(No Model.) 2 Sheets—Sheet 1.

J. WENSTRÖM.

DYNAMO ELECTRIC MACHINE.

No. 426,576. Patented Apr. 29, 1890.

Fig. 1.

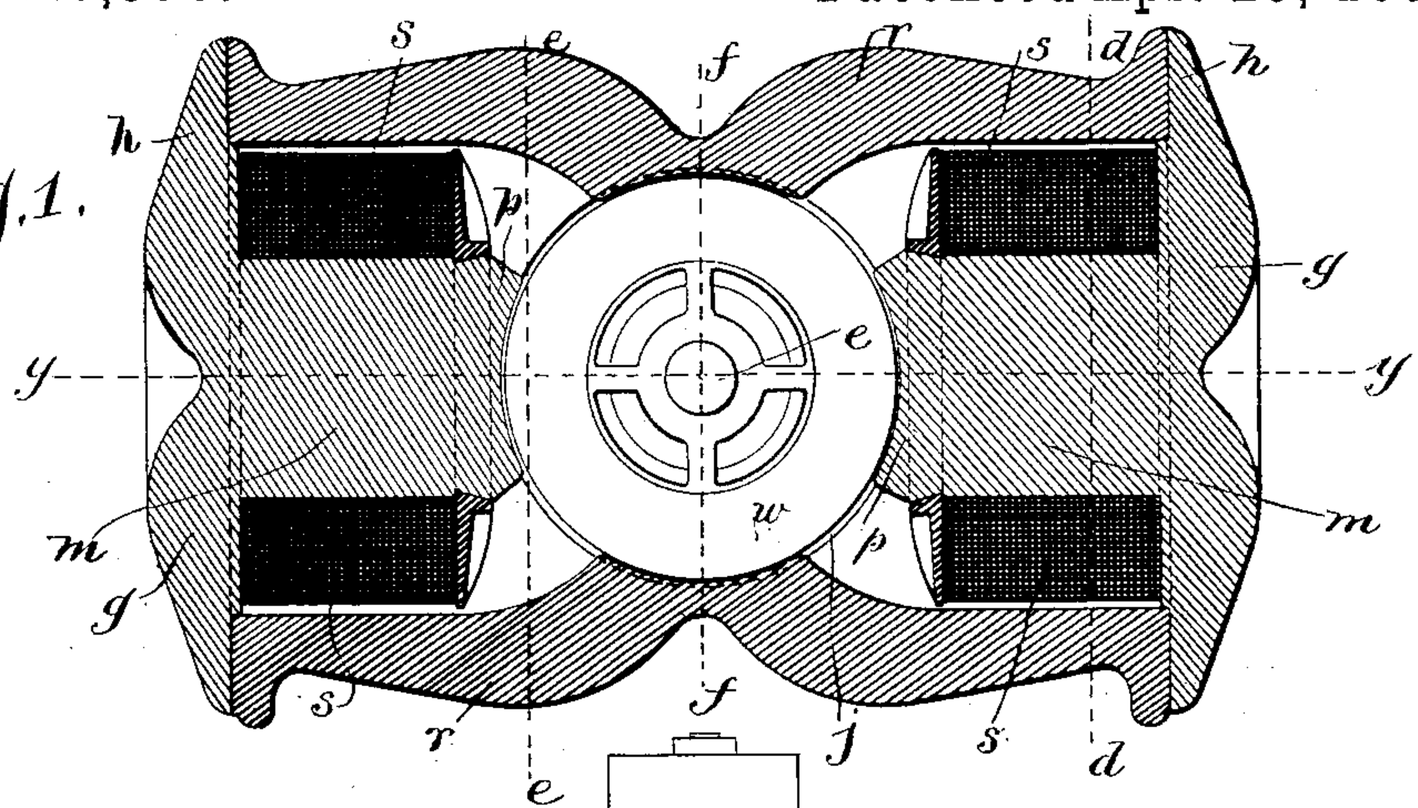


Fig. 2.

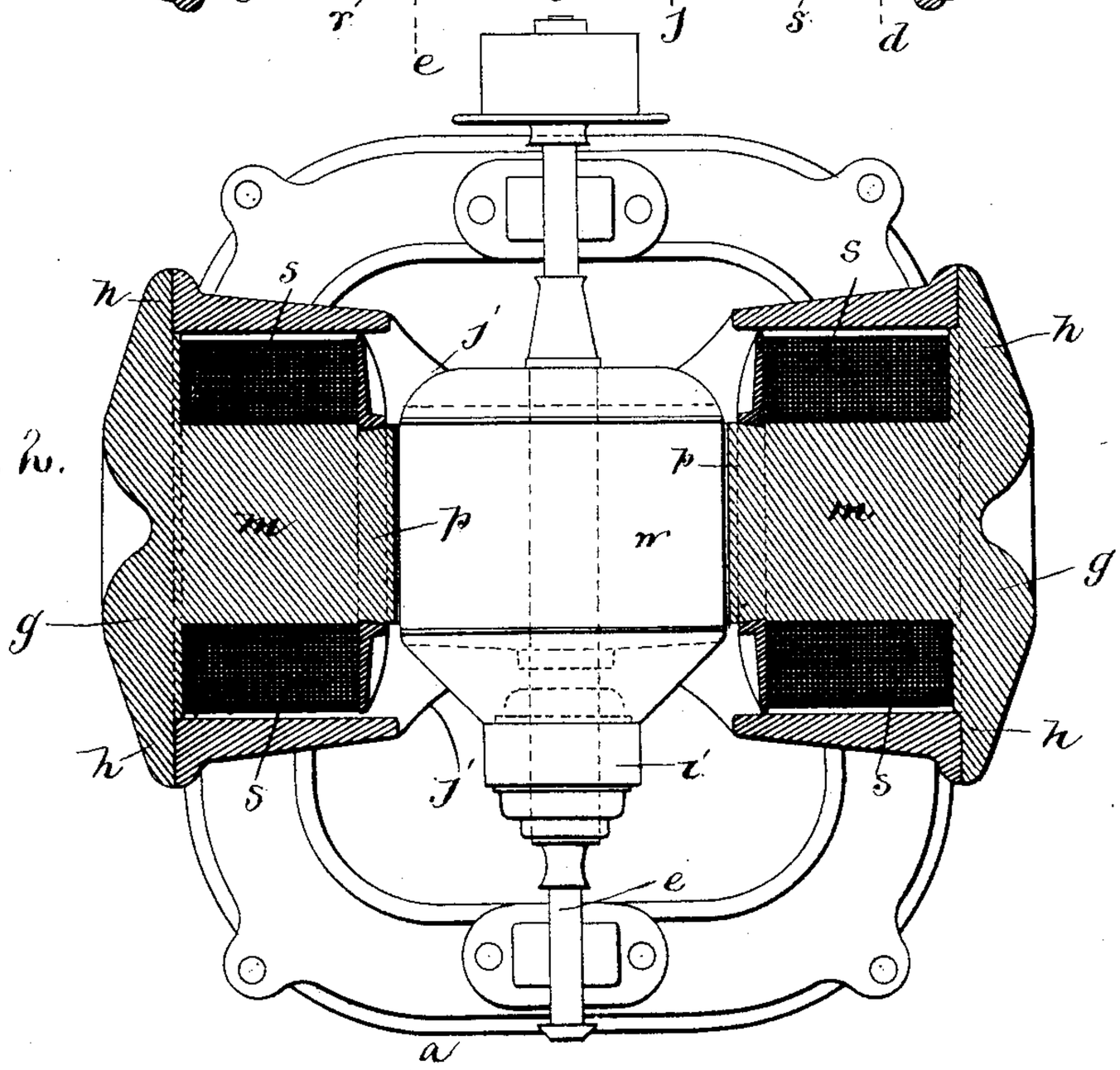
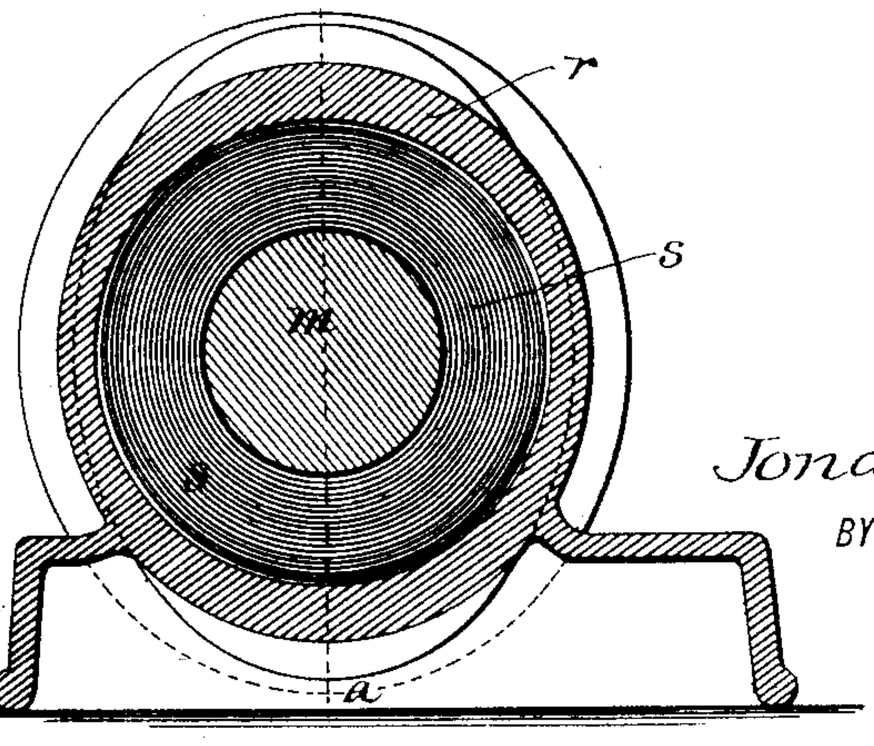


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

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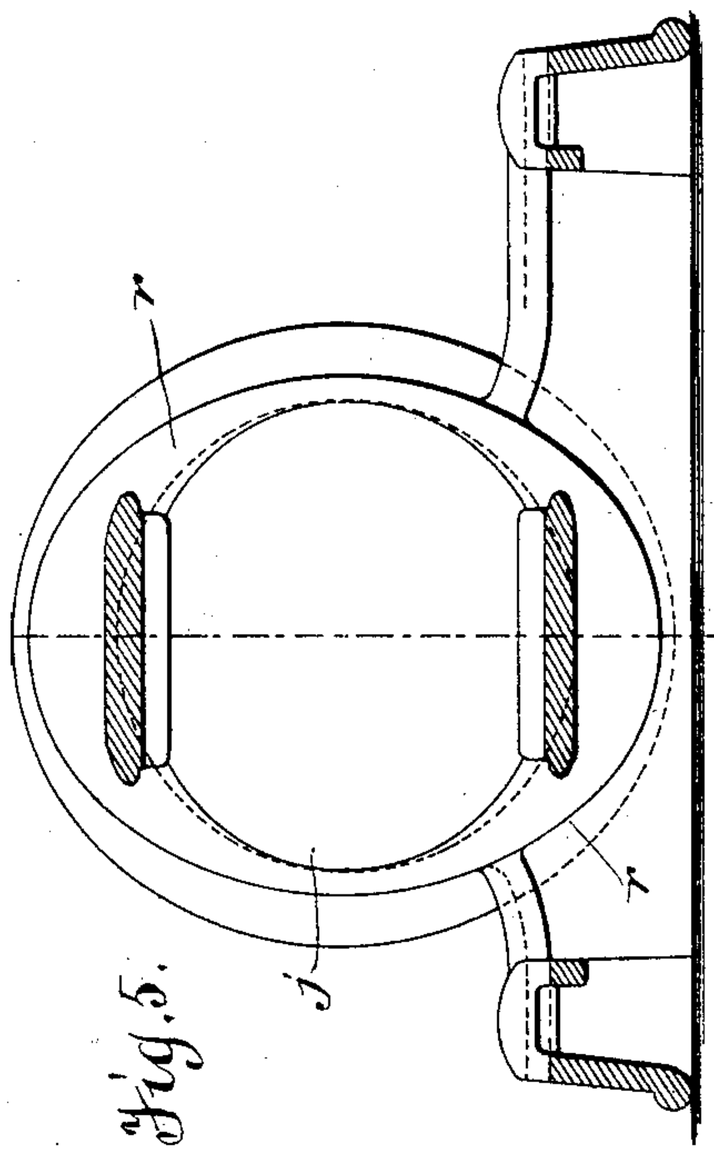

Fig. 5.

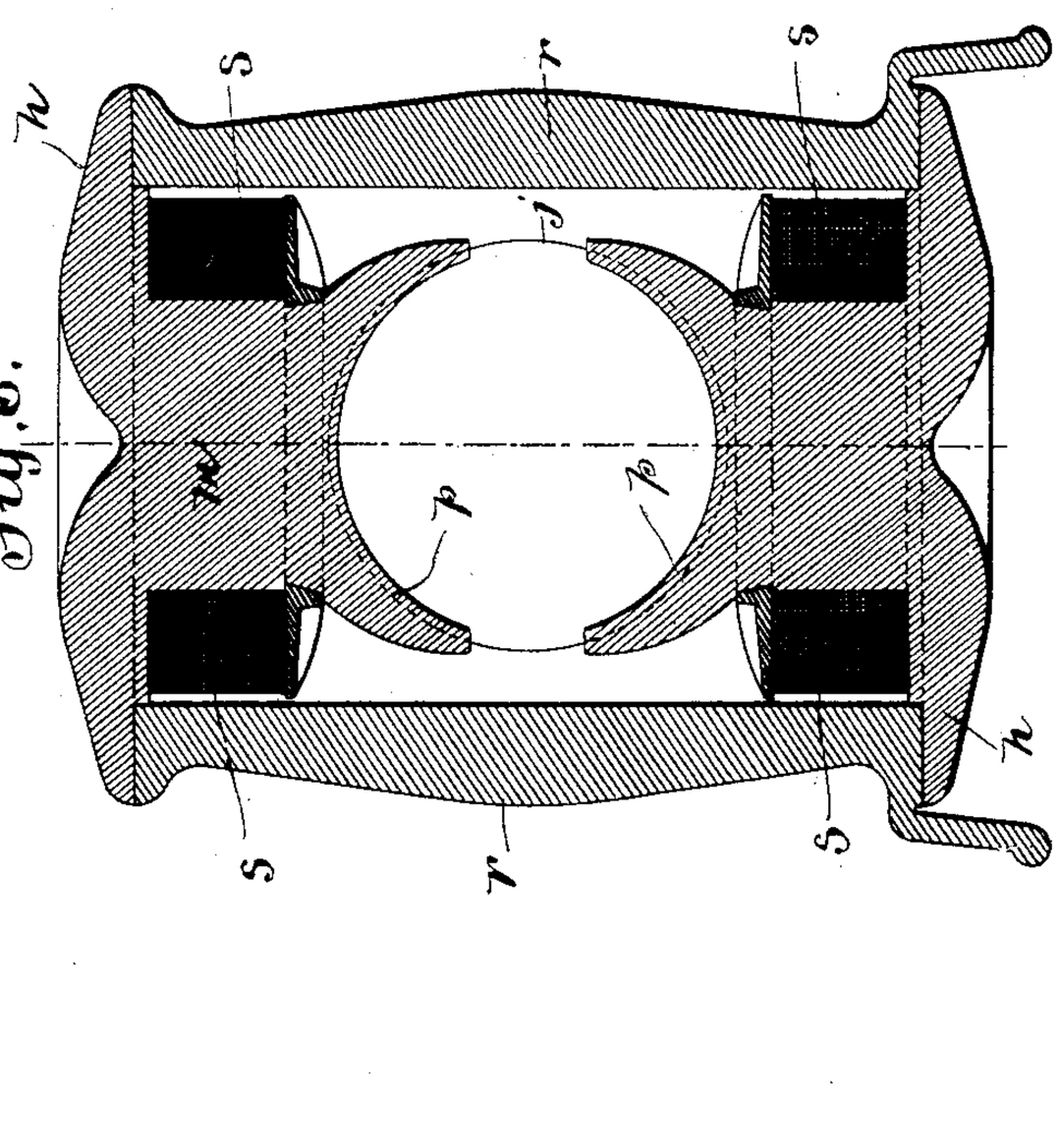

Fig. 6.

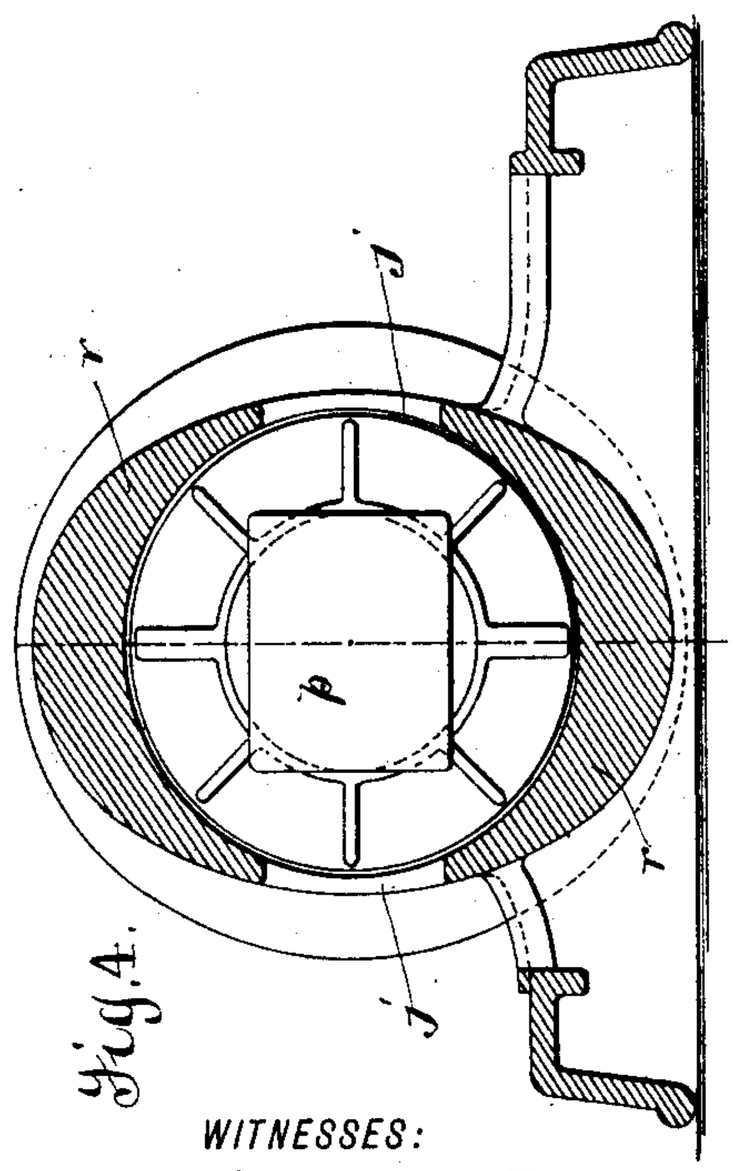

Fig. 4.

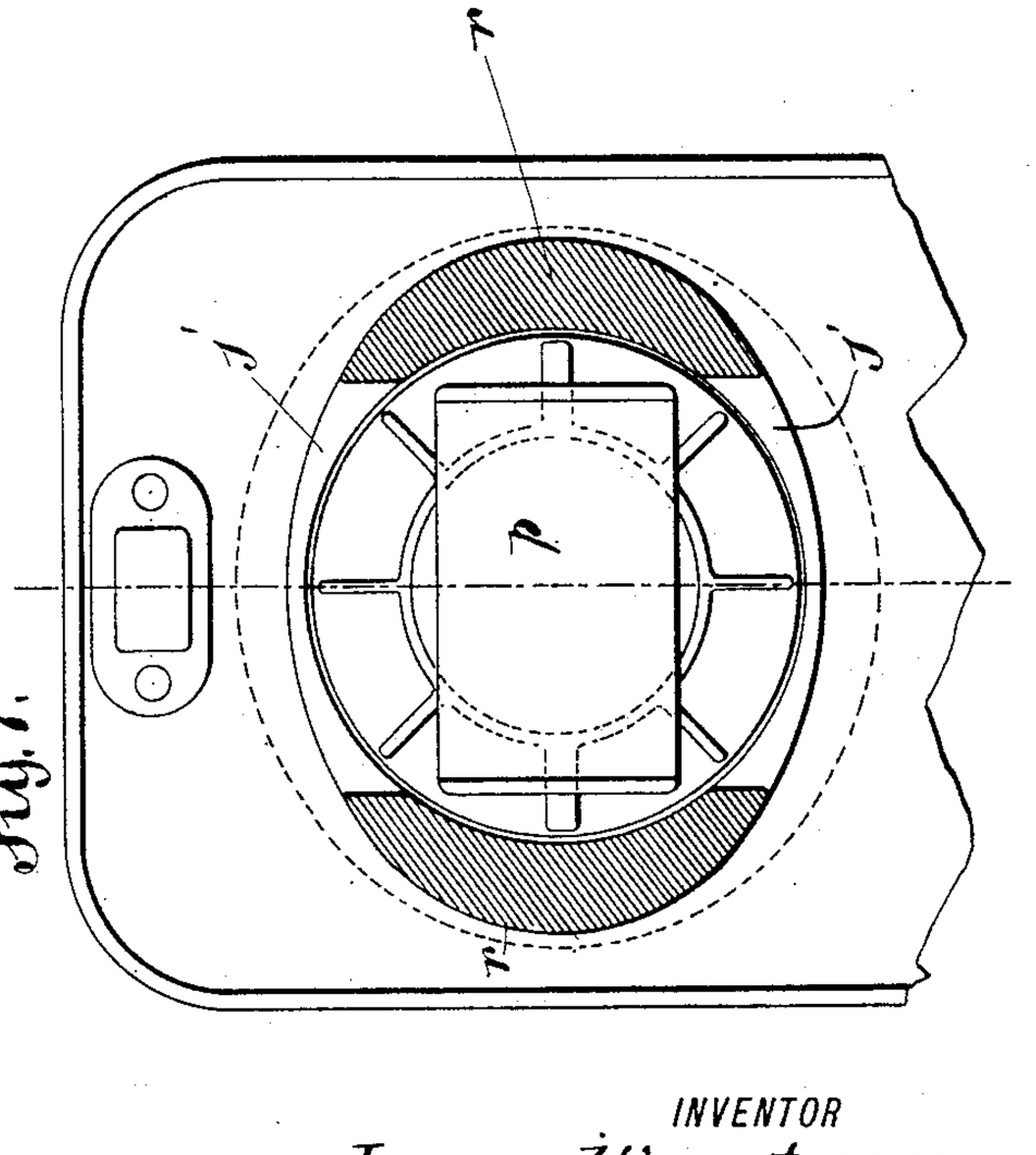

Fig. 7.

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JONAS WENSTRÖM, OF OREBRO, SWEDEN.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 426,576, dated April 29, 1890.

Application filed August 31, 1889. Serial No. 322,556. (No model.)

To all whom it may concern:

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

This my invention relates especially to improvements in dynamo-electric machines having iron-clad field-magnets.

The invention relates to the field-magnets; and it consists in provisions by which the path of the magnetic lines of force is made short and of ample size without sacrificing the space available for the conductors.

Referring to the drawings, Figures 1 to 5 relate to a dynamo with four poles, and Figs. 6 and 7 to a two-polar dynamo, in the latter case only those sections being shown in which the deviations from the four-polar type will appear. Fig. 1 is a longitudinal section on a plane *a a* through the axis of the field-magnet and vertical to the armature-shaft. Fig. 2 is a longitudinal section on a plane *y y* through the axis of the field-magnet and the armature-shaft. Figs. 3, 4, and 5 are cross-sections, Fig. 3 on a plane *d d* close to the back yoke. Fig. 4 on a plane *e e* close to the magnet-poles, and Fig. 5 on a plane *f f* through the armature-shaft. Figs. 6 and 7 are sections similar to Figs. 1 and 5, respectively, but referring to two polar dymanos, as said before. The armature is here left out.

In the field-magnets the inner cores *m* are cylindrical and they have pole-pieces *p* on the end pointing toward each other. Their other ends are cast in one piece with the back yokes *g*, which on their other rim are provided with broad flanges *h* to insure a tight and large contact at the joint with the surrounding casing *r*. The magnetizing-coils *s* and the inside surface of the casing *r* also are cylindrical. Accordingly all these parts, which must be fitted together exactly, may be adjusted in the lathe, the simplest and most exact method known. Besides, the winding of the coils thus is made very easy and uniform when of cylindrical form.

In the casing the cylindrical form is not retained in the outside surface, because it is not so convenient as this form here specified for the conveying of the magnetic lines through the casing. As the armature *w*, with the shaft *e e* and commutator *i*, must be inserted through this casing, corresponding large openings *j* must be made through it, cutting away a considerable part of the conduits for the magnetic lines through the casing and forcing them through the remaining parts. This lengthens the track for most of the lines and increases the magnetic resistance in proportion.

The shortest track through the iron, evidently, is as close as possible to the plane *a a*, referred to above, and to get most of the lines to follow this track the iron must be considerably increased in thickness in that place, but thinned in the vicinity of the plane *y y*, when no more lines will be conveyed than those resulting from the magnetization made in this very place directly by the magnetizing-coils inside; but the confinement of the magnetic lines to two comparatively narrow parts of the circumference cannot be done at once, as the lines, which are radiating in all directions through the back yoke, will only gradually be gathered together in the confined space referred to. The thickness of the iron must therefore only gradually increase in the vicinity of the plane *a a* and decrease at the plane *b b*. To fulfill this purpose my invention consists in making the outer surface of oval shape instead of cylindrical, the ellipses formed by transverse sections, as shown in Figs. 3 and 4, being more oval—viz., the departure from the cylinder being more conspicuous—close to the poles, Fig. 4, than in the vicinity of the back yoke, Fig. 3. Already in the yokes and joints the increasing difference in the thickness of the iron at the planes referred to is apparent. Thus the rim will be heavier and the flange broader in places where the meeting casing is thicker, as before explained.

These improvements may be applied as well in field-magnets with four poles as in those with two, because the introduction of the two poles at the middle of the exterior casing makes no difference in the general distribution of the magnetic lines in the iron.

The shaft of the dynamo usually is horizontal; but the axis of the field-magnets may be

arranged either horizontally or vertically, Figs. 6 and 7, without interfering with the application of this invention. In either case the enveloping casing may be cast in one piece with the foot plate or base, as shown in the drawings, and the interior cylinders are free from it in order to facilitate the winding of the coils on them, these wound cores being afterward put in and bolted together with the casing. When convenient, and this is especially the case in two-polar magnets, this part of my invention may also be applied without using joints at *h*, the exterior core, the back yoke, and the casing being cast in one piece. To these field-magnets armatures of any convenient type may be applied.

Having thus described my invention, I claim—

1. The combination, with interior cylindrical iron cores situated on both sides of the armature and cast in one piece with pole-pieces on the ends facing the armature and with back yokes on the other end and surrounded by cylindrical magnetizing-coils, of an outer enveloping casing, the interior surface of said casing being cylindrical, but the exterior of an oval shape, of such arrangement that the thickest parts of the casing will be situated at a plane laid through the axis of the field-magnets and perpendicular to the armature-shaft.

2. The combination, with interior cylindrical iron cores situated on both sides of the armature and cast in one piece with pole-pieces on the ends facing the armature and with back yokes on the other end and surrounded by cylindrical magnetizing-coils, of an outer enveloping casing, the interior surface of said casing being cylindrical, but the exterior of an oval shape, of such arrangement that the thickest parts of the casing will be situated at a plane laid through the axis of the field-magnets and vertical to the armature-shaft, the difference in thickness of the casing being more conspicuous in the middle than at the ends, the transformation of the iron mass being gradually developed, commencing in the back yoke and ending in the middle of the casing.

3. The combination, with interior cylindrical iron cores situated on both sides of the armature and cast in one piece with pole-pieces on the ends facing the armature and with back yokes on the other end and surrounded by cylindrical magnetizing-coils, of an outer enveloping casing, the interior surface of said casing being cylindrical, but the exterior of an oval shape, of such arrangement that the thickest parts of the casing will be situated at a plane laid through the axis of the field-magnets and vertical to the armature-shaft, said casing being provided with poles in the middle, facing the armature.

4. The combination, with interior cylindrical iron cores situated on both sides of the armature and cast in one piece with pole-pieces on the ends facing the armature and with back yokes on the other end and surrounded by cylindrical magnetizing-coils, of an outer enveloping casing, the interior surface of said casing being cylindrical, but the exterior of an oval shape, of such arrangement that the thickest parts of the casing will be situated at a plane laid through the axis of the field-magnets and perpendicular to the armature-shaft, said field-magnets being arranged with their axis horizontal or vertical, the casing in both cases being cast in one piece with the foot-plate.

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

JONAS WENSTRÖM.

Witnesses:

NERE A. ELFWING,

HUGO GINTTLER.