

D. L. LINDQUIST.

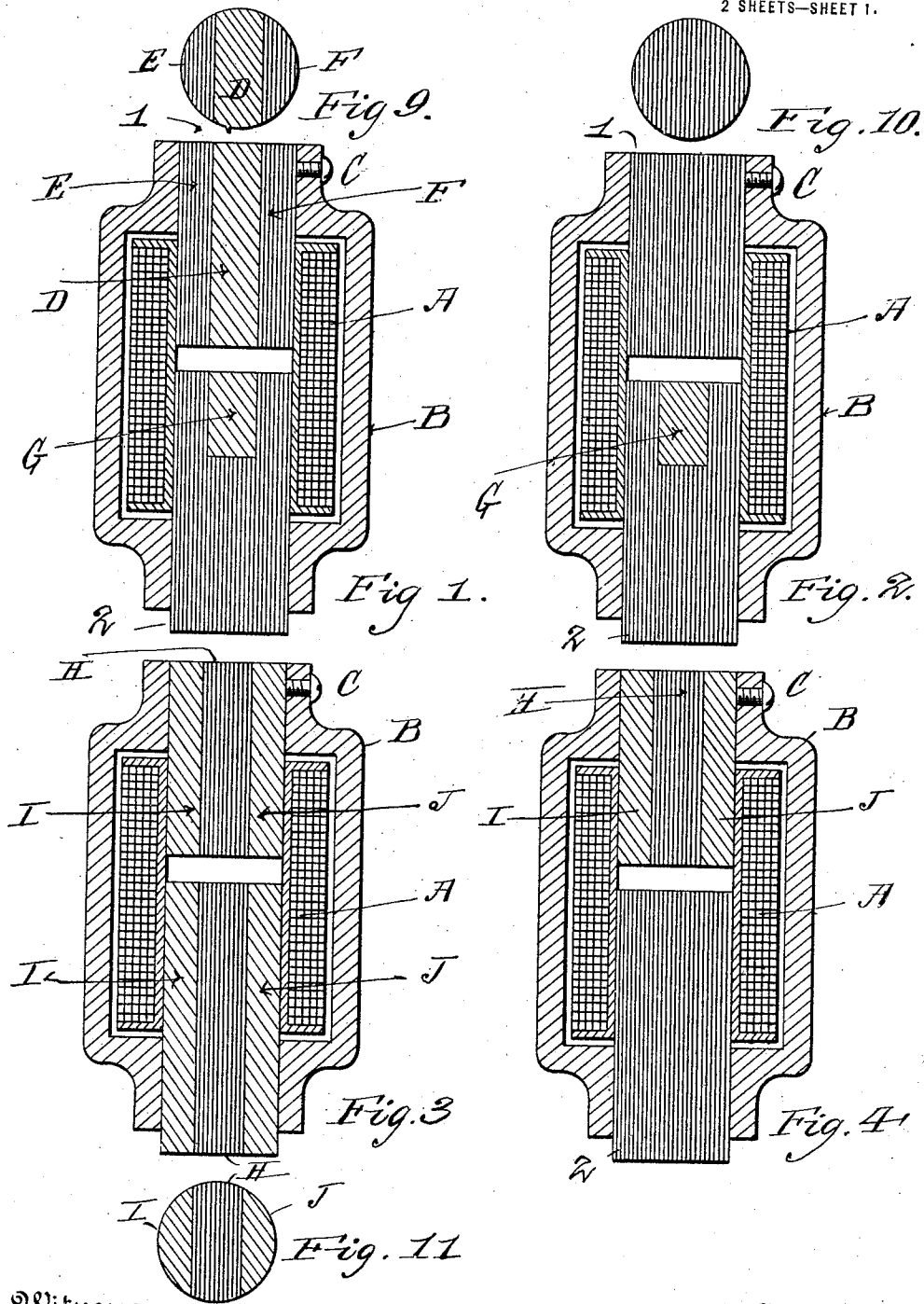
ALTERNATING CURRENT ELECTROMAGNET.

APPLICATION FILED FEB. 6, 1913. RENEWED NOV. 9, 1915.

1,186,012.

Patented June 6, 1916.

2 SHEETS—SHEET 1.



Witnesses:
M. McIlwain
May J. McIlwain

Inventor,
David L. Lindquist
By *Hyatt* Attorney
R. C. Benjamin

D. L. LINDQUIST.
 ALTERNATING CURRENT ELECTROMAGNET.
 APPLICATION FILED FEB. 6, 1913. RENEWED NOV. 9, 1915.

1,186,012.

Patented June 6, 1916.

2 SHEETS—SHEET 2.

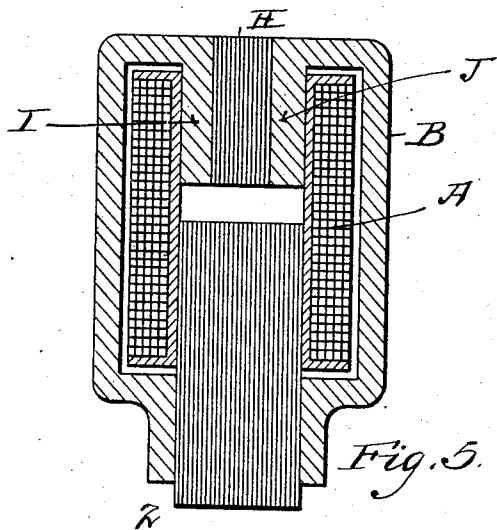


Fig. 5.

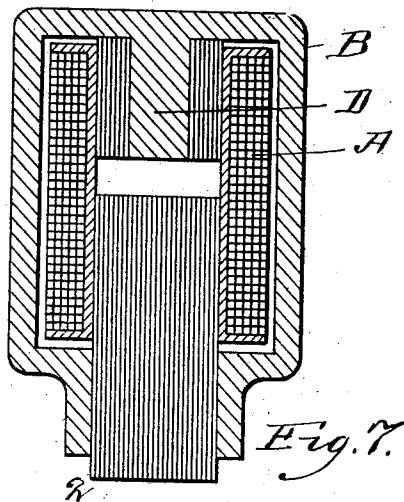


Fig. 7.

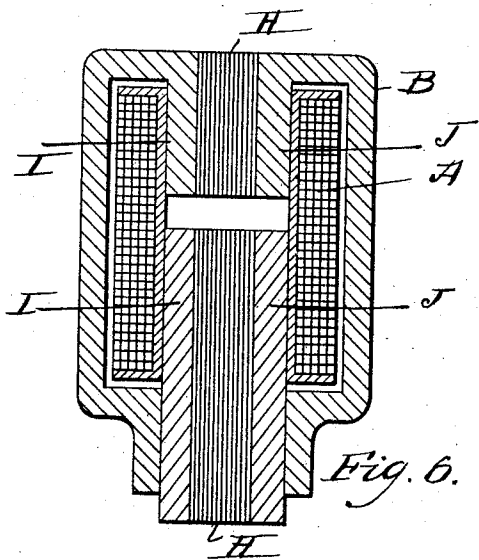


Fig. 6.

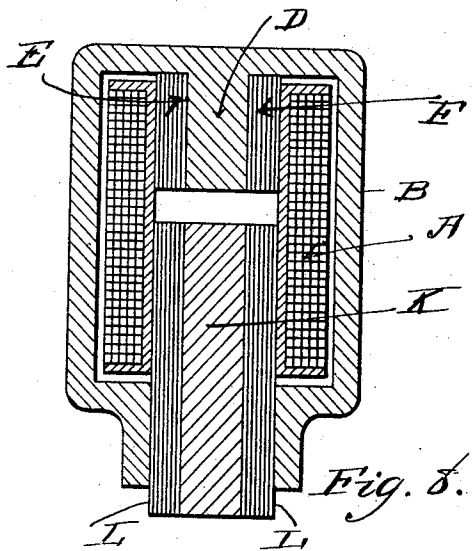


Fig. 8.

Witnesses:
 J. M. Millward.
 May J. McGarry.

Inventor.
 David L. Lindquist
 By Attorney
 Paul Benjamin

UNITED STATES PATENT OFFICE.

DAVID L. LINDQUIST, OF YONKERS, NEW YORK, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

ALTERNATING-CURRENT ELECTROMAGNET.

1,186,012.

Specification of Letters Patent.

Patented June 6, 1916.

Application filed February 6, 1913, Serial No. 746,446. Renewed November 9, 1915. Serial No. 60,531.

To all whom it may concern:

Be it known that I, DAVID L. LINDQUIST, a subject of the King of Sweden, residing at Yonkers, in the county of Westchester and State of New York, have invented a certain new and useful Improvement in Alternating-Current Electromagnets, of which the following is a specification.

My invention relates to an alternating current electro-magnet, of the general type disclosed in U. S. Letters Patent No. 744,773, granted to me November 24, 1903, and of the specific type set forth in U. S. Letters Patent No. 1,005,855, granted to me October 17, 1911.

My present invention consists in constructing the magnet core of (1) laminations and (2) of a solid cubical mass of inductive material, without an opening, and of greater cross sectional area than a unit of said laminations, so that the secondary current is induced and circulates in the solid cubical mass. In this way, I avoid the use of secondary coils, rings or tubes inclosing the laminations, and simplify the construction.

In the accompanying drawings—Figures 1 to 8, inclusive, show longitudinal sections of various modifications of my electro-magnet. In Figs. 1, 2, 7, 8, the solid portion of the core is interposed between the core laminations. In Figs. 3, 4, 6 and 7, the core laminations are interposed between two solid portions. Fig. 9 is an end view of the polar extremity of either the fixed or the movable core of Figs. 1 and 8, or the movable core of Fig. 2. Fig. 10 is an end view of the polar extremity of the fixed core of Fig. 2, and the movable cores of Figs. 5 and 7. Fig. 11 is an end view of the polar extremity of either the fixed or the movable core of Fig. 3, and the fixed cores of Figs. 5 and 6.

Similar letters and numbers of reference indicate like parts.

A is the energizing coil inclosed in a casing B of inductive metal. The core of magnetic material which enters the coil is made in two parts. One of said parts, 1, in Figs. 1, 2, 3 and 4, is clamped in the casing by set screws C. The other part 2 is movable, and forms the armature which is drawn into the coil A, when said coil is energized.

In the form shown in Fig. 1, the fixed core 1 comprises a solid cubical mass D of inductive material, and two parallel and similar groups of laminations, E, F, on opposite

sides thereof—said three parts being of equal length. The laminated armature 2 has a recess in its pole face, to receive a solid cubical mass G of inductive material.

In the form shown in Fig. 2, the fixed core 1 is formed of laminations only, and the armature is the same as shown in Fig. 1.

In the form shown in Fig. 3, the fixed core and the armature are each constructed of an inner group H of laminations and two solid cubical masses I, J of inductive material.

In the form shown in Fig. 4, the fixed core 1 is the same as in Fig. 3, and the armature 2 is made up of laminations only.

In the forms shown in Figs. 5, 6, 7, 8, the solid members of the fixed core 1 are made integral with the casing B, Fig. 5 being (with the above difference) like Fig. 4, and Fig. 6 like Fig. 3. Fig. 8 is like Fig. 1, with the further difference that the solid cubical mass K of the armature is of the same length as the laminations L thereof. In Fig. 7, the fixed core 1 is similar to the corresponding part of Fig. 8, and the armature 2 is made up of laminations only.

In all of these forms, when single-phase current is supplied to the coil A, secondary currents are produced in accordance with the well known split-phase inductive method in the solid cubical mass in the core, said currents circulating at right angles to and around the longitudinal axis of the magnet, which secondary currents are out of phase with the inducing current in coil A; so that, as already fully explained in my previous patents, the current energizing the magnet never falls to zero, and by reason of the magnetic symmetry of the device, a constant resultant pull in a straight line is exerted upon the armature 2 to hold it firmly attracted without vibration or chattering. In order to secure said magnetic symmetry in the embodiments of my invention herein illustrated, the material of the solid cubical mass is symmetrically disposed with reference to the longitudinal axis of the core.

The solid cubical mass, which forms a part of the core, is to be of greater cross sectional area than a unit of said laminations, and where a plurality of said masses are used, each one of them is to be of greater cross-sectional area than said unit. The cross sectional area here referred to of unit laminations and solid cubical mass is that shown in the end views of the core, such as Figs. 110

9 and 11. Unit lamination means one of the plates which are placed face to face to form the laminated part of the core.

I claim:

5 1. An alternating current electro-magnet of the type set forth, comprising an energizing coil and a core consisting of (1) a solid cubical mass of inductive material and (2) laminations, each of less cross sectional
10 area than said mass: the material of said mass being symmetrically disposed with reference to the longitudinal axis of the core.

2. An alternating current electro-magnet
15 of the type set forth, comprising an energizing coil and a core consisting of (1) a solid cubical mass of inductive material and (2) laminations, each of less cross sectional area than said mass: the said mass extending longitudinally through said core and having its material symmetrically disposed
20 with reference to the longitudinal axis of said core.

3. An alternating current electro-magnet
25 of the type set forth, comprising an energizing coil, a core, a casing of magnetic metal inclosing said coil and having an opening receiving said core, the said core being in magnetic circuit with said casing and consisting of (1) a solid cubical mass of inductive material and (2) laminations,
30 each of less cross sectional area than said mass: the material of said mass being symmetrically disposed with reference to the longitudinal axis of said core.

4. An alternating current electro-magnet
40 of the type set forth, comprising a primary energizing coil, a laminated core, and a secondary conductor in the form of a straight bar extending parallel to said

laminations, of greater cross section than a unit of said laminations and having an end terminating at a polar extremity of said core: the material of said bar being symmetrically disposed with reference to the
45 longitudinal axis of said core.

5. An alternating current electro-magnet of the type set forth, comprising a primary energizing coil, a laminated core, and a secondary conductor in the form of a straight
50 bar extending parallel to said laminations, of greater cross section than a unit of said laminations and having its ends terminating at the polar extremities of said core: the material of said bar being symmetrically
55 disposed with reference to the longitudinal axis of said core.

6. An alternating current electro-magnet of the type set forth, comprising a primary coil, a core, and a casing of magnetic metal;
60 the said core being formed in part of laminations and in part of a body of magnetic metal integral with said casing, the said body being of greater cross sectional area than a unit of said laminations.
65

7. An alternating current electro-magnet of the type set forth, comprising a primary coil, a core, and a casing of magnetic metal;
70 the said core being formed in part of laminations and in part of a plurality of bodies of magnetic metal integral with said casing, each of said bodies being of greater cross sectional area than a unit of said laminations.
75

In testimony whereof I have affixed my signature in presence of two witnesses.

DAVID L. LINDQUIST.

Witnesses:

GERTRUDE T. PORTER,

MAY T. MCGARRY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."