(No Model.) 3 Sheets—Sheet 1.

J. WENSTRÖM.

DYNAMO ELECTRIC MACHINE.

No. 381,451. Patented Apr. 17, 1888.

Fig: 2.

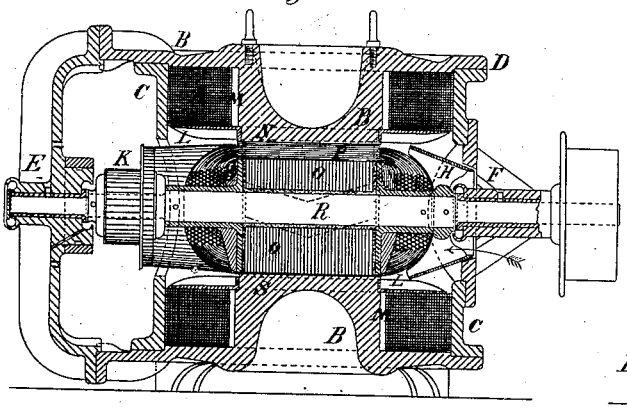


Fig: 1.

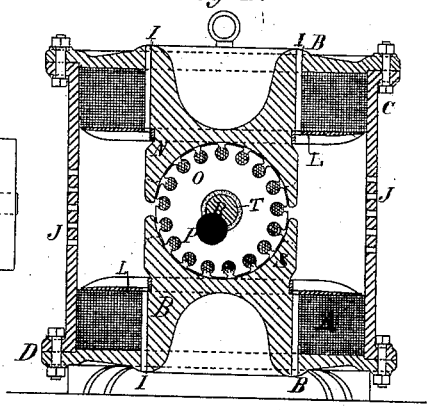


Fig: 3.

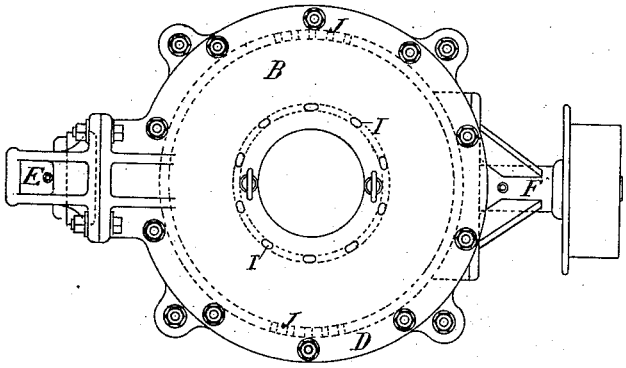


Fig: 8.

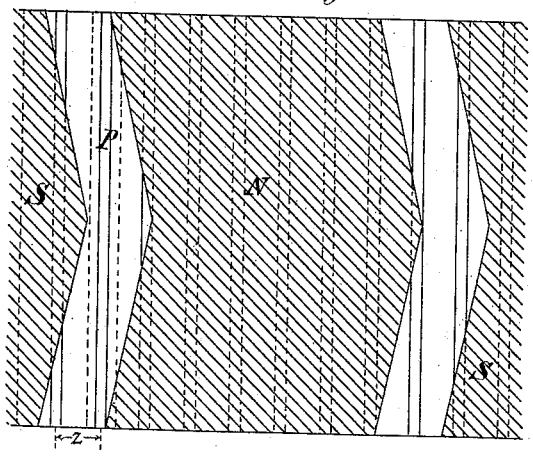
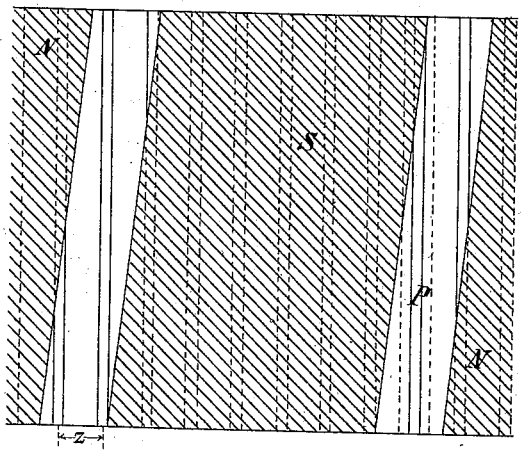


Fig: 9.



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DYNAMO ELECTRIC MACHINE.

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Fig: 5.

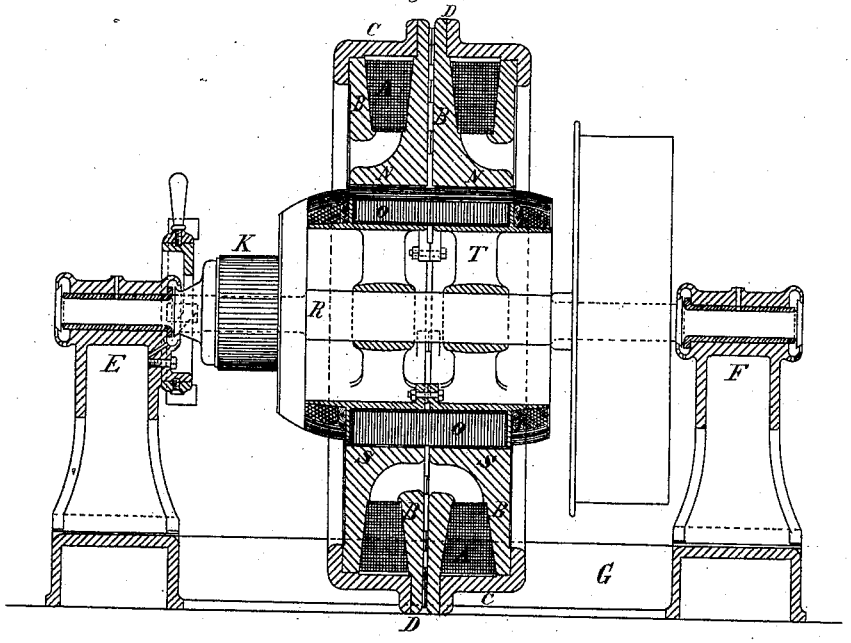
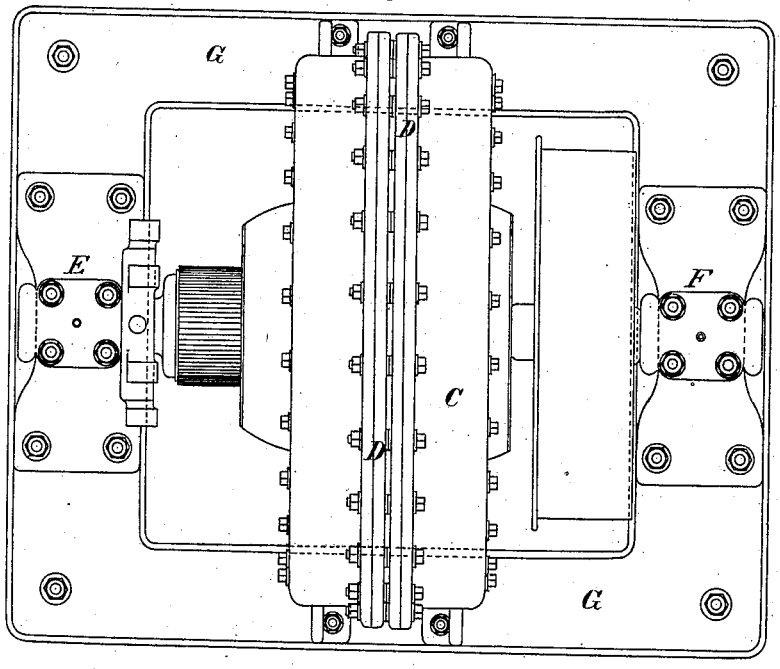


Fig: 6.



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3 Sheets—Sheet 3.

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DYNAMO ELECTRIC MACHINE.

No. 381,451. Patented Apr. 17, 1888.

Fig. 4.

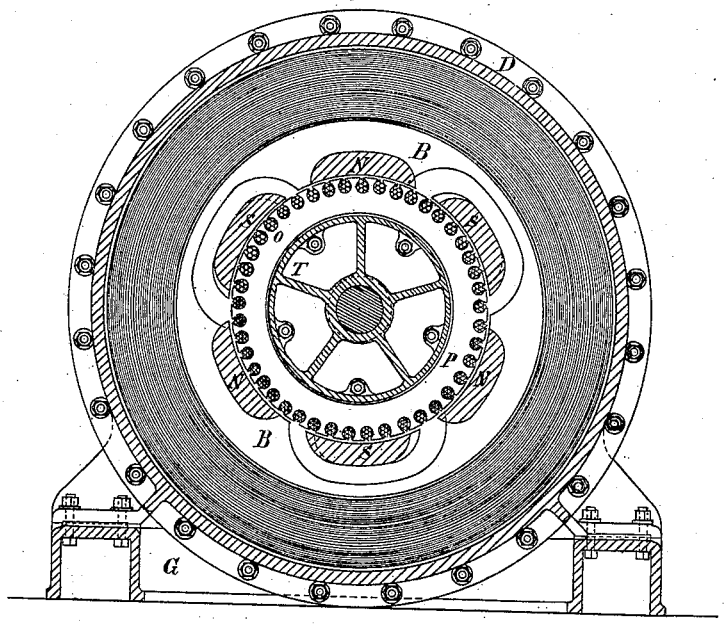
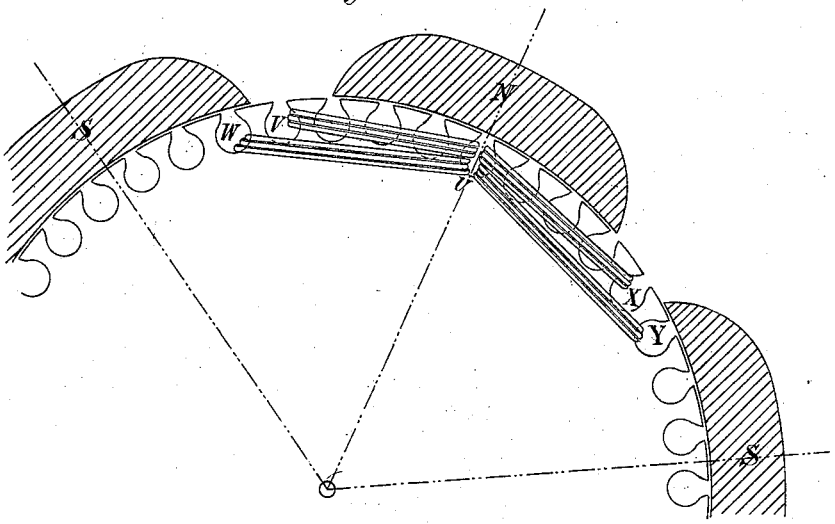


Fig. 7.



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UNITED STATES PATENT OFFICE.

JONAS WENSTRÖM, OF ÖREBRO, SWEDEN.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 381,451, dated April 17, 1888.

Application filed February 10, 1888. Serial No. 191,432. (No model.)

To all whom it may concern:

Be it known that I, JONAS WENSTRÖM, a subject of the King of Sweden, residing at Örebro, Sweden, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is a description.

The invention as herein described and shown in the drawings is applied to two types or styles of dynamos, differing only in the arrangement and shape of their corresponding parts, but both designed on the same principles and with the same purposes—viz., simplicity and cheapness of construction, stability of machinery in running, comparatively low speed, protection against accidents, economy in magnetism, and diminution of self-induction.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a cross-sectional elevation, Fig. 2 a longitudinal sectional elevation, and Fig. 3 a plan view, of the type or style most suitable for dynamos of limited power. Figs. 4 and 5 are respectively a cross-section and longitudinal section, and Fig. 6 a plan view, of the type or style most suitable for machines of larger power. Fig. 7 is a cross-section of part of the armature and poles. Figs. 8 and 9 are explanatory views showing the surfaces of the pole-pieces and the armature displayed in one plane.

The magnets are built up of annular coils, A, of insulated conductors, surrounded partly by the iron disks B, bearing the pole-pieces S N, partly by the iron cylinders C. In all places of this magnetic circuit of iron the sectional area perpendicularly to the magnetic lines of force is of equal size, sufficient to conduct the whole excited magnetism. Besides, the joints D are arranged in such places that the touching areas of the flanges may be extraordinarily large, so as to effectively diminish the resistance against the magnetic conduction created by such a disturbance in the continuity of the iron. By these special features of my magnets, in connection with those of my armature, the greatest part of the excited magnetism is utilized within the dynamo, while practically nothing is to be found outside of it, which permits of reducing the speed of the armature, and, besides, the machine gets a strong protecting housing of simple form, permitting of close running with safety, and of cheap construction.

In the style shown in Figs. 1, 2, and 3 the bearings E and F are fixed on the cylinder C; but in the other style, Figs. 4, 5, and 6, the cylinders C are arranged concentrically with the shaft R and bolted to the bottom plate, G, on which also the bearings E F are secured.

In the former style, where natural ventilation is not sufficient, additional ventilation is provided for by placing inside of the bearing F a fan, H, which sucks in the air through the vent-holes in the bearing-piece F (see arrow in Fig. 2) and forces it out through the vent-holes I in the disks B and the holes J in the cylinder C, and through the bearing-piece E, after passing through the coil-grooves in the periphery of the armature and round the commutator K. In the other type such means are not needed, as the natural ventilation is strong enough through the hollow armature and partly-separated magnet-disks. This latter style is shown with three pairs of pole-pieces; but it may be adapted for any convenient number of them.

The conductor A is coiled up in its place between the disks B by fitting them to an auxiliary spindle, though in the style Figs. 1, 2, and 3 the coils are on one side supported by brass shields L and bedded on wooden pieces M, in order to form the ventilating-space referred to.

The armature-core is laid together of thin sheet-iron disks O, stamped out, as shown in Figs. 1 and 4, with a series of round notches at the circumference, by which as many split cylindrical cavities P are formed in the core, in which grooves the coils are wound through the narrow slits in the surface. The disks are firmly held together and supported on the shaft R by the centers T.

The projecting parts of the iron core left between the grooves are made large enough to convey all the utilized magnetism. For this reason the coils are not required to be placed at equal distance from the surface of the armatures, but may at pleasure fill the grooves. These iron projections serve, also, to screen separate coils from inductive influence of coils

in neighboring grooves, which provision, together with the peculiar manner of arranging the coils, effectively diminishes the self-induction of the armature and its liability of sparking at the brushes.

The plan of winding the coils in the armature is shown in Fig. 7, which is common to both types or styles of the machine shown. Of the two pairs of coils that are wound in a certain groove, U, each pair is wound in separate but neighboring grooves V W and X Y on each side of the first groove, U. It is then evident that the four coils in the same groove are magnetically independent of each other, and that only one of them will change the current in the same moment.

In Figs. 8 and 9, also common to both styles, it is shown how the pole-pieces N S are shaped in relation to the armature-grooves P in order to avoid fluctuations in the magnetization of the armature or in the induction of the coils. This is effected by giving the pole-pieces everywhere in the direction of the motion of the armature a length equal to a whole multiple of the pitch *z* of the grooves P in the armature, and by cutting the pole-pieces oblique, either as in Fig. 8 or in Fig. 9; but in both cases the obliquity shall be equal to one pitch *z* of the grooves of the armature and executed in such a way as not to oppose the above-stated demand of a certain length of the pole-pieces. By this provision it is evident that the pole-pieces always cover an equal iron surface of the armature, and that the coils in the armature are under an evenly increasing or decreasing influence of the magnetism, and that hereby all abrupt effects are avoided.

By the peculiar form of the projections between the grooves in the iron core overlapping the coils and presenting to the magnet-poles an extraordinarily large iron surface close to them, it is obvious that the coils are effectively protected against damage, and that the magnetism is easily conveyed to the armature from the poles.

Having thus 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 magnetizing-coils located in annular spaces between the iron cores and iron casing-cylinders, of the iron cases provided with air-circulating apertures leading from the interior through to the outer periphery of the machine.

2. In a dynamo electric machine, in combination with the magnetizing-coils located in annular spaces between the cores and casing, the spacing-pieces next to the cores for the purpose of providing air-circulating spaces next to the cores.

3. In a dynamo-electric machine, the combination of a fan, H, located within one side of the casing, and the casing and cores provided with ventilating air-discharge apertures, substantially as herein set forth.

4. In a dynamo-electric machine, in combination with an armature-core having a series of longitudinal holes or grooves near the periphery thereof, armature-coils arranged in the said holes or grooves by series, having two pairs of coils in one groove, the returning parts of each pair of coils being inserted in other separate grooves, substantially as herein specified.

5. In a dynamo-electric machine, the combination, with an armature having its coils arranged in peripheral grooves in and lengthwise of its core, of the pole-pieces of the magnet made oblique, the degree of obliquity in the direction of the motion of the armature being equal to one pitch of the grooves of the armature, substantially as herein set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JONAS WENSTRÖM.

Witnesses:
H. GÓRANSON,
W. HALÉN.