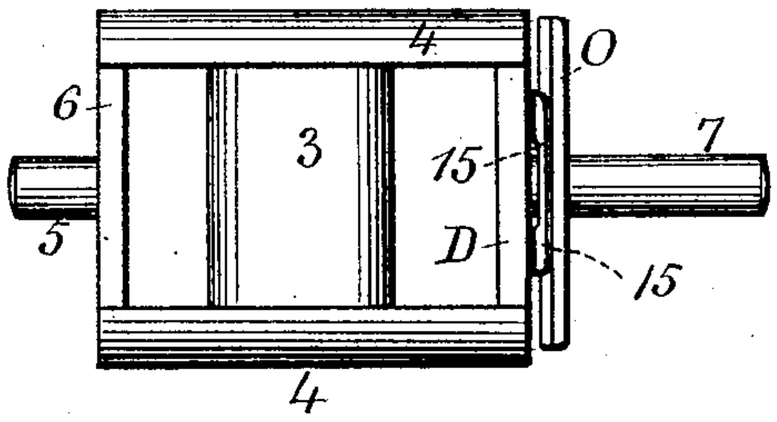


Fig. 5.



Witnesses:
J. Staib
Chas. H. Smith

Inventor:
John E. Fuller
per L. W. Serrell & Son
Attys

UNITED STATES PATENT OFFICE.

JOHN E. FULLER, OF NEW YORK, N. Y., ASSIGNOR TO CALEB COLES DUSENBURY, OF LAKE MAHOPAC, NEW YORK.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 615,351, dated December 6, 1898.

Application filed March 24, 1898. Serial No. 674,958. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. FULLER, a citizen of the United States, residing in the city, county, and State of New York, have invented an Improvement in Dynamos, of which the following is a specification.

This invention is especially intended for developing electricity for an incandescent lamp upon a cycle or carriage, the armature being driven by a connection to one of the wheels. In consequence of the varying speed at which the vehicle may be propelled there is risk of too great a current being developed and the lamp being injured or else the current is insufficient for the lamp when the vehicle is moving slowly. In the present dynamo the parts are constructed with reference to producing the current necessary for an incandescent lamp upon a cycle or carriage when the vehicle is moving at the slowest rate, and as the speed of the vehicle increases the current developed is cut down in such a way as to avoid injury to the lamp by too strong a current.

In the drawings, Figure 1 is a vertical section longitudinally of the armature-axis. Fig. 2 is a plan view, and Fig. 3 is an end view. Fig. 4 is a diagram illustrating the circuit connections, and Fig. 5 shows the governor at the end of the armature-poles.

The field-magnet A is advantageously of the shape represented in Fig. 3, and it is permanently magnetized at the poles N S, the faces of which are arcs of circles, and the armature B is made with a core 3 of soft iron, there being a helix or coil of insulated copper wire C wound around the core 3 and between the pole-pieces 4 4, the outer faces of which pole-pieces are segments of cylinders.

The armature shaft or arbor 5 at one end is supported by the cross-piece 6 of non-magnetic material between the pole-pieces 4 4, and the shaft 7 at the other end is upon the similar cross-piece or head D, and the plate E is connected by the screws 8 to the field-magnet poles, and it receives through it the shaft or arbor 5, and this plate E is insulated from the magnet-poles and receives upon it the binding-post F for one of the conductors passing to the electric lamp, and there is a spring 10 extending from the binding-post and bearing against the shaft or arbor 5, so that the circuit passes from this binding-post F and spring 10 and shaft 5 to the cross-piece 6 and to the core of the armature B.

This shaft 7, which projects out from the head D of the armature, is supported by a plate G, having screws 11 passing into the poles of the field-magnet, and upon this shaft 7 is a pulley H, which is preferably grooved deeply for the reception of a belt 12 or cord leading to the wheel that is revolved when the vehicle is in motion, so that the armature is revolved by the belt 12 upon the pulley H through the shaft 7 and head D.

The hub of the pulley H forms a continuous contact for the spring 13, that passes to the binding-post I, from which the other circuit-wire passes to the lamp, so that it will be seen that the external circuit is to the binding-posts F and I (see Fig. 2) and from such binding-posts through the arbors or shafts of the armature.

The armature itself contains the coil C, of insulated wire, the inner end of which is advantageously connected to the core of the armature, and the head D of the armature is insulated at its connections to the ends of the pole-pieces 4 in order that the governor O, which is carried by this head D, may regulate the current set up in the circuit, as hereinafter described.

The armature, being of soft iron and having a coil or helix around it, becomes an electromagnet, and I find that when the governor is in the form of an iron plate retracted by a spring from one end of the armature the current developed in the coil of the armature is in proportion to the speed of rotation, and when the magnetic energy in the armature is sufficient to overcome the resistance of the spring the governor-plate will be attracted by the magnetism in the armature at one end thereof, and by coming into contact with the two armature-poles, the magnetism of the core and pole-pieces is reduced in proportion to the intimacy of contact of such governor, and the governor-plate becomes a magnetic neutral, so that the N and S polarity is alone manifested at the opposite end of the armature to the governor.

The strength of the spring carrying the gov-

ernor can be varied or it can be made with reference to a given current developed by the dynamo, and in addition to the governor changing the magnetism of the armature such governor may also be employed for throwing into the armature-circuit a resistance to cut down the current flowing through such armature-helix.

The governor O is long enough to extend across from one pole of the armature to the other, and this governor O is supported by a suitable spring upon the cross-piece D or armature-head. This spring is represented at 15 in approximately the form of a horseshoe, and the strength of the spring can be varied by any suitable mechanism, and when the magnetism set up in the electromagnetic armature is sufficient to overcome the spring 15 and attract the ends of the governor O against the projecting ends of the armature the governor-plate O, coming into contact with such ends of the armature, acts like a keeper or yoke between the two cores of an electromagnet, and hence such governor O becomes neutral, leaving the N and S polarity at the other end of the body of the armature, and the magnetic action of the armature upon the current set up in the coil of such armature is cut down to the extent of contact of the governor with the ends of the armature and to the duration of the contact, so that when the current is excessive and sufficient to attract the governor O and hold it into contact with the ends of the armature the magnetism of such armature is cut down and the output of current proportionately lessened, and this governor O will play back and forth upon the end of the armature with more or less rapidity, because the magnetism will be cut down in the armature by the reduction of current flowing through the helix of the armature. Under most circumstances this vibrating governor O is sufficient for regulating the output of current, according to the speed of the vehicle or the armature-shaft. I, however, find it advantageous under some circumstances to provide a resistance in the form of a coil L, of German-silver or other wire, around the armature, so as to throw this resistance into the circuit of the lamp whenever the output of current is abnormal in consequence of increase in the speed of the cycle or other vehicle.

The armature-helix C is always in circuit, because the current passes from F through 10 and 5 to the body of the armature and through the insulated coils C to the head D, and from thence, by the shaft 7, pulley H, and spring 13, to the external circuit, and I connect the resistance-coil L at one end to the wire of the armature-coil C, and the other end of the resistance L is connected with the cross-bar D and external circuit.

The spring 17 is insulated, and to the same the ends of the helix C and the resistance-coil L are connected, as indicated in Fig. 4, and the spring-contact 16 is upon the cross-piece or head D, and in the ordinary position of use the spring 17 engages the spring 16 and short-circuits the resistance-coil L; but when the governor O, acting upon the spring 17, breaks the circuit connection between 17 and 16 the current passes through the armature-helix and through the resistance-helix L in series and thence to the cross-bar or head D. Hence the resistance L is thrown into series simultaneously with the breaking of the circuit between 16 and 17, and by this arrangement and the proper proportioning of the parts according to the average speed of the vehicle, so the output of current from the dynamo to the lamp will be sufficient for the illumination thereof and without risk of injury by too strong a current. As soon as the magnetism and the current developed in the armature are sufficiently lessened the governor O springs back and the spring 17 closes the circuit through the spring 16 and head D, short-circuiting the resistance-coil L, and in so doing the current set up by the revolution of the armature is augmented, and by the play of the governor O back and forth the voltage is regulated according to the strength of the springs 15 and 17.

The guard-disk 20 surrounds the arbor 7 of the armature and is adapted to turn freely with the armature, and there is sufficient space between the guard-disk and armature-poles for the governor to vibrate with freedom; but such guard-disk prevents the governor coming into contact with the plate or frame that supports the arbor and armature.

It is important, especially in portable dynamos for vehicles, to obtain and maintain a uniformity of magnetic polarity in the two poles of the field-magnet. Where the pole-pieces are in one and are as wide as the length of the armature, the greatest magnetism is usually developed near the ends of the pole-pieces and where the wires of the armature-coil as they revolve do not cut the lines of magnetic force. To avoid this difficulty and unify the polarity of the field-magnet, I separate such poles by incisions that are perpendicular to the axis of the armature, and such incisions extend down the pole-supports or legs or base to the neutral point or place of no magnetism, or nearly so, in order that the solid portion 22 may connect the N and S tongues or bars of the field-magnet, and the incisions at 23 are advantageously made by a saw and are sufficiently near together to properly divide up the pole-pieces N S into bars that are approximately rectangular in section, so that each bar may be magnetized to saturation either as a permanent magnet or as an electromagnet, and by this construction the expense of the field-magnets is much less than in cases where separate horseshoe or other magnets are joined together in a group, and each bar of the pole-pieces in my improvement becomes uniformly magnetized

and will retain such magnetism and act to better advantage in the development of current by the wires of the armature crossing the lines of magnetism between the pole-pieces than in cases where the pole-pieces are not divided up into sections.

I claim as my invention—

1. The combination with the field-magnet, of an armature having a core and coil and an external circuit to a lamp, a governor at one end of the armature, and a spring to draw back the governor, such governor acting to lessen the magnetism in the armature when in contact with the poles thereof, substantially as set forth.

2. The combination with the field-magnet and armature in a dynamo, of a governor adjacent to the ends of the armature, a spring to draw such governor away from the armature, a resistance-coil around the armature and a circuit connection controlled by the governor for throwing the resistance-coil into series with the armature-coil when an excess of magnetism is developed in the armature, substantially as set forth.

3. The combination with the revolving armature, of field-magnet pole-pieces, integral with a common connecting-base, but divided up into similar sections at the respective poles whereby a uniformity of magnetism is set up and maintained in the poles of the field-magnet, substantially as set forth.

4. The combination with the field-magnet, of an armature having a core and coil and a resistance-coil connected in series with the armature-coil, a spring-contact to short-circuit the resistance-coil, and a governor acted upon by the magnetism of the armature to break the short-circuit and throw the resistance into the armature-circuit when the magnetism of the armature becomes abnormal, substantially as set forth.

5. In a dynamo, the combination with the field-magnets having segmental faces, of an armature core and coil, a cross-bar and shaft at one end of the pole-pieces, an insulated head, an arbor at the other end of the pole-pieces, a governor adjacent to the pole-pieces of the armature and an insulated spring for supporting the same, and a spring-contact and resistance in a branch circuit, whereby the resistance is thrown into series with the armature-coil when the branch circuit at the spring-contact is broken, substantially as set forth.

Signed by me this 19th day of March, 1898.

JOHN E. FULLER.

Witnesses:

GEO. T. PINCKNEY,

S. T. HAVILAND.