No. 779,432. PATENTED JAN. 10, 1905.

D. L. LINDQUIST.

POLYPHASE MAGNET.

APPLICATION FILED MAY 23, 1904.

2 SHEETS—SHEET 1.

FIG. 1.

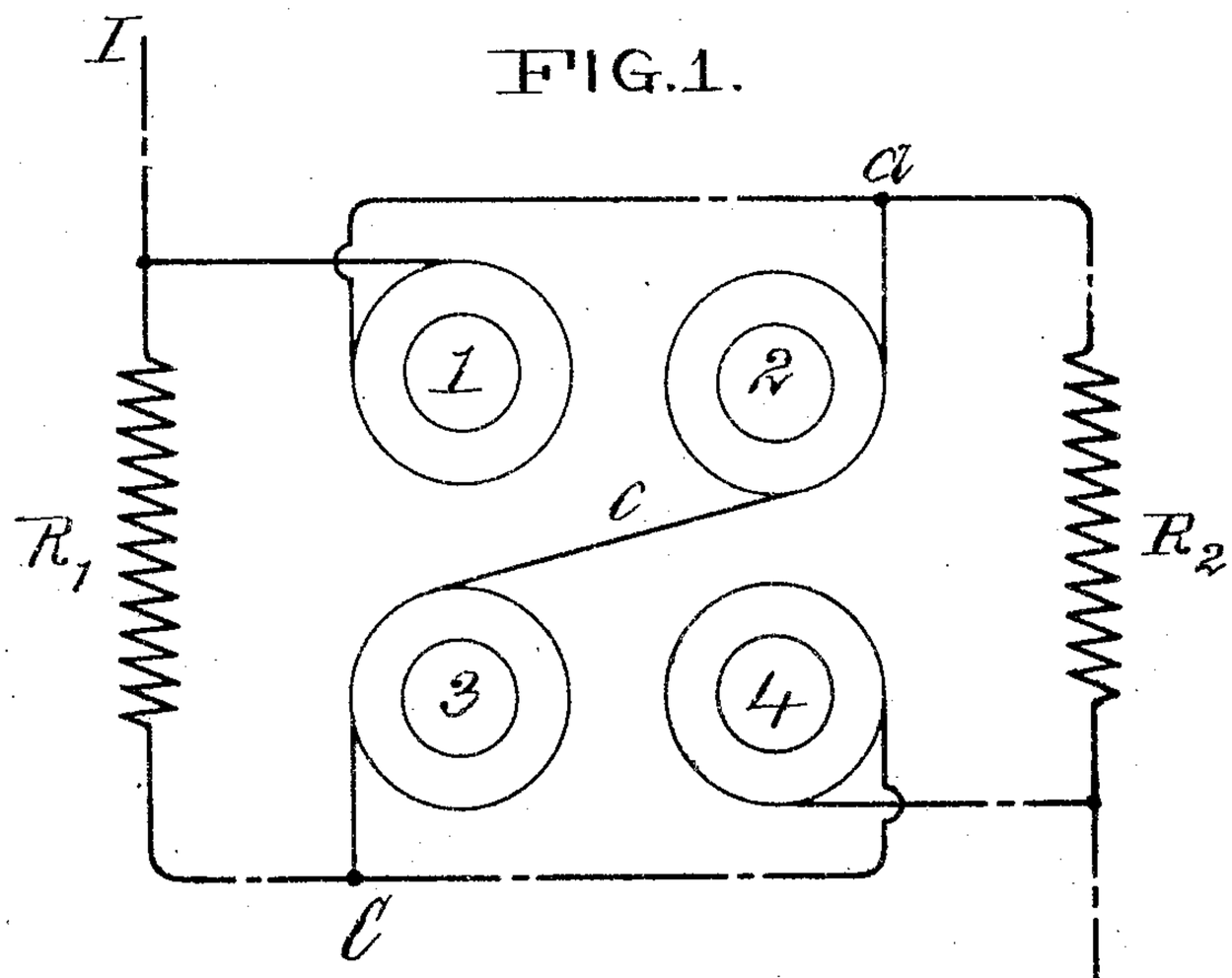


FIG. 2.

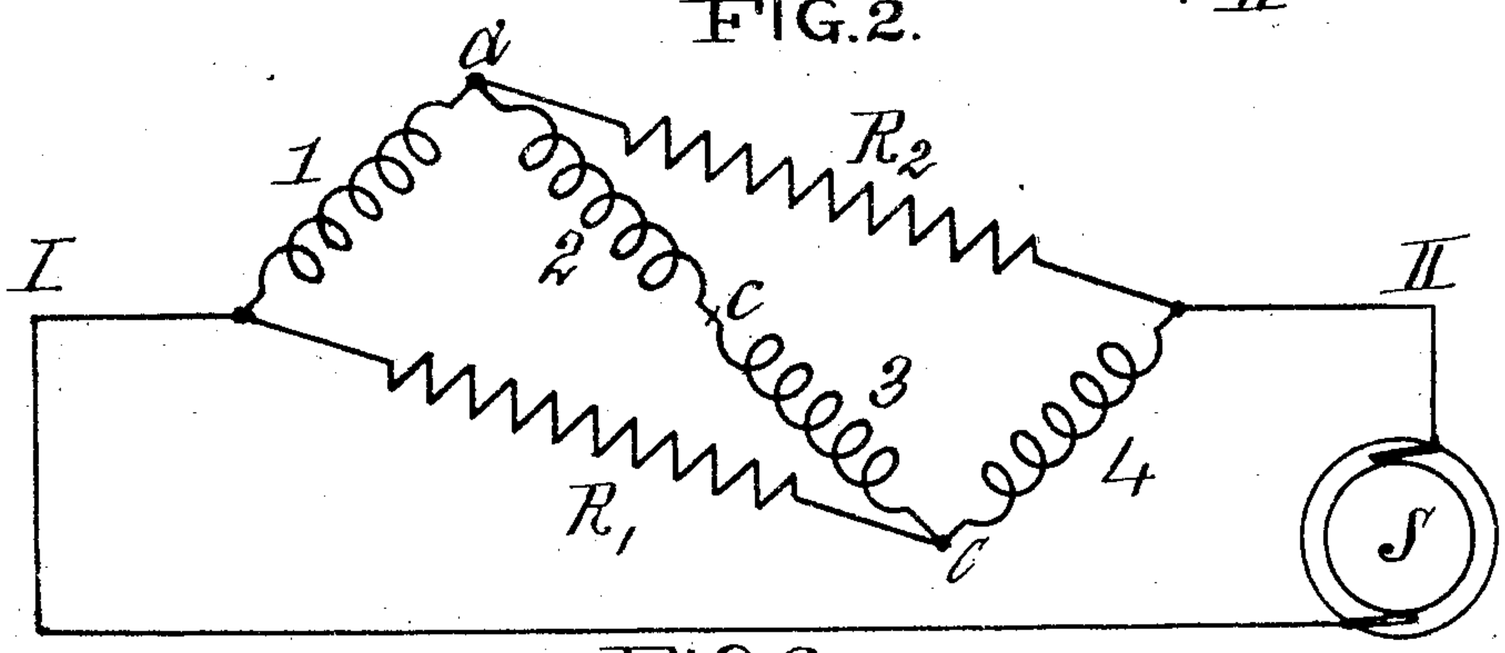
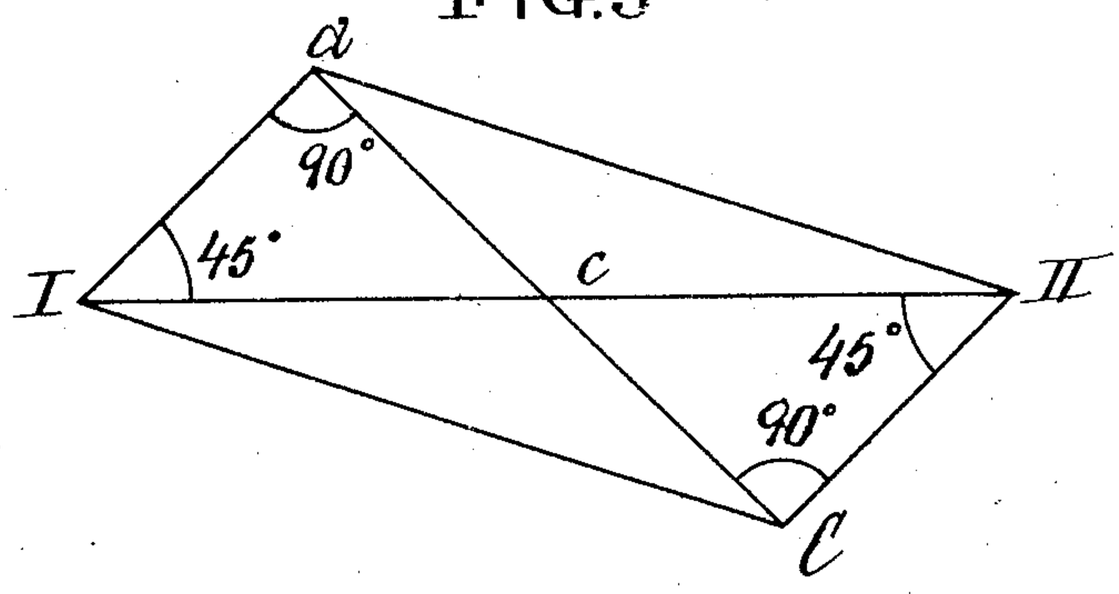


FIG. 3



Witnesses
S. H. Van Wart
L. D. Morgan.

David L. Lindquist Inventor
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2 SHEETS—SHEET 2.

FIG. 4.

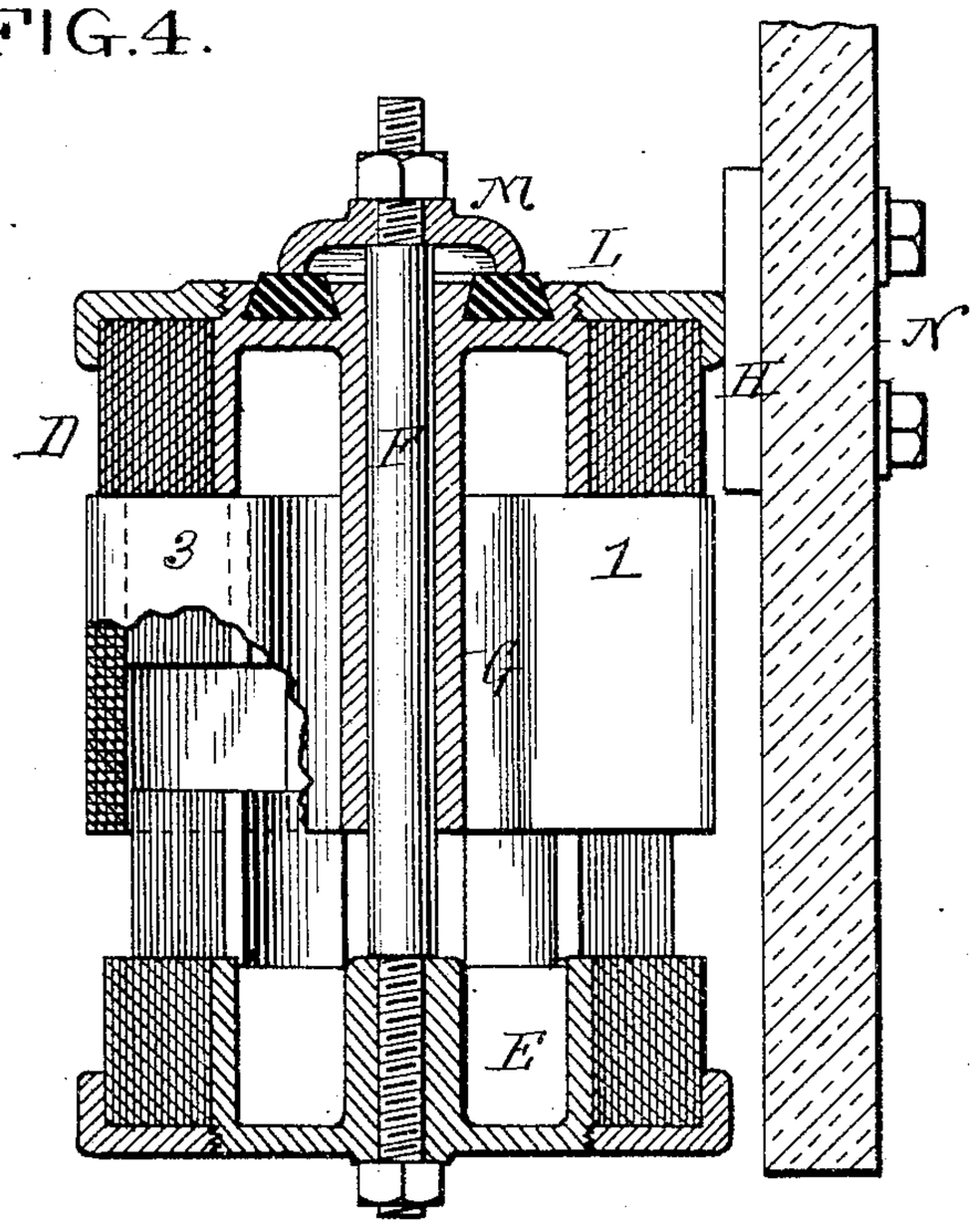
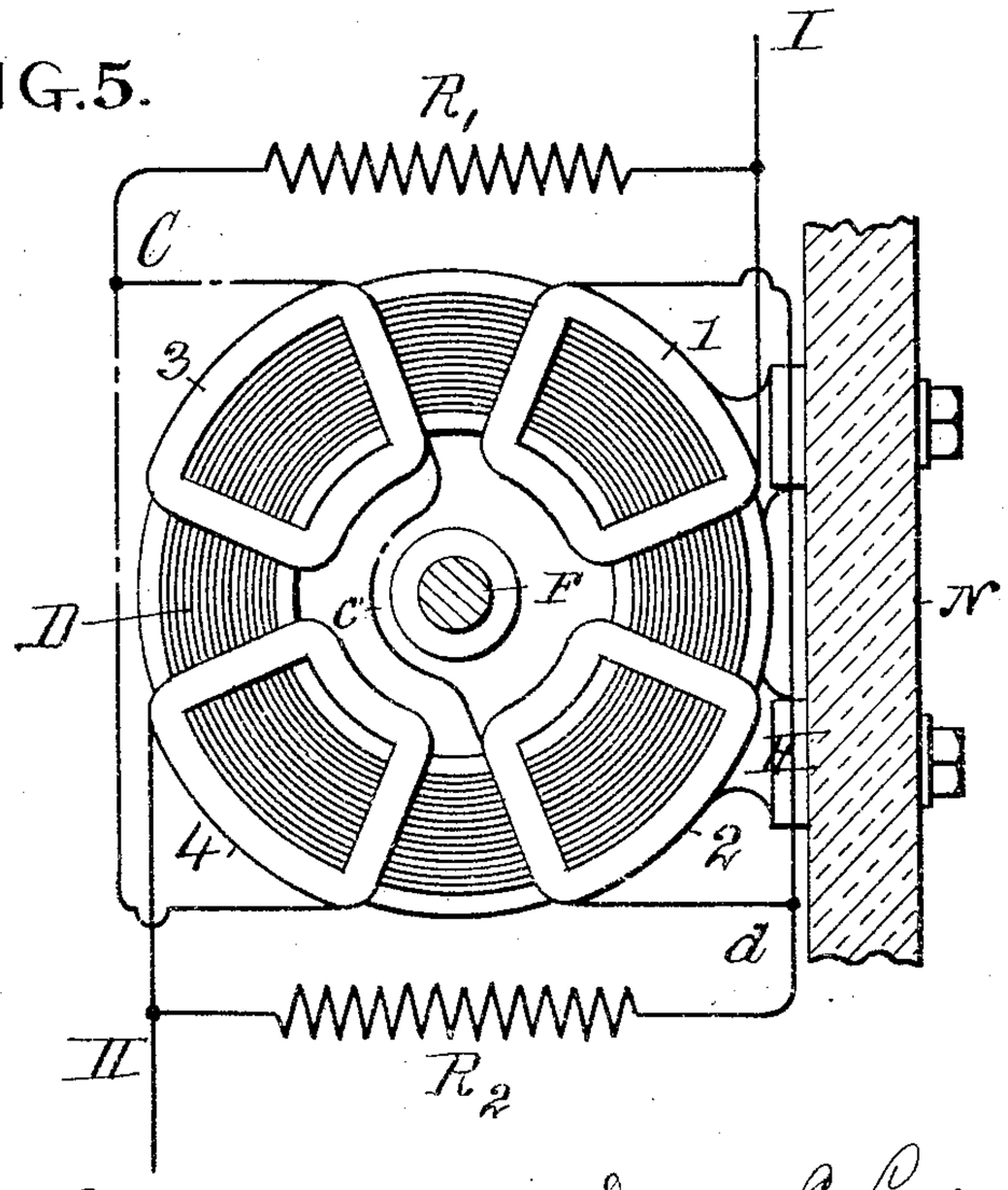


FIG. 5.



Witnesses
C. A. Van Wart
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Inventor
David L. Lindquist
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UNITED STATES PATENT OFFICE.

DAVID L. LINDQUIST, OF YONKERS, NEW YORK, ASSIGNOR TO THE SUNDH ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

POLYPHASE MAGNET.

SPECIFICATION forming part of Letters Patent No. 779,432, dated January 10, 1905.

Application filed May 23, 1904. Serial No. 209,414.

To all whom it may concern:

Be it known that I, DAVID L. LINDQUIST, of Yonkers, Westchester county, New York, have invented a new and useful Improvement in Polyphase Magnets, of which the following is a specification.

The invention relates to alternating-current magnets, and more directly to polyphase magnets connected to single-phase circuits; and it consists in the combinations more particularly pointed out in the claims. The main object is to make such magnets as noiseless as possible.

My invention is here illustrated in a two-phase magnet with additional resistances connected to a single-phase source of supply in such a way that the magnet receives two-phase current of ninety degrees phase difference in exactly the same manner as if connected to a two-phase source of supply. It is to be understood that I do not limit my arrangement to being connected to my special form of polyphase alternating-current magnet.

Figure 1 shows diagrammatically in end view my invention embodied in a two-phase magnet having four coils and two external ohmic resistances. Fig. 2 is a diagram showing the phase differences in the different paths when a two-phase magnet is connected to a single-phase alternating-current source of supply. Fig. 3 is a voltage diagram of the foregoing. Fig. 4 shows a polyphase magnet such as set forth in my United States Patent No. 744,773, dated November 24, 1903, to which my present invention is to be applied. Fig. 5 is a plan view of the lower face of said magnet, showing the laminated core and connections as in Fig. 1.

Similar numbers and letters of reference indicate like parts.

It is well known to be impossible to make a plain alternating magnet operate noiselessly with single-phase current on account of the increase and decrease of the current and consequent increase and decrease in the magnetism, which causes a variable pull that makes the magnet to vibrate. It is therefore necessary to have at least two phases, so that when the current in one is zero the other has its maximum, and vice versa. This I accomplish in the following manner:

Referring to Figs. 1, 2, and 5, the main line from the source S of single-phase current is connected to points I and II. Suppose, therefore, the current comes in at I and dividing proceeds through coil 1 and resistance R^2. The voltage in coil 1 will then be in direction 1 *a*, (see Fig. 3,) and its amount will be represented by the length of the line I *a*. The voltage across the resistance R^2 will be represented in direction and amount by line *a* II. The current also goes through the resistance R′ and coil 4. Then the voltage across the resistance R′ will be represented in amount and direction by the line I C and the voltage in coil 4 by C II. The voltage of coils 2 and 3 will therefore be represented in amount and direction by the line *a* C.

The proportion between the magnet-coils, laminated cores, and resistances is to be made so that the voltages in coil 2 (*a c*) and coil 3 (*c* C) will be in amount the same as in coils 1 and 4; but the phase direction of the current in coils 2 and 3 will vary ninety degrees from that in coils 1 and 4. This is shown in Fig. 3. It will be seen that by this arrangement the magnet as a whole is supplied with two-phase current from a single-phase source of supply. The inductances in coils 2 and 3 should be larger than in coils 1 and 4. The difference can be obtained in any known way, as by making more turns in the coils, or, better, by smaller air-gaps or different sections of iron core.

In the magnet shown in Figs. 4 and 5 and fully described in my patent aforesaid D is the laminated core, having projections on which are the magnet-coils 1 2 3 4, so that the same are symmetrically disposed around a central axis. E is the armature, supported on the rod F, which passes up through a sleeve G on the magnet-support L and is provided with a stop-disk M on its upper end. The magnet-support is carried by a bracket H, secured by bolts to the back plate N.

The term "ninety-degrees phase difference" used herein means a phase difference of substantially ninety degrees, a slight variation one way or the other being obviously immaterial and is not restricted mathematically to said angle.

I claim—

1. The combination in a polyphase magnet of a plurality of magnet-coils, a source of single-phase-current supply in circuit therewith and means for converting said single-phase current into two-phase current of ninety-degrees phase difference.

2. The combination in a two-phase magnet of four magnet-coils 1, 2, 3, 4, connected in series, an ohmic resistance in shunt with the leading-in terminal of coil 1 and the leading-out terminal of coil 3, an ohmic resistance in shunt with the leading-in terminal of coil 2 and the leading-out terminal of coil 4 and a source of single-phase current in circuit with said coils.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DAVID L. LINDQUIST.

Witnesses:
WM. H. SIEGMAN,
I. A. VAN WART.