(No Model.)

3 Sheets—Sheet 1.

H. L. TYLER.

DYNAMO ELECTRIC MACHINE.

No. 501,117.

Patented July 11, 1893.

Fig. 1.

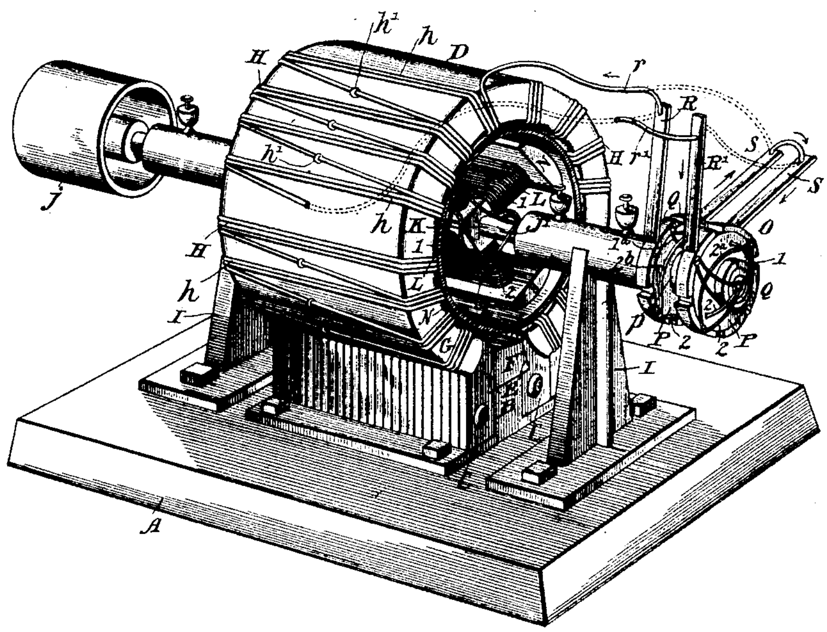
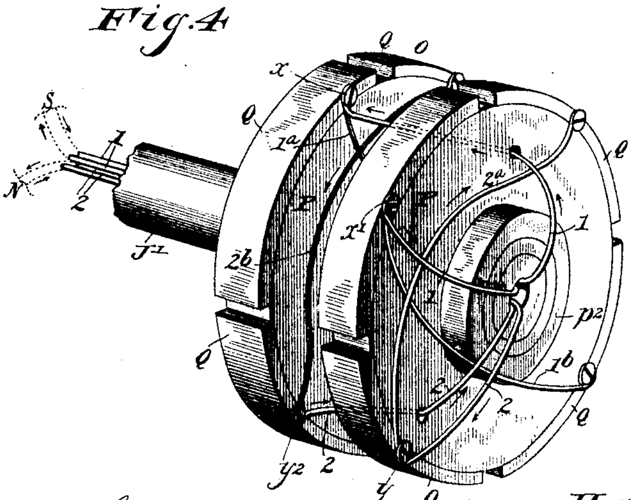


Fig. 4.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

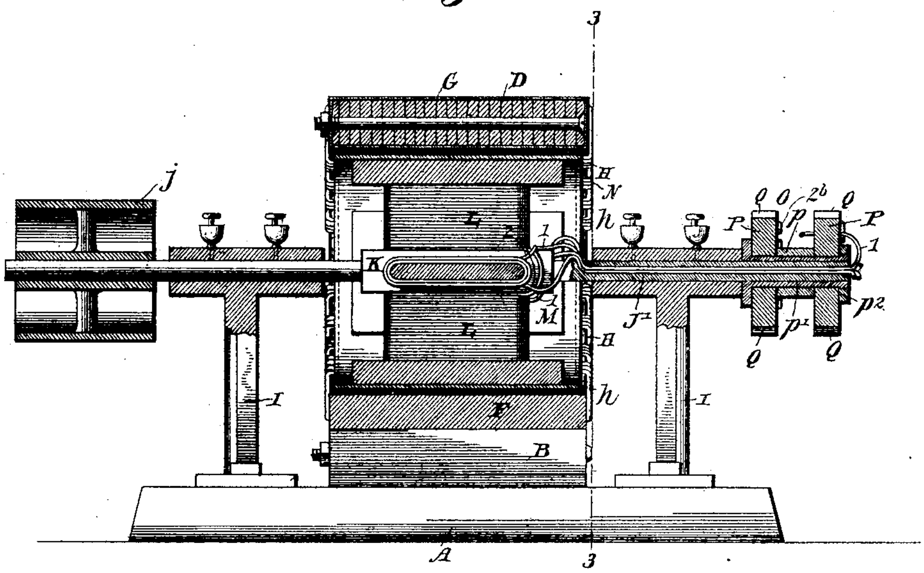
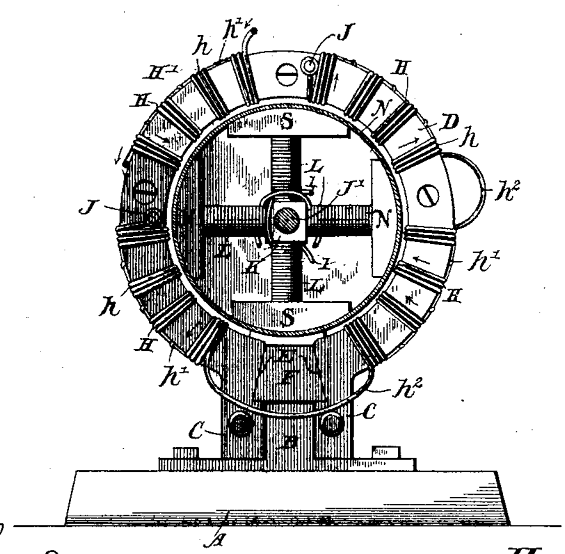


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

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DYNAMO ELECTRIC MACHINE.

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Fig. 5.

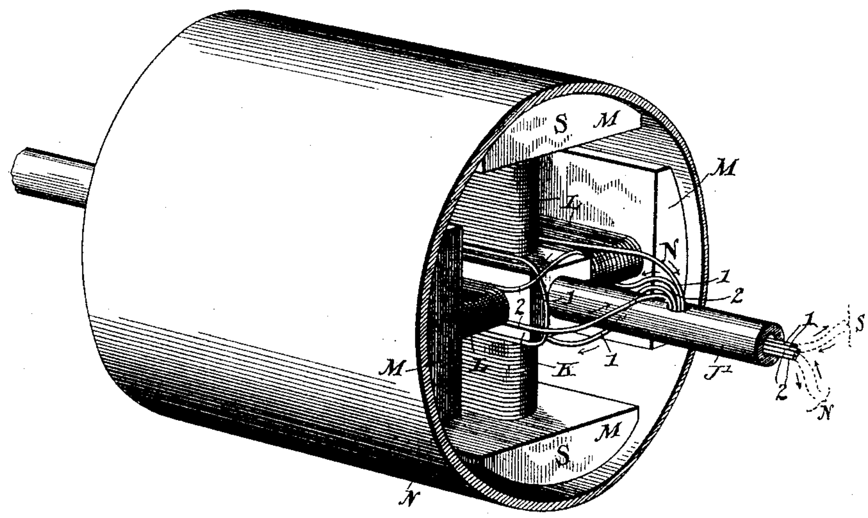
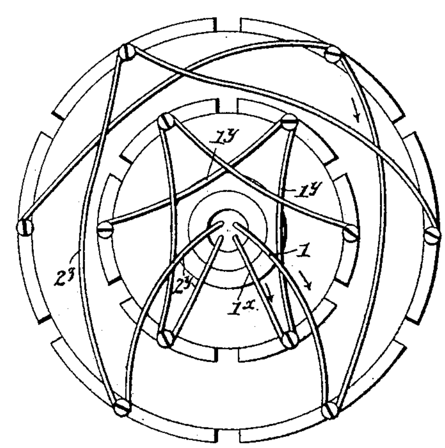


Fig. 6.



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UNITED STATES PATENT OFFICE.

HARRY L. TYLER, OF CORNING, NEW YORK, ASSIGNOR OF TWO-THIRDS TO JOHN MAGEE AND LOUIS P. MILLER, OF SAME PLACE.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 501,117, dated July 11, 1893.

Application filed October 17, 1892. Serial No. 449,074. (No model.)

To all whom it may concern:

Be it known that I, HARRY L. TYLER, a citizen of the United States, residing at Corning, in the county of Steuben and State of New York, have invented a new and useful Dynamo, of which the following is a specification.

This invention relates to electric generators commonly termed dynamos; and it has for its object to construct a machine of this character of comparatively few parts, while at the same time attaining great efficiency.

To this end the invention primarily contemplates a generator, self-exciting in character, and which, while being capable of maintenance at a low cost and with slight attention, at the same time is positively noiseless and sparkless, which is due to the novel connections and features claimed.

With these and many other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a perspective view of an electric generator constructed in accordance with this invention. Fig. 2 is a vertical longitudinal sectional view thereof. Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 2. Fig. 4 is an enlarged detail in perspective of the double pole changer. Fig. 5 is a similar view of the rotating field magnet. Fig. 6 is a diagrammatic view of a modification of the pole changer.

Referring to the accompanying drawings:— A represents a suitable base or frame upon which the various parts of the machine are mounted.

Securely bolted on the frame A, is a T-shaped armature base B, which projects between and receives the lower ends C, of the laminated stationary armature D. The laminated armature D, is of the ring type and is provided at its inner lower ends with the angle grooves E, which receive the beveled circuit closing block F, registering with said grooves and completing the circle of the ring in order to close the magnetic circuit thereof. The said armature D, is incased by the usual protective covering G, and is designed to accommodate the several separate and independent coils H, in each of which currents are induced by the revolving field magnet, which is designed to be inclosed within said stationary armature to secure this result.

It will now be observed that the principle of induction in the present invention, involves a direct reversal of the construction of ordinary dynamos, in which the field magnets are stationary, and the armature and induction coils are revolved, it being found that better results are secured, as well as more convenient and greater number of connections attained, by having the armature and induction coils thereon stationary. With this principle in view, the machine herein described is constructed substantially as set forth.

Each of the induction coils H, may comprise a group of small coils h, connected in series and soldered at their terminals as at h', as will be readily apparent, and as illustrated in Fig. 3 of the drawings three of said groups of coils H, are connected in series with each other by the connecting wires h^2, and the terminals of these several coils end at the binding posts J, which receive the wires of the external circuit, so that each group of coils contributes to the current of the external circuit, but it will of course be readily understood, by those skilled in the art, that each separate coil can maintain a separate and distinct external circuit of its own, which might be of advantage in using the same machine for different purposes at the same time. As illustrated, the remaining group of coils which may be designated as H′, is placed on a closed circuit with the field magnet to be described, in order to excite the same, and also in connection with such closed circuit to avoid sparking.

Arranged at each open end of the armature D, are the bearing standards or brackets I, in which is journaled the rotating field magnet shaft J′, carrying at one end thereof the usual band wheel j, and to which is secured the hub K, from which radiate the field magnets L, which comprise a multipolar field magnet having the usual shaped pole pieces M. The field magnets L, are arranged in pairs of any desired number, preferably corresponding to the coils on the armature, but necessarily corresponding in number to the segments on the pole changing devices to be hereinafter described. The entire field magnet including the exterior faces of the pole pieces, is inclosed in a non-magnetic cylindrical case N, which while not interfering with the lines of force and the necessary induction of currents, at the same time not only avoids the churning of the air and thereby renders the field magnet more easily run and reduces the requisite horse-power, but at the same time prevents the vibrations of the poles, which goes much toward the burring and buzzing of the machine while in operation, and which is a disagreeable feature of dynamos.

Each pair of field magnets L, are connected in series with each other, so that their poles will always be of the same polarity, and therefore as clearly shown in Fig. 5, a separate wire is employed for the winding of each pair of magnets. To clearly illustrate this, reference may be had to the arrows and figures illustrating the direction of the current. The shaft of the field magnet is hollow at one end to accommodate the several wires of the field magnet as illustrated, and now taking the wire 1, the current passes therethrough and around the core of the lowermost magnet in a direction so as to produce a south polarity. The same wire passes to and connects in series the magnet directly opposite, and is wound in an opposite direction there-around, so as to produce the same polarity, which in this set is south, and leaving the upper magnet, the wire 1, passes out through the shaft, as illustrated and to the pole changing devices to be presently described. Now taking the wire 2, we find that it enters in the direction of the arrow, and passes to one of the opposite set of magnets and is wound therearound in a direction so as to produce a magnet of north polarity, and this same wire is connected in series with the magnet directly opposite so as to produce the same polarity, and passes in the direction indicated by the arrows through the hollow shaft. Now by winding the field magnets as described, so as to connect the magnets of each pair in series to have the same polarity, it will be seen that each alternate pair of magnets is of opposite polarity, and by the means to be presently described the polarity of each pair never changes, and furthermore, that the current is in only one pair of coils at the same time, and it will of course be readily understood that to keep up this constant unvarying polarity of the field magnets, it is necessary that as the current alternates in the exciting coil or coils as the case may be, of the armature, means must be provided for directing the current alternately through the opposite field magnet coils.

Fixedly secured upon one end, or at least, the hollow end of the shaft J, is the pole changer O, comprising the parallel duplicate disks P, which disks are spaced apart by the central or intermediate spacing sleeve p, and are held onto the shaft by means of the securing collar p', threaded at its outer end to receive the clamping nut or ring p^2.

Fixedly secured on the periphery of the pole changer disks P, is a series of segmental contact plates Q, said segmental contact plates Q, being directly opposite to each other and in corresponding positions on both disks, and are of course insulated at their ends from the adjacent pairs of plates, said pairs of plates corresponding in number to the number of magnets in the field magnet. The field magnet wires 1 and 2 are connected and cross connected to the segmental plates of the pole changer in the manner now to be described. By reference to Figs. 1, 4 and 5, the connections described will be clear. Taking the wire 1 as it leaves the uppermost magnet coil clearly shown in Fig. 5, the same passes through the hollow shaft J, and through the outer opened end thereof. Thence the wire 1 passes through the outermost pole changer disk and is connected at x, to one of the segmental contact plates of the inner disk. A cross-connecting wire 1^a, leads from the connection x, to the next alternate contact plate on the same disk, but when the pole changer is in the position shown in Fig. 1, the current passes from the contact plate with which the wire 1, is directly connected, to the brush R, contacting therewith. From the brush R, the current passes in the direction indicated by the arrow over the wire r, to the field magnet exciting coil H′, of the stationary armature D, in which coil the current is induced in the direction indicated, so that the same leaves the coil over the wire r', and is connected to a corresponding brush R′, standing parallel with and adjacent to the brush R, so as to contact with the segmental contact plates of the outermost disk corresponding in position to the plate of the innermost disk, and therefore leads the current onto the returning portion of the wire 1. The returning portion of the wire 1, is connected as at x', to the segment plate of the outermost disk and leads therefrom through the hollow shaft as indicated by arrows back to the same pair of field magnets from which it was led. A cross connecting wire 1^b, leads from the connection x' to the next alternate segment plate to correspond to and be a duplicate connection of the innermost disk. Thus it will be seen that one disk of the pole changer takes the current from the armature coil H′, and leads it to one set of field magnets, while the other disk takes the current on its return from the same set or pair of field magnets and thus closes the circuit with their exciting coil. As the contact plates, connected with the two terminals of the wire 1, leave the brushes R and R′, respectively, it will be readily seen that the current from the exciting coils H′, is taken off from the pair of magnets just described, and circuited onto the next pair of magnets through the next adjacent contact plates of the pole changer disks. Assuming the brushes to be in contact with the next pair of contact plates Q, or at least assuming the pole changer to have made a quarter revolution from the position shown in Fig. 1, the circuit is closed through the exciting coil H′ and the wire 2, of the next pair of magnets of the exciting field magnet. With the pole changer in the position just noted, the wire 2, as it leaves the coil of one of the north pole magnets passes through the hollow shaft J and the outer open end thereof, and is connected as at y, to one of the segmental contact plates of the outer disk, and said wire by a cross connecting wire 2^a is connected to the next alternate contact plate on the same disk. In the position assumed, the brush R′, is on the contact plate to which the wire 2^a, leads from the connection y, and the current therefore passes back over the wire, r', to the exciting coil, H′, inasmuch as the current is induced in the exciting coil in an alternate or opposite direction to that described, owing to the change in position of the poles of the field. The current therefore leads from the coil H′ over the wire r to the brush R, and therefore to the contact plate of the innermost disk corresponding to the plate of the outermost disk to which the wire 2^a, is connected. From the plate of the innermost disk to which the current is led from the exciting coil, the said current passes over the cross-connecting wire 2^b, to the next alternate contact plate of the same disk, and is connected thereto as at y^2, from which the main positive portion of the wire 2, leads, through the outermost disk and the hollow shaft to the north pole magnets which it excites. By reason of the cross connecting of the contact plates of the pole changer, it will be seen that at every quarter revolution of the pole changer, the same pair or set of magnets in the field magnet is excited from the exciting coil H′, while the other pair of magnets in the field magnet is not excited, electrically, from the exciting coil H′, inasmuch as such pair of magnets is not in the circuit of said exciting coil, but it will be readily understood by those skilled in the art, that the magnets of this pair are excited or charged from the coils of the other pair through which the current is now passing, inasmuch as the lines of force are drawn in by the charged coils and directed to the other magnets, and it will be further observed by those skilled in the art, that a current of slight degree is induced in the inactive coils, which current is short circuited through the connected brushes S, arranged so as to contact with the next pair of contact plates on the pole changing disks, adjacent to the pair with which the brushes R and R′ contact. Now it will be clearer that the magnets of the field magnet are always of a constant unvarying polarity, so that the field magnet may be said to be constantly charged, although only one pair of magnets is charged directly from the exciting coil H′, at a time. This is an advantageous point in dynamo structure, inasmuch as one pole, which is constant in its polarity, is always followed by a pole of different polarity, to cause the usual alternate induction of currents in the induction coils. This construction provides for a constant closed circuit between the exciting coils and the field magnet, so as to avoid sparking, while at the same time securing a high degree of potential energy from the several coils in which currents are induced.

It will be obvious that the number of the poles of the exciting field magnet may be increased at the option of the manufacturer, but in this event the pole changer must be constructed so as to have a corresponding number of segment plates, which modification is illustrated in diagrammatic Fig. 6, in which the disks are shown in different sizes to fully illustrate the connections.

Fig. 6 shows a pole changer adapted for a six-pole field magnet, in which the magnets are connected three in a series, so that the wires 1^x, from the coils are connected by the cross-connecting wire 1^y, with every alternate contact plate of both segments to secure to same result as that described, while the terminals of the wire 2^y, from the other coil of the field is connected by the cross-connecting wires 2^z, with every alternate contact plate of the two disks of the pole changer, as will be readily understood, in order to alternately pass the current from the exciting coil into the field magnet coils.

From the above it is thought that the construction, operation and many advantages of the herein described generator, will now be apparent.

If so desired good results are secured by connecting the several field magnet coils in series with the charging coil of the armature. To effect this the current is carried from the exciting coil H′, over the wire r' to the brush R, as illustrated in dotted lines in Fig. 1. The current then passes from the innermost pole changer disk to one pair of magnet coils and back to the outermost disk, from which the current is taken through the brush R′, and over a short circuit wire x, to the outermost of the brushes S. The current then returns to the other field magnet coils and back again to the innermost disk, from which it is led through the innermost of the brushes S, back to the exciting coil of the armature. These latter connections also provide means wherein the charging current is taken to the field coils simultaneously, and always in the same direction, while at the same time avoiding any possibility of sparking, as noted for the other connection.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an electric generator, the combination of a **T**-shaped base, a stationary ring arma-

ture having extended lower ends registering with the T-shaped base and provided with inner angle grooves, a beveled circuit closing block registering with said grooves to complete the circle of the ring and close the magnetic circuit thereof, a series of induction coils arranged on the armature, a rotating field magnet within the same, and connections from the field magnet to one or more coils of the armature, substantially as set forth.

2. In a magneto-electric machine, the combination with a stationary armature, having a series of separate and independent induction coils, a rotating multi-polar field magnet revolving within the armature, and a non-magnetic cylindrical case inclosing the entire exterior portion of said field magnet, substantially as set forth.

3. In an electric generator, the combination of a stationary ring armature, a circuit closing block connecting the adjacent ends of the armature to close the magnetic circuit thereof, a series of separate and independent induction coils coiled on the armature, alternate pairs of revolving field magnets moving inside of the armature, a non-magnetic case inclosing the entire set of field magnets inside of the armature, separate field magnet coil wires connecting the magnets of each pair separately in series to produce a constant polarity in each pair, a pole changer connected with the separate coil wires to charge the same separately and alternately, and wires leading from one or more of the induction coils to said pole changers, substantially as set forth.

4. In a magneto electric machine, the stationary armature having induction coils, alternate pairs of revolving field magnets moving within the armature, separate field magnet coil wires connecting the magnets of each pair separately in series to produce a constant polarity in each pair, the polarity of the pairs alternating with each other, a pole changer connected with the separate coil wires to charge the same alternately and separately, wires leading from one or more of the armature coils to said pole changer to feed the coils of the field magnet, and a short circuit connection with said pole changer to short circuit the induced current in the uncharged or unfed field magnet coils, substantially as set forth.

5. In a magneto electric machine, a stationary armature having induction coils, the revolving multi-polar field magnet, separate coil wires connecting pairs of the field magnets in series, a pole changer comprising parallel duplicate disks having separated contact plates, connecting wires connecting the terminals of the field magnet coils with the alternate plates of each disk, the two pairs of brushes, the charging wires leading to one pair of brushes, and a short circuit connection to the other pair, substantially as set forth.

6. In a magneto electric machine, a stationary armature having induction coils, the revolving multi-polar field magnet, separate coil wires connecting pairs of the field magnets in series, a pole changer comprising parallel duplicate disks having corresponding parallel separated contact plates, cross-connecting wires connecting the two terminals of each field magnet wire with alternate contact plates of the separate disks, respectively, two pairs of brushes, the charging wires leading from an armature coil to one pair of brushes and a short circuit connection with the other pair, substantially as set forth.

7. In a magneto electric machine, a stationary armature having induction coils, the revolving muti-polar field magnet, separate coil wires connecting the field magnets in series, the pole changer comprising duplicate disks having separated contact plates alternately connected with each other and the field magnet wire terminals, two pairs of brushes adapted to contact with adjacent pairs of contact plates at the same time, the armatnre coil having its terminals connected to one of the brushes of each pair contacting with the same disk, and a short circuit wire connecting the opposite brushes contacting with the other disk, to throw the several field magnet coils in series with the charging coil, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HARRY L. TYLER.

Witnesses:
J. H. SIGGERS,
H. G. PIERSON.