(No Model.)

2 Sheets—Sheet 1.

P. GRANT.

DYNAMO ELECTRIC MACHINE.

No. 396,867. Patented Jan. 29, 1889.

Fig. 1.

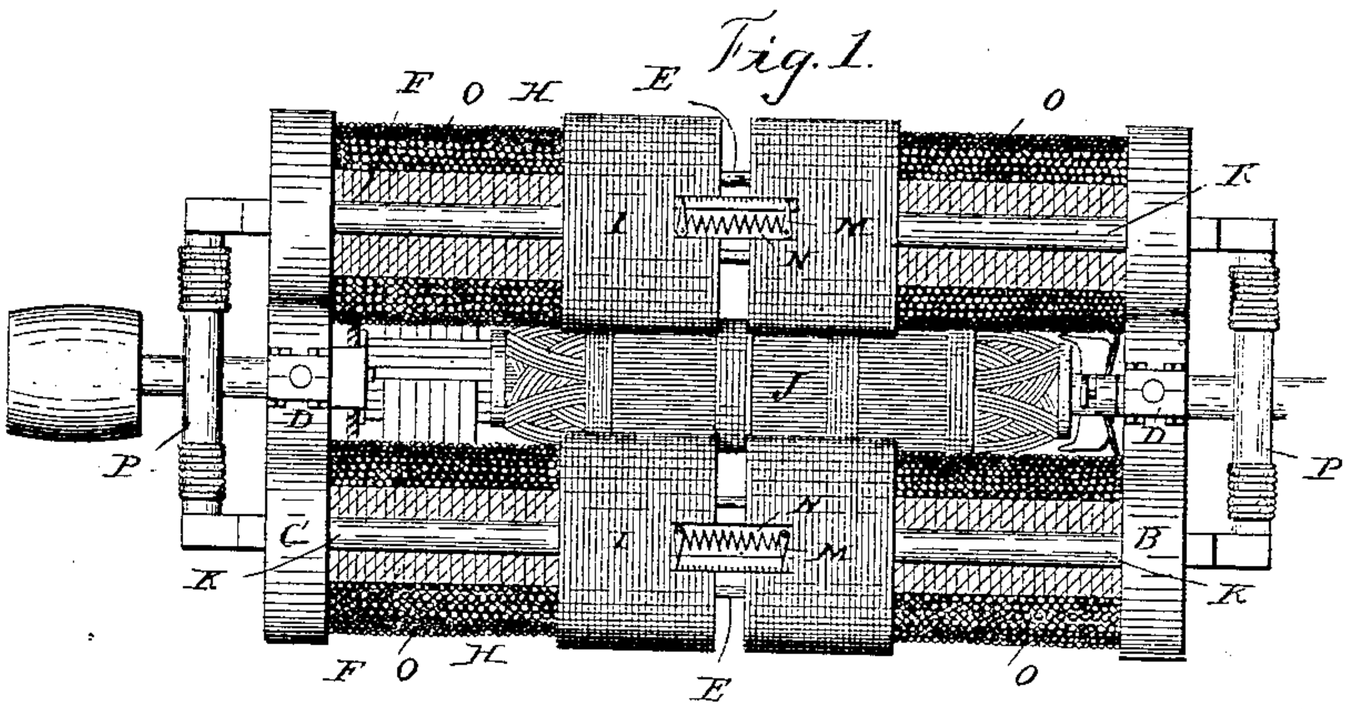
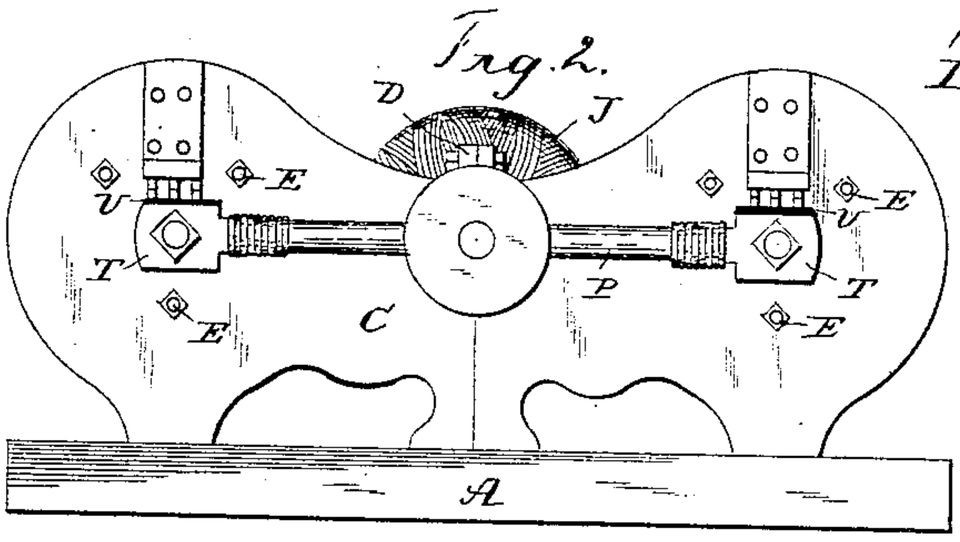


Fig. 2.



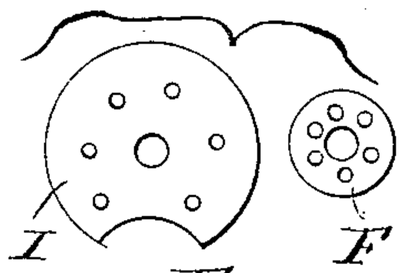


Fig. 10.

Fig. 3.

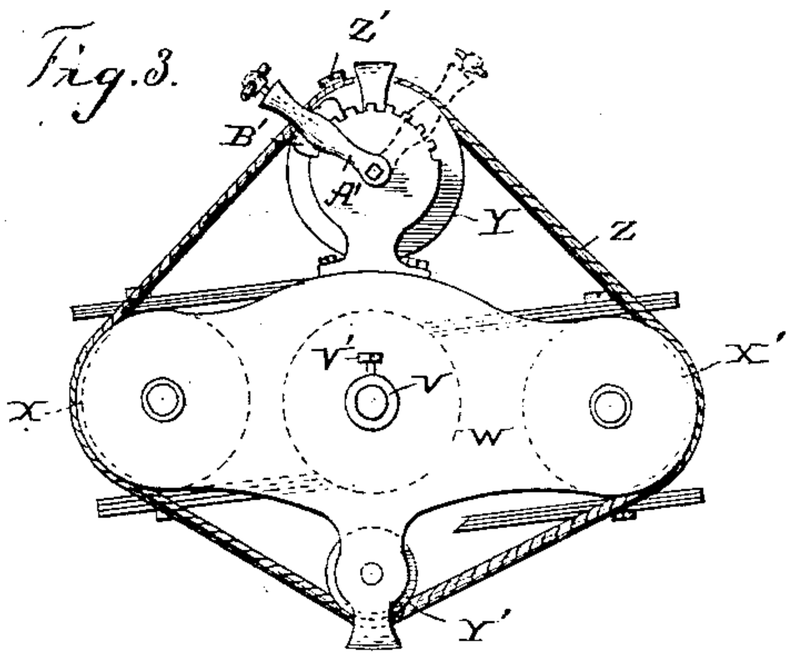
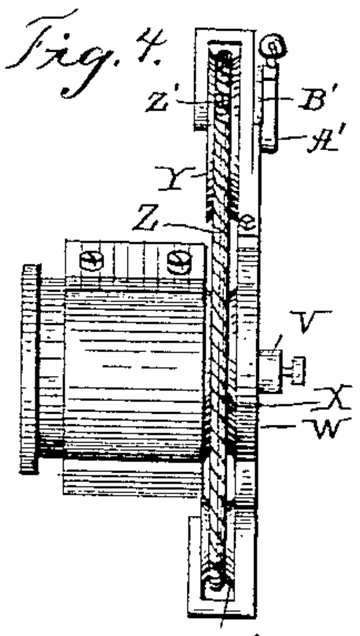


Fig. 4.



Witnesses,
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Inventor,
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By his Attorney
A. H. Denning

(No Model.) 2 Sheets—Sheet 2.

P. GRANT.

DYNAMO ELECTRIC MACHINE.

No. 396,867. Patented Jan. 29, 1889.

Fig. 5.

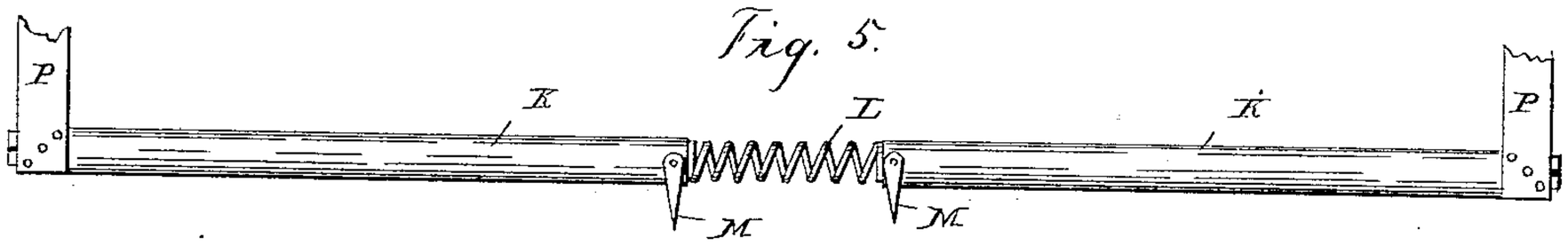


Fig. 6.

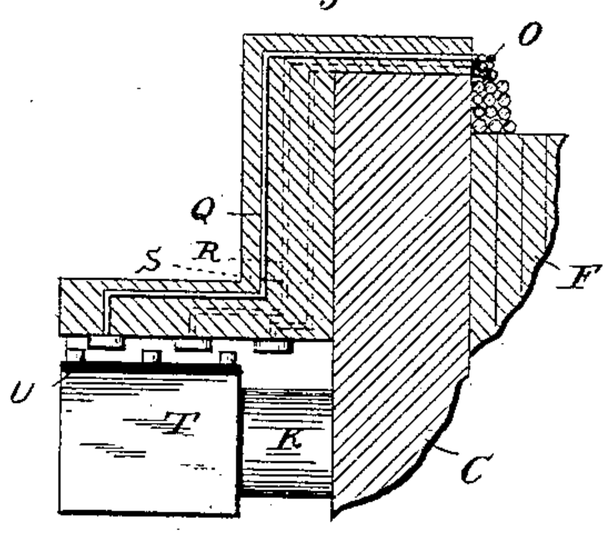


Fig 7.

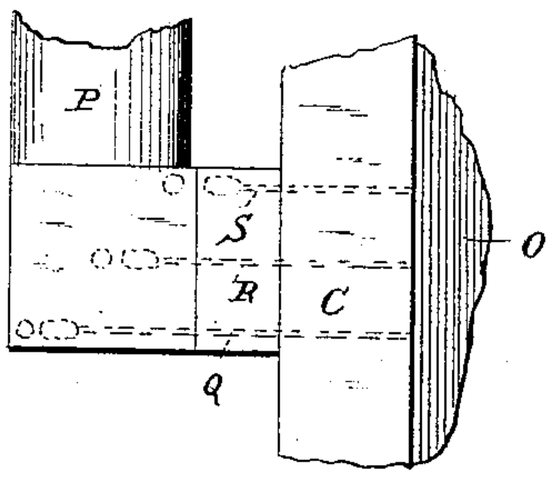


Fig 8.

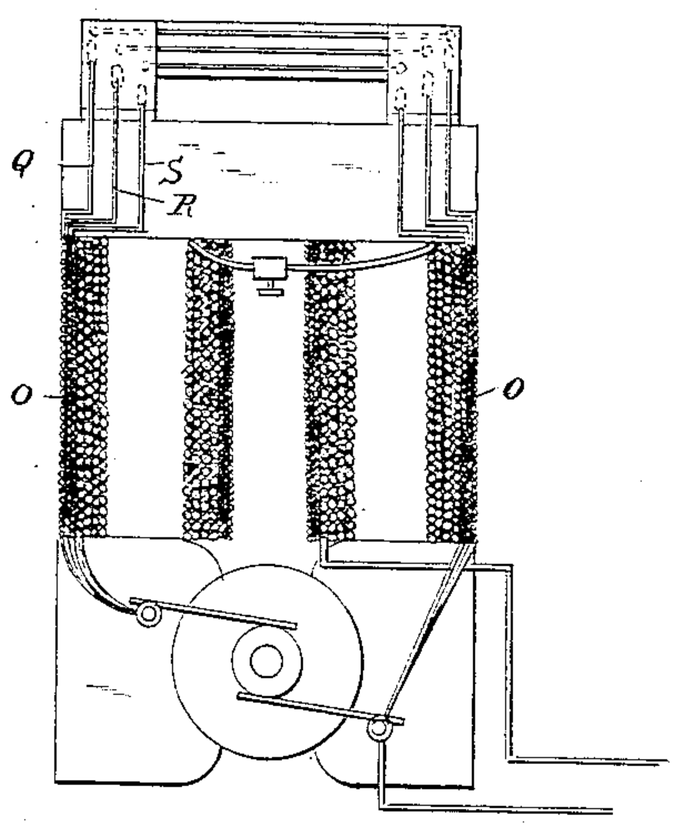
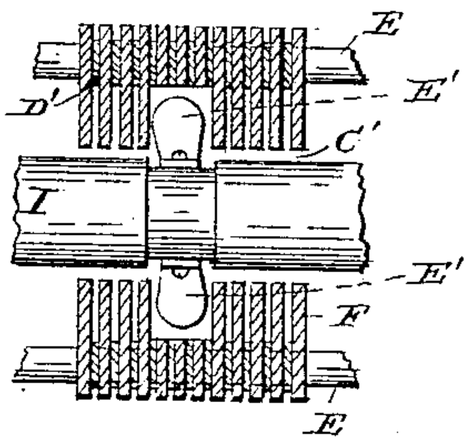


Fig 9.



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Sterling Galt

Inventor,
Perrin Grant
By his Attorney
A. H. Simmons

UNITED STATES PATENT OFFICE.

PERRIN GRANT, OF BALTIMORE, MARYLAND.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 396,867, dated January 29, 1889.

Application filed March 19, 1888. Serial No. 267,683. (No model.)

To all whom it may concern:

Be it known that I, PERRIN GRANT, a subject of the Queen of Great Britain, residing at Baltimore city, Maryland, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is so full, clear, and exact a description as will enable those skilled in the art to which this invention appertains to make and use the same, reference being had to the appended drawings, forming a part hereof.

This invention relates to certain new and useful improvements in dynamo-electric machines; and the object of the invention is to so construct the machine that on an increased current passing through the same a current from one or more shunt-coils will be automatically thrown into circuit or out of circuit accordingly as the strength of the current of the dynamo or motor is increased or decreased.

Another object of my invention is to provide a simple device for reversing the rotation of the armature.

Still another object of my invention is to adapt my automatic regulator to the ordinary form of horseshoe-magnets; and still another object of my invention is to provide means whereby the strength of the current passing may be automatically determined.

In the accompanying drawings, forming a part of this specification, and on which similar letters of reference indicate the same or corresponding features, Figure 1 is a plan view of a dynamo-electric machine constructed in accordance with my invention, showing a portion of the field-magnets in section. Fig. 2 is an end view of my machine. Fig. 3 is a side elevation showing my improved device for reversing the rotation of the armature. Fig. 4 is an end view of the same. Fig. 5 is a detail view showing the construction of the regulator-bars. Fig. 6 is a detail view showing the terminals of the shunt-coils and their contact points or plates. Fig. 7 is another detail view of the same. Fig. 8 is a view illustrating my invention as applied to a horseshoe-magnet. Fig. 9 is a detail sectional view showing the construction of my armature with a fan therein Fig. 10 is a detail view of one of each of the forms of washers or disks which form the core of the field-magnet.

The frame-work supporting my machine consists of a base-plate, A, having the end pieces, B and C, each of which consists of two parts joined together by bolts or otherwise, as may be desired, at D.

Mounted in the end pieces or plates, in a longitudinal plane, are the bolts E, on which a series of washers, F, constituting the body or core of the field-magnets H, is placed. Those washers or disks which form the central portion, I, of the core, however, instead of being circular or disk-shaped, are made of a contour to partially embrace, on the inner sides, the armature J. These disks, constituting the field-magnet cores, I intend to stamp out by dies, so that they shall have a central aperture and several smaller apertures concentric therewith, through which latter rods or bolts pass to hold them together, and I provide the yoke or end pieces with an aperture corresponding to the central aperture in the disks, for the purpose of introducing the regulators rods or bars K. These regulator-bars, as more clearly shown in Fig. 5, are united together by a spiral or other spring, L, and mounted on their adjacent inner ends are index-fingers or pointers M.

The central portion, I, of the field-magnets is slotted, as seen at N, and extending up through this slot is the rod bearing the pointer M.

The field-magnets are exteriorly wound with three shunt-coils, O, and the outer ends of the regulator-bars are connected together by cross-bars P, and, as more clearly seen in Fig. 6, the wires Q R S, constituting the shunt-coils, descend through insulating material S′ upon the yoke, and pass down to the contact points or plates on its inner face. The end of the regulator-rod terminates in an enlarged head, T, having a rubber face, U, provided with contact-points oppositely disposed to those upon the yoke, and to these latter points or plates are connected the shunt-coils, which continue on over the connecting or cross bars to the other field-magnet, and so on.

The operation of this invention is as follows: As the current of the field-magnets becomes stronger, it tends to draw within the magnets

the soft-iron regulator-bars; but as said bars are drawn in, the contact-points upon it come successively in contact with the opposite contact-points, which are the terminals of the shunt-coils. The circuit through these coils is then established, and the said coils receive the additional strength of the current. Being wound in a direction the reverse of that of the main field-magnet coil, they will obviously act as demagnetizers and prevent the velocity of the armature being increased by any increase in the strength of the current, inasmuch as they entirely prevent such increase of strength from reaching the armature. When the strength of the current has decreased to the normal, the regulator-bars are released, and are pressed outwardly to their normal position by the springs L, thus throwing the shunt-coils out of the circuit, and providing against the same having any effect upon the speed of the armature when the strength of the current is normal.

The yoke at that end where the commutator is situated is provided with a boss, V, on which is mounted and secured by a set-screw, V′, a plate, W, and on this latter are mounted the grooved pulleys X X′ and Y Y′, over which passes a cord or rope, Z, the same being securely fastened to the pulley Y by a set-screw, Z′, and mounted upon the pulleys X X′ are the usual contact-brushes, which impinge against the commutator. The shaft upon which the pulley Y is mounted is slightly extended, and thereon is mounted a lever, A′, having a bolt, B′, which fits into the notches in the segment-rack formed on the upper portion of the plate in which the shaft has its bearings. When the lever A′ is in the position shown in Fig. 3, the current takes the following course: Entering the armature from the lower left-hand brush, and passing around the conductor surrounding the armature, it next enters the right-hand brush at the top of the commutator, and thence travels back to the dynamo. When the lever is turned to the opposite side, (shown in dotted lines,) the direction of current is reversed. The said current, then entering the armature upon its upper side through the left-hand brush, passes around the conductors surrounding the armature and travels back to the dynamo by the lower right-hand brush. It will thus be quite obvious that the position of the lever will delineate the direction of the current, and that such direction is determined by the position the brushes occupy. The levers being provided with notches enables the brushes to be more accurately and properly adjusted to the non-sparking position.

In Fig. 9 I have illustrated the central portion of my armature as cut away and a fan located therein. It is found in practice that some machines have had their armatures burned out, owing to the great heat, and for that reason I have shown the armature herein as provided with a fan in order to keep up a constant and free circulation of air and prevent said armature from heating to such a degree as to injure it. Apertures C′ are provided in the armatures, through which the air can pass. Instead, also, of placing between each metallic disk a layer of non-conducting material covering the entire surface of the disk, I sometimes, as shown in Fig. 9, place only a small disk, D′, of insulating material over the connecting-bolt, so that the metallic disks are held apart from each other by the small insulating washer or disk D′, and a free circulation of air is permitted over almost the entire surface of the said metallic disks.

In Fig. 8 I show the ordinary form of horse-shoe-magnet provided with my improved regulator-rod, the construction thereof being similar to that already described, save that I use only one bar for each side and that I dispense with the spring which, when two bars are used, connects together their adjacent ends. As seen in Fig. 9, I also provide the main shaft on which the armature is wound with fans E′ E′, so as to create a still further draft and assist in keeping the armature from becoming heated.

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

1. In a dynamo-electric machine, the combination, with the frame thereof, the armature and the armature-shaft supported therein, the commutator, and the contact-brushes, of the field-magnets whose cores are composed of a series of disks and an aperture extending throughout the length of said magnets.

2. In a dynamo-electric machine, the combination, with the frame thereof, the armature and the armature-shaft supported therein, the commutator, and the contact-brushes, and the field-magnets having an aperture extending therethrough, of the regulator located in said aperture and constructed to automatically regulate the speed of the armature.

3. In a dynamo-electric machine, the combination, with the frame thereof, the armature and the armature-shaft supported therein, the commutator, and the contact-brushes, and the field-magnets having an aperture extending therethrough, of the regulator located in said aperture and shunt-coils connected therewith, said regulator being so constructed that when the strength of the current of the field-magnets is increased one or more shunt-coils are automatically put into circuit and the speed of the armature regulated.

4. In a dynamo-electric machine, the combination, with the frame thereof, the armature and the armature-shaft, the commutator, and contact-brushes, and the field-magnets having an aperture extending therethrough and shunt-coils wound thereon, of the regulators located in said apertures and having contact-points which correspond with the termination of the shunt-coils, whereby said shunt-coils are thrown into or out of circuit

accordingly as the strength of the field-magnets is increased or decreased.

5. The combination, with a magnet having an aperture therein and shunt-coils wound thereon, of a regulator-bar located in the aperture and having contact-points to correspond with the terminals of the shunt-coils, whereby said shunt-coils are thrown into or out of circuit accordingly as the strength of the magnet is increased or decreased.

6. The combination, with a magnet having an aperture therein and shunt-coils wound thereon, and a scale located on its surface, of a regulator-bar having a pointer located in the aperture and provided with contact-points to correspond with the terminals of the shunt-coils, whereby said shunt-coils are thrown into or out of circuit accordingly as the strength of the magnet is increased or decreased, and the pointer indicates the strength of the current upon the scale.

7. The combination, with the contact-brushes united by a cord, of a segment-rack and bar or lever engaging in the same, whereby upon movement of the lever the position of the brushes is regulated.

8. In a dynamo-electric machine, the combination, with an armature-shaft and an armature mounted thereon whose core is composed of disks kept apart from each other by smaller intervening insulating-disks, said armature being partially hollowed out in its center, of fan-blades mounted on the shaft within the hollowed-out portion, whereby a current of air is created within the armature.

In testimony whereof I affix my signature in the presence of two witnesses.

PERRIN GRANT.

Witnesses:
JNO. T. MADDOX,
WM. J. BRUNS.