(No Model.) 2 Sheets—Sheet 1.

J. H. F. GÖRGES.

ROTARY FIELD MOTOR.

No. 547,069. Patented Oct. 1, 1895.

Fig. 2.

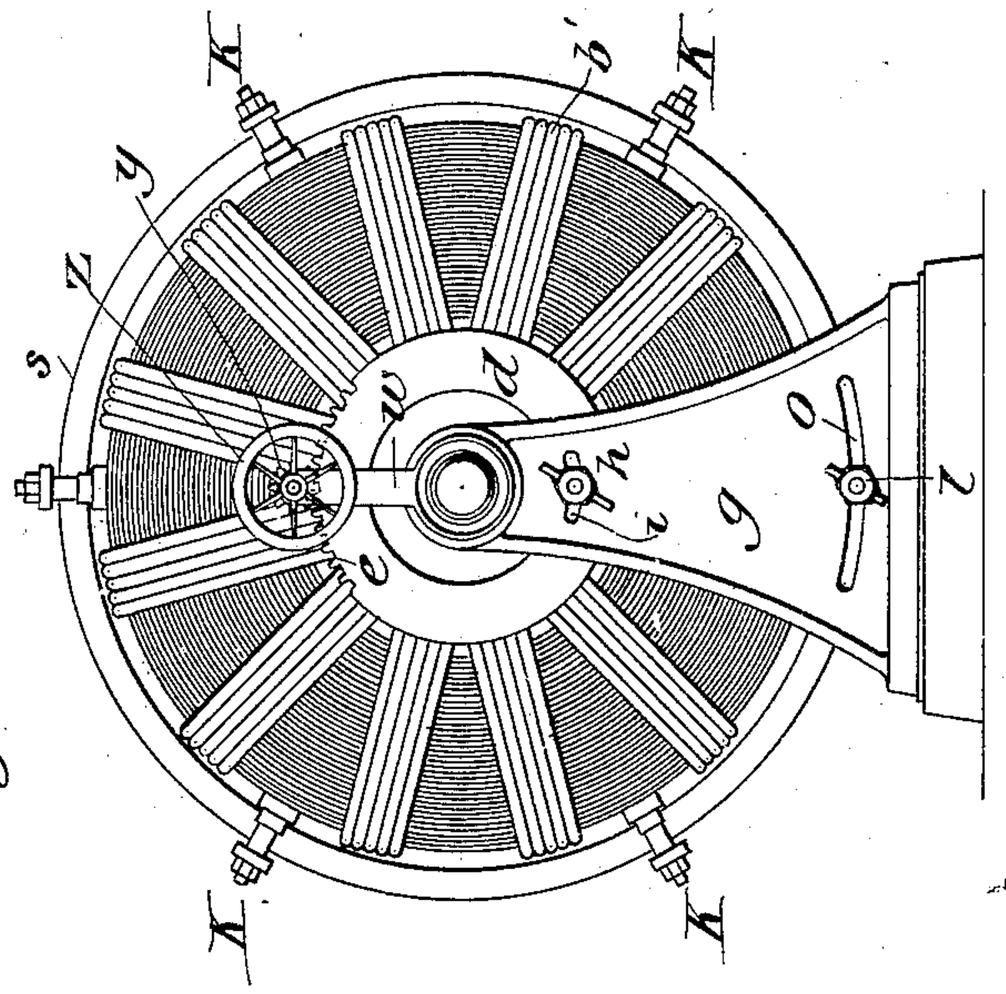


Fig. 3.

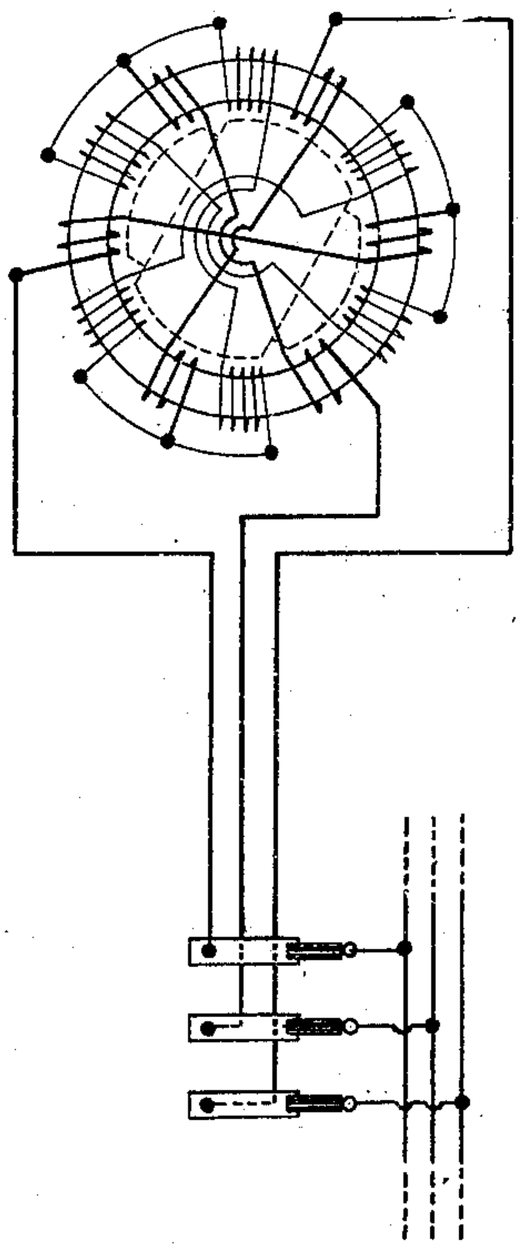
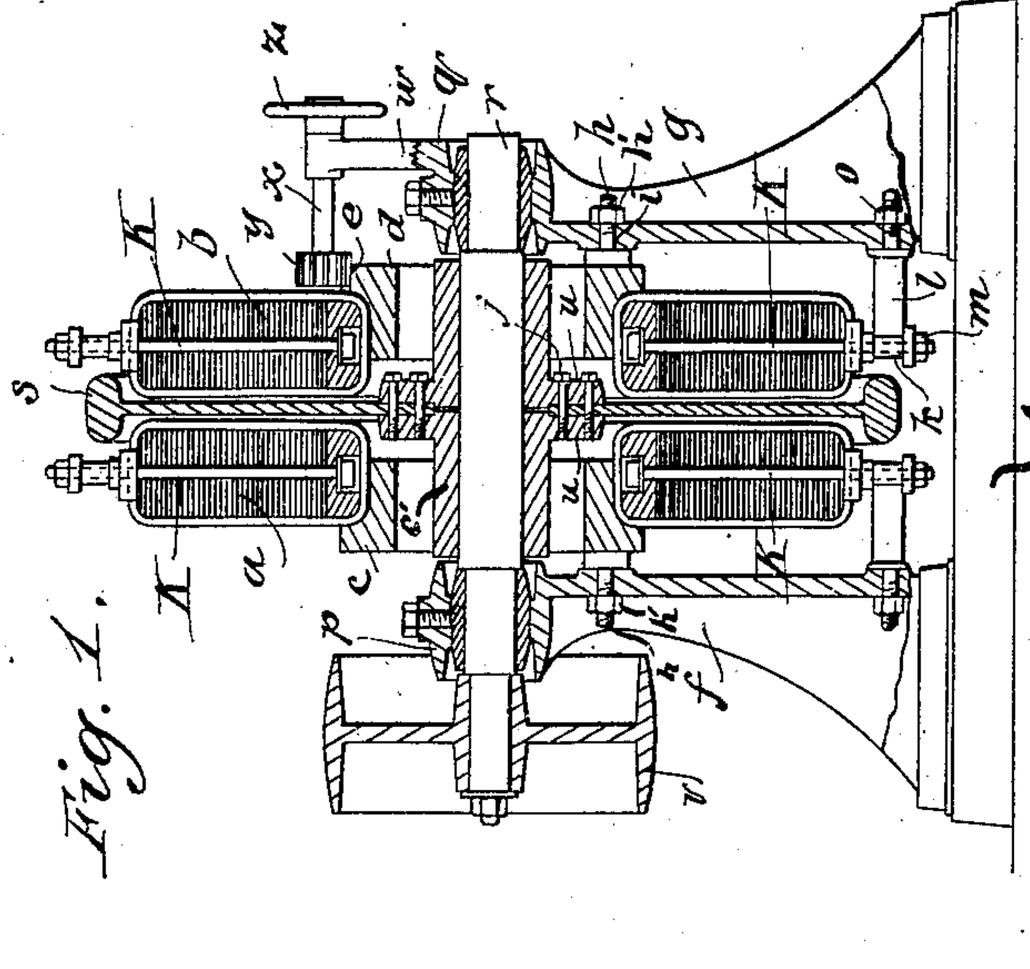


Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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ROTARY FIELD MOTOR.

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Fig. 4.

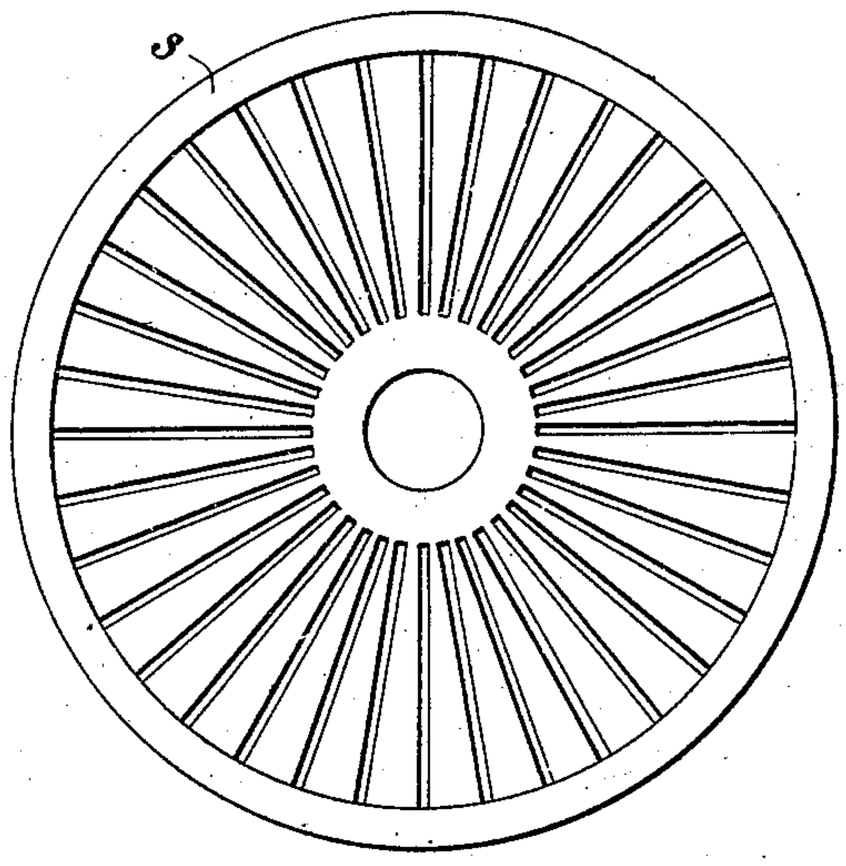


Fig. 5.

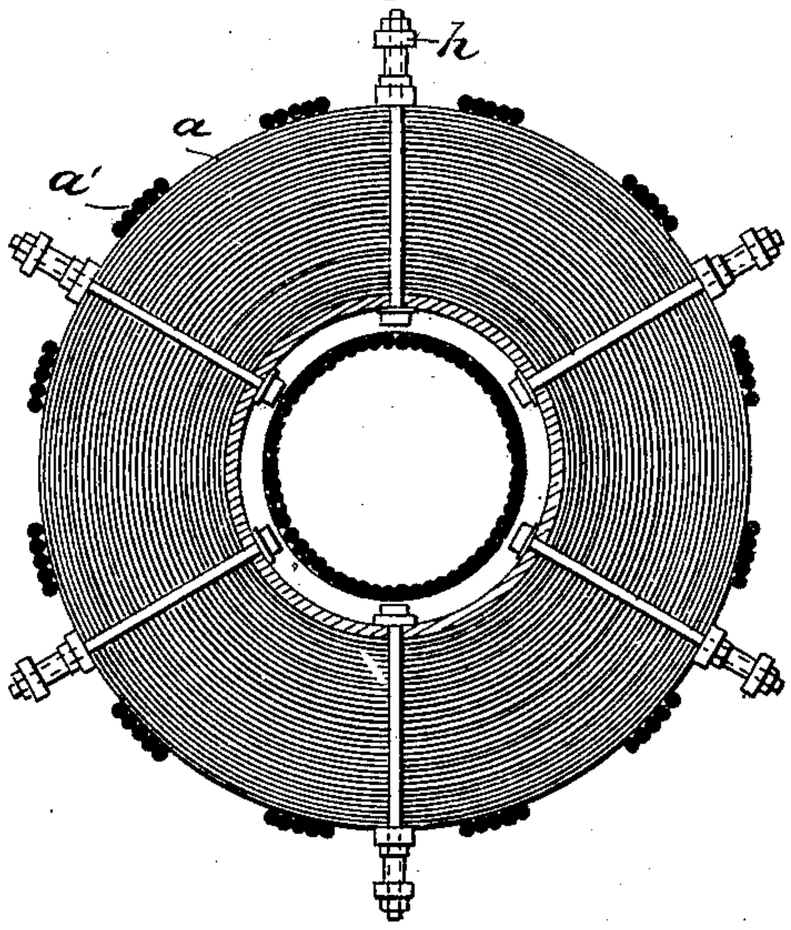


Fig. 6.

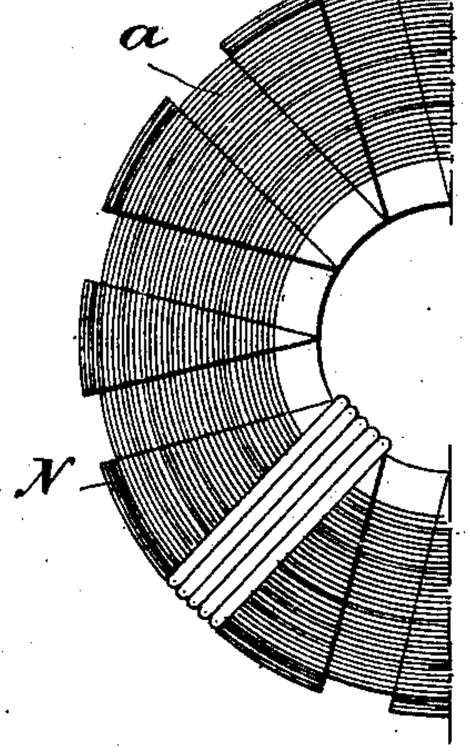


Fig. 6ª.

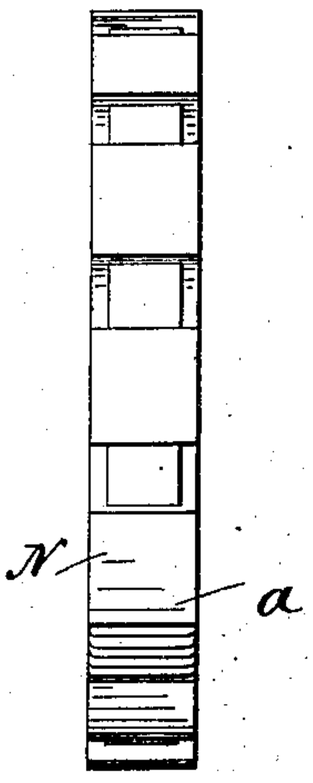
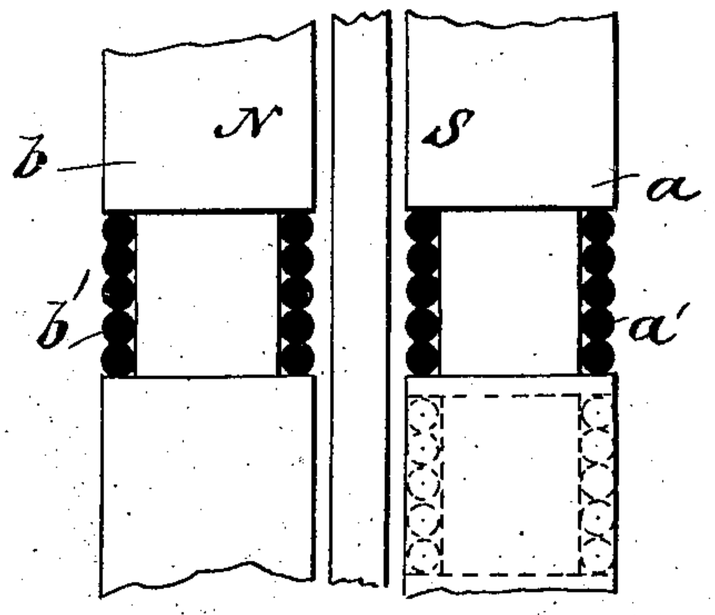


Fig. 7.



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ROTARY FIELD-MOTOR.

SPECIFICATION forming part of Letters Patent No. 547,069, dated October 1, 1895.

Application filed October 10, 1893. Serial No. 487,760. (No model.) Patented in Germany October 3, 1891, No. 65,056.

To all whom it may concern:

Be it known that I, JOHANNES HEINRICH FRIEDRICH GÖRGES, a subject of the Emperor of Germany, residing at Berlin, in the German Empire, have invented new and useful Improvements in Rotary Field-Motors, (for which I have obtained Letters Patent of Germany No. 65,056, dated October 3, 1891,) of which the following is a specification.

This my invention relates to polyphase machines in general, and more particularly to their regulation and to the construction and arrangement of the fixed members thereof.

Polyphase machines haye been heretofore constructed by locating a revolving member within a fixed member of ring form, or vice versa, according to the peculiar application intended for the machine. In the first case—that is, where the revolving member is located within a fixed ring member—the objection is noted that the lines of force, as created by the coils on the ring, do not, if the ring is of sufficient size, traverse the whole diameter of the ring—that is, from pole to pole—with the result that a comparatively weak field is formed, and the maximum efficiency of the machine is not secured. In the second case—that is, where the ring is the revolving member—the lines of force tend, as is well known, to describe curves from their respective poles. Here, also, as in the case above mentioned, an intense magnetic field cannot be attained, for the reason that the greater the curvature of the lines of force the greater their length, and consequently the less their strength.

The object of my invention is to so construct a polyphase machine that an intense field or fields may be created and that such fields shall have uniform intensities. This I accomplish, as is hereinafter set forth, by such an arrangement of the members as that the resulting lines of force are straight and that their length is very short.

A further object of my invention is to provide means for varying the intensity of the magnetic fields irrespective of the energizing-current or the position of the collector-brushes, which object I attain by a relative shifting of the opposing-poles and a consequent alteration of the lengths of the lines of force of the fields.

In the accompanying drawings, forming a part of this specification, and in which like letters relate to similar parts in the several views, Figure 1 is a vertical section of a dynamo constructed in accordance with my invention. Fig. 2 is a side elevation of my dynamo and showing means for rotatively shifting the relative positions of the rings and also for retaining them in the desired mutual relation. Fig. 3 is a diagrammatic representation of a winding for rotary machines, for which I have made application for United States Letters Patent, Serial No. 412,123, and which winding I prefer to use in a motor as constructed in accordance with my present invention. Fig. 4 is a view of one form of copper disk used, which disk forms the revolving member of the machine. Fig. 5 is a section of one of the fixed members, showing the laminal construction thereof and the position of the winding thereon. Fig. 6 is a side elevation of a portion of the form of core which I prefer to use in the construction of the fixed members, said core having radial ribs forming recesses for the reception of the windings. Fig. 6* is an edge elevation of a ring construction after the design shown in Fig. 6; and Fig. 7 is a plan view of portions of the fixed members and the movable disk therebetween, showing their relative positions at times of greatest intensity of the fields.

Referring now to the drawings, A is a base or supporting frame for the machine and is provided with standards *f g*, provided with bearings *p q*, respectively, in their upper portions for the reception of a shaft *r*, having secured thereto a revoluble member *s*, consisting of an enlarged rim, an interior disk, and a separable hub *c'*, which latter is formed of two parts provided with internally-arranged flanges *u*, located to clamp the interior edge of the disk, the said disk and hub members being held in their proper relations by means of suitable bolts or screws *j* passed therethrough. The shaft *r* may be provided with a belt-wheel *v* or with any other suitable power-transmitting means.

a and *b* represent two fixed members of my machine similar in form and winding and each secured positively in any desired manner, such as by a key, to a collar *c* and *d*, re-

spectively, each or both of which collars may be provided with a peripheral or otherwise arranged rack *e*, for the purpose as shall be presently explained. In Fig. 1 of the drawings I have shown such rack formed only in the collar *d*.

Each of the aforesaid members is preferably of laminal construction, the usual layers of which may be retained in position by means of bolts *k* passed therethrough in radial directions.

In Figs. 6, 6ª, and 7 I have shown a preferred form of core, which is of the usual ribbed type, the advantages of which are that the established poles may be brought nearer together, whereby a consequent greater strength of fields results, and that the accuracy of winding is facilitated and a less amount of wire is necessary.

The collars *c* and *d* and members thereto attached are passed over shaft *r* from either end thereof previous to its location in the bearings in the standards.

Each member *a* and *b* is provided with means for adjustably securing it in the desired position, which means may consist of a threaded bar *h* passed through a slot *i* in the standard adjacent to a member and entering the collar thereto attached, said bar being provided with an adjustable nut *h'*, whereby it may be allowed to play in said slot upon the loosening of said nut, at which time its collar and member thereon may be given a desired degree of revolution. Secured in the desired manner to the external portion of each of the members *a* and *b* is a bar *l* similar to bar *h* and arranged to play in a like manner thereto in the segmental slot *o* in a standard of the frame. By the use of the second bar steadiness and positiveness are given to the member in its altered position.

Extending from the standard *g* is an arm *w*, having bearings for the reception of the shaft *x*, provided with an operating hand-wheel *z* on its exterior extremity, and having on its inner end a pinion *y*, arranged to mesh with the rack *e* on the adjacent collar *d*. As hereinbefore intimated, a like arrangement may be secured to the standard *f*. However, this is not necessary. The object of this contrivance is to enable the revoluble shifting of one member *b* relative to its opposing member *a*, which shifting is accomplished, as will be readily seen, by turning the hand-wheel *z* after the nuts on the bars *h* and *l* have been loosened.

In Figs. 1 and 7 of the drawings I have shown the relative juxtapositions of the fixed and revolving members, and it will be noted that they lie very closely together, and herein lies one of the features of my invention, as it is evident that the closer the opposing poles the shorter the lines of force, and, under the influence of a current of constant intensity, the greater the strength thereof. Moreover, it will be noted that as one ring is shifted relative to the other the lines of force of the fields are not only increased in length but are given an oblique direction, which obliquity is increased as the opposing poles are moved farther apart. Thus a slight shift is alone necessary to accomplish a considerable alteration in the intensity of the fields, which alteration in this case is not only proportional to the square of the distance, but also also bears a relation to the angle of obliquity.

Having now described my invention, its operation is as follows: Rotary current being fed to the windings of the fixed members and the member *b* being revolved to such an extent that its poles are directly opposite the unlike poles of the opposing member *a*, the disk *s* will be caused to revolve with its maximum speed, and energy will be developed, due to the rotary impulses imparted to the disk by the current generated therein. Should, however, the intensity of the lines of force be decreased by any means whatsoever, a corresponding decrease in the efficiency of the machine will result in proportion to the said variance. This I accomplish by gradually revolving one member *b* relatively to its opposing member *a* in the manner hereinbefore described, whereby the unlike opposing poles thereof are gradually separated, the lines of force are both lengthened and rendered oblique, and the intensities of the fields are consequently decreased. The described arrangement of the ring members not only imparts to the machine the feature of being readily regulated, but such regulation can be most delicately and accurately accomplished, and, moreover, the maximum intensities of the fields is much greater than in other constructions, due to the fact that the lines of force thereof are both very short and are straight.

I do not limit myself to any particular means for shifting the members nor to the peculiar construction of the disk used, which latter may be formed with radial spokes, as is shown in Fig. 4 of the drawings, or it may be made solid. Its composition may also be changed at will, and I may employ instead of a copper disk one of iron with a copper hub and rim. Moreover, I may so arrange the elements of my machine that the disk will remain stationary while the rings will rotate, and, if desired, I may regulate the operation thereof by a change of connections.

It is evident that the principles involved in this my invention may be applied to a dynamo as well as to a motor, it being only necessary in the former instance that contact-brushes be arranged to bear upon the disk at its periphery and center to secure a current according to the laws covering the well-known disk machine.

Having now described my invention, its constructions, and methods of operation, what I claim is—

1. The combination with two ring members placed face to face and provided with pluriphase windings to produce a rotating magnetic field in the space between the ring mem-

bers, of a rotatable member situated in the space between said ring members adapted to be rotated by said field; substantially as described.

2. The combination with two ring members placed face to face and provided with pluriphase windings to produce a rotating magnetic field in the space between the ring members, of a rotatable member situated in the space between said ring members and adapted to be rotated by said field, and means for rotating said ring members relatively to vary the strength of the rotating field; substantially as described.

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

JOHANNES HEINRICH FRIEDRICH GÖRGES.

Witnesses:

GEO. H. CHANDLEE,

C. S. CAAMPION.