No. 764,608. PATENTED JULY 12, 1904.

D. L. LINDQUIST.

ELECTROMAGNET.

APPLICATION FILED MAR. 8, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 1.

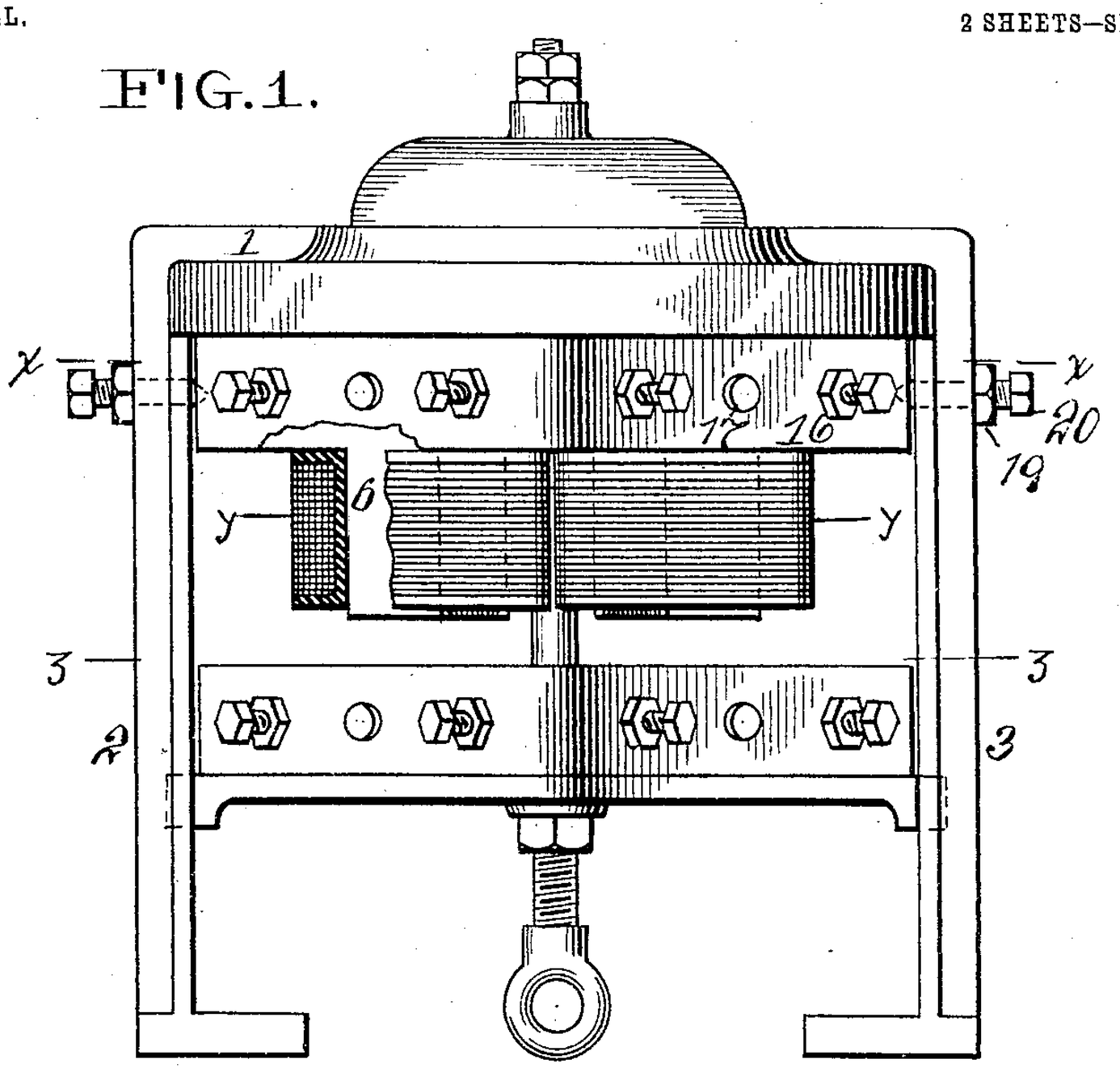
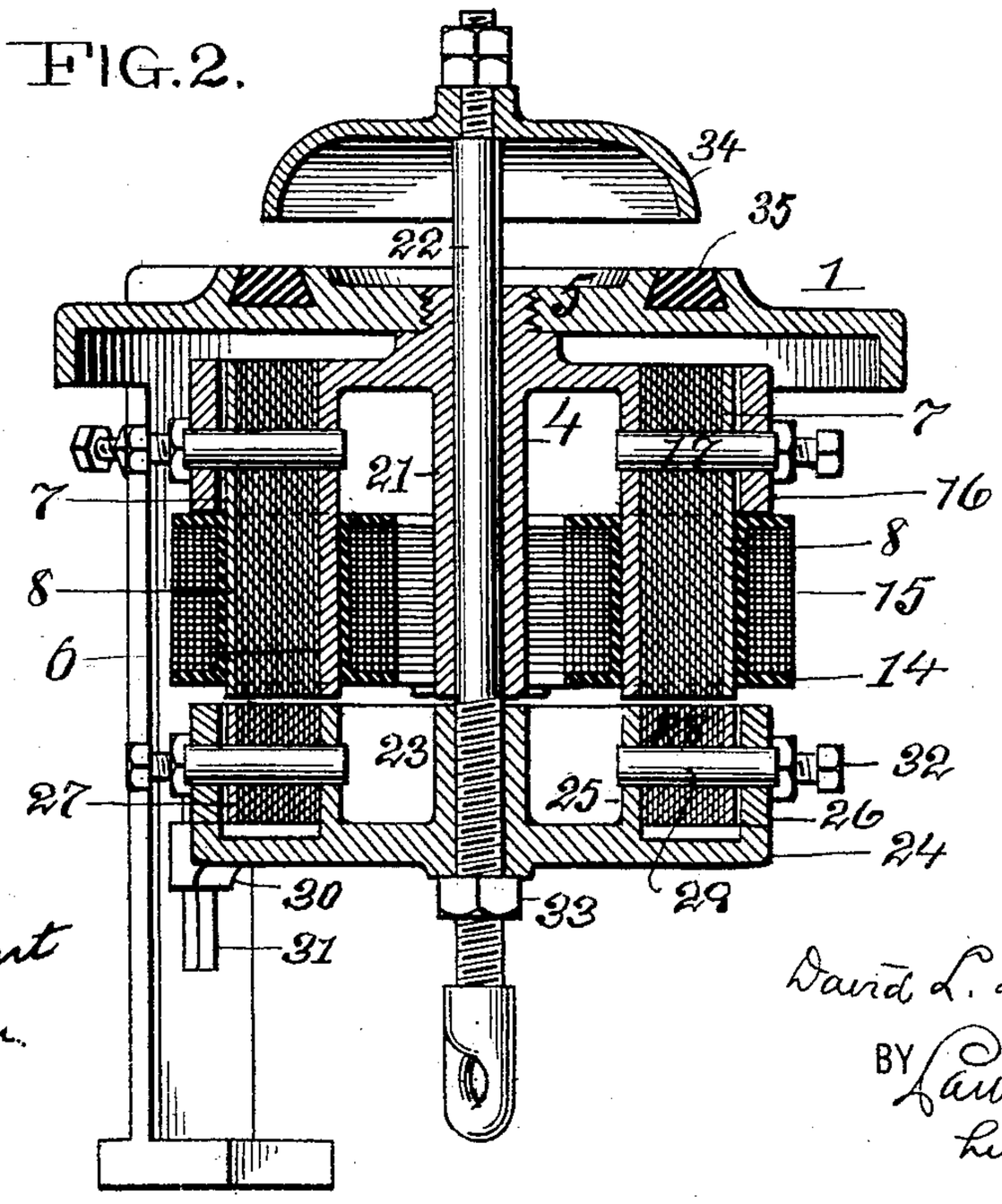


FIG. 2.



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NO MODEL. 2 SHEETS—SHEET 2.

FIG. 3.

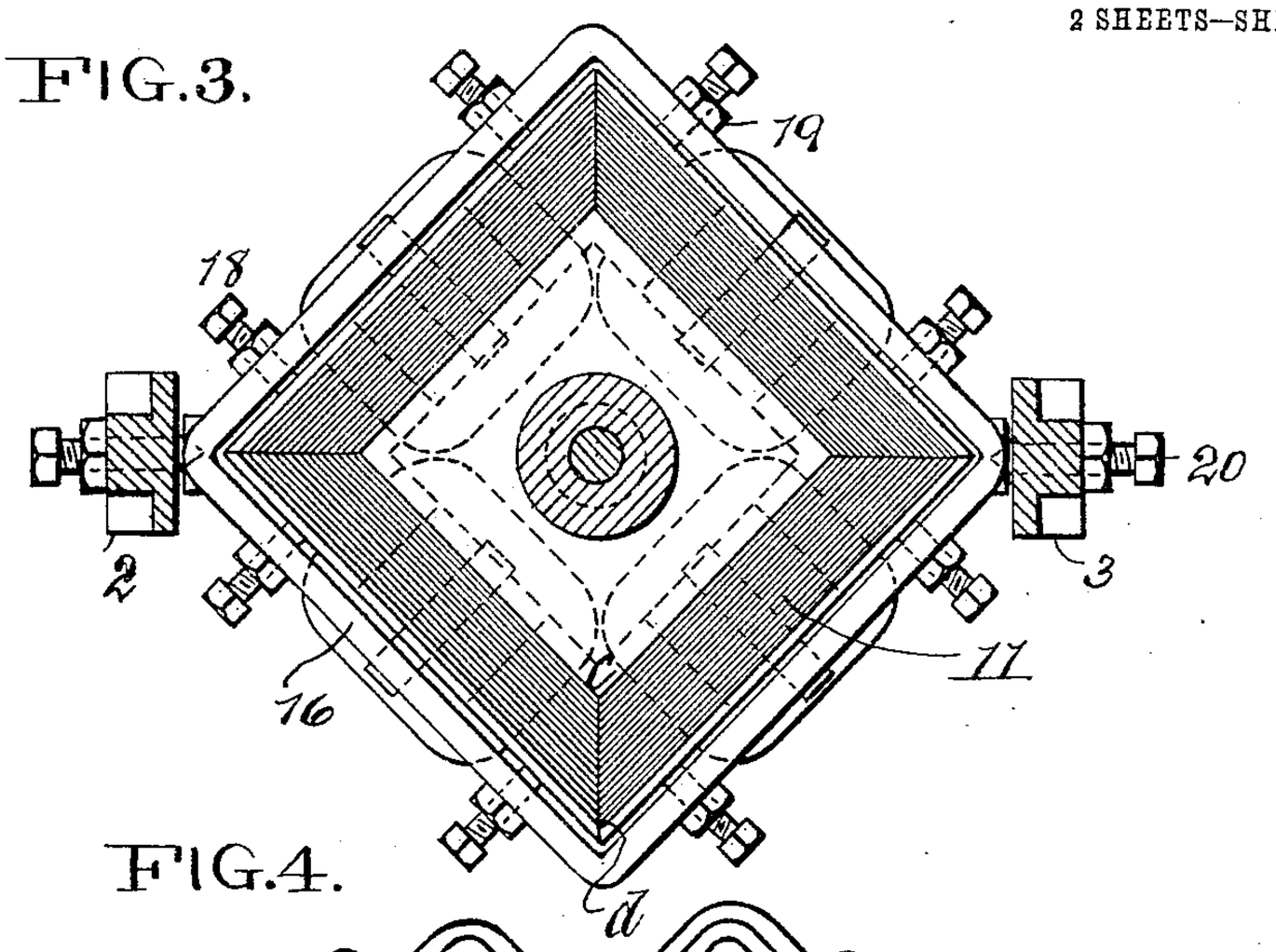
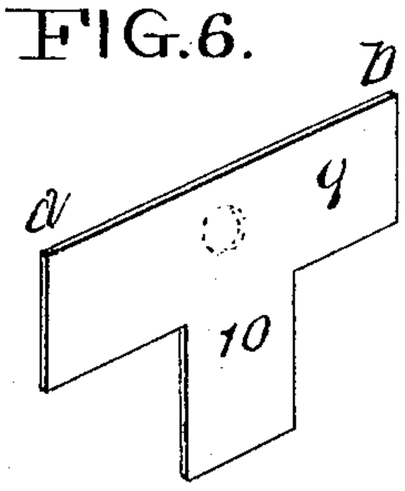


FIG. 4.

FIG. 6.



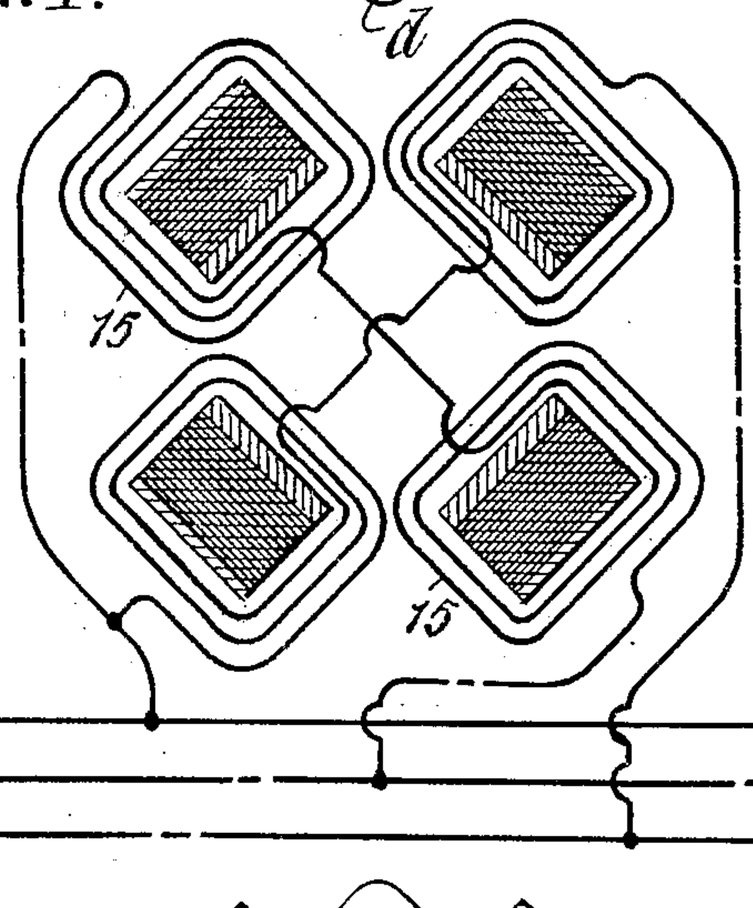


FIG. 7.

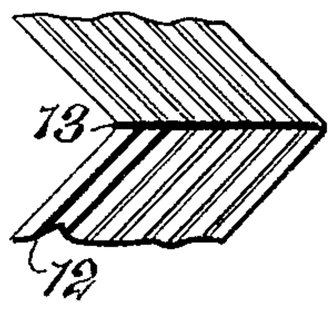
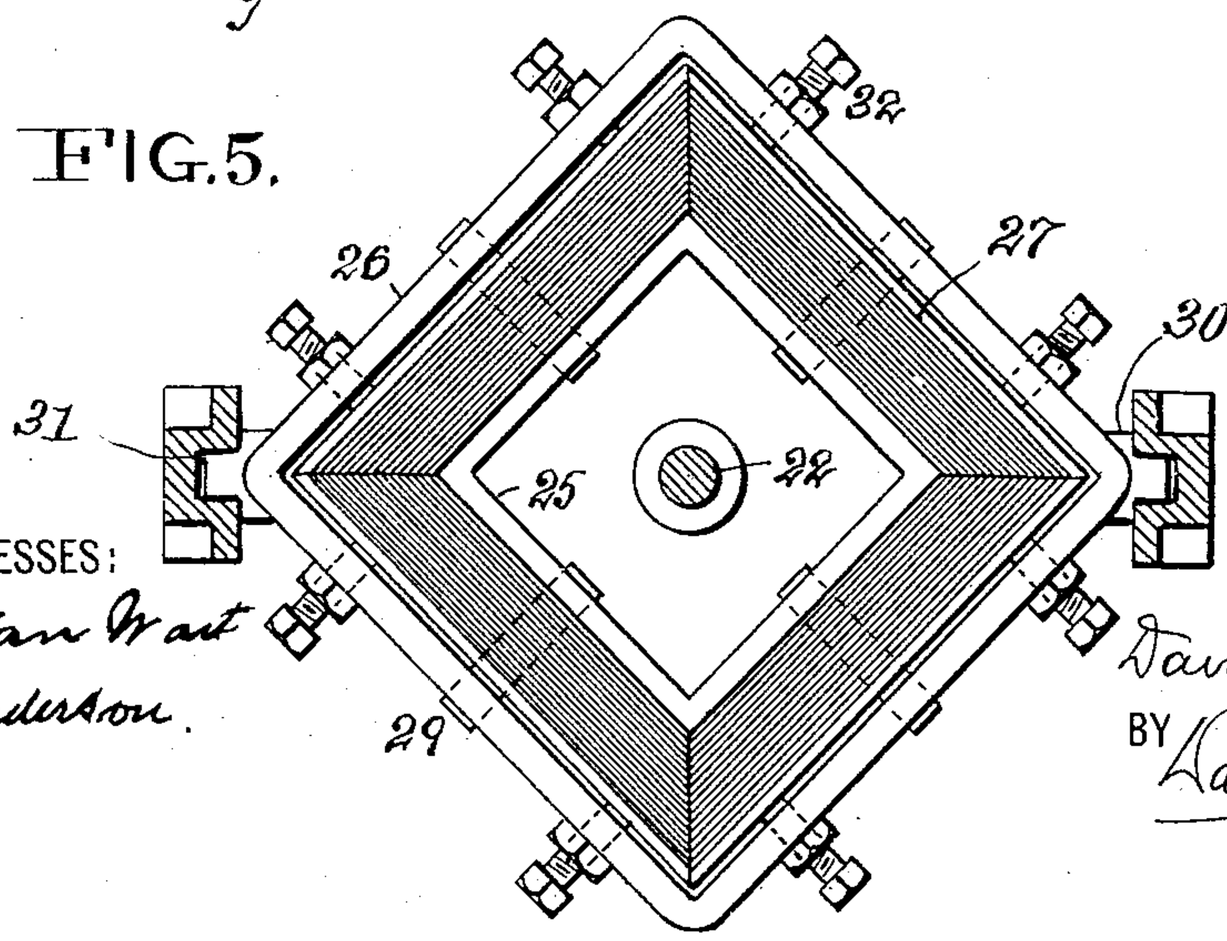


FIG. 5.



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No. 764,608. Patented July 12, 1904.

UNITED STATES PATENT OFFICE.

DAVID L. LINDQUIST, OF YONKERS, NEW YORK.

ELECTROMAGNET.

SPECIFICATION forming part of Letters Patent No. 764,608, dated July 12, 1904.

Application filed March 8, 1904. Serial No. 197,119. (No model.)

To all whom it may concern:

Be it known that I, DAVID L. LINDQUIST, a subject of the King of Sweden and Norway, and a resident of Yonkers, Westchester county, New York, have invented a new and useful Improvement in Electromagnets, of which the following is a specification.

The invention relates to an electromagnet constructed to be energized by an alternating current and when so energized to attract its armature and hold the same in position by substantially constant pull and without chattering.

The invention consists in the improved construction herein set forth of the electromagnet disclosed in United States Letters Patent No. 744,773 to myself, dated November 24, 1903, the said improvements being as more particularly hereinafter pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of the magnet and its armature. Fig. 2 is a vertical section with one of the supporting-brackets omitted. Fig. 3 is a horizontal section on the line x x of Fig. 1. Fig. 4 is a diagram in cross-section on the line y y of Fig. 1, showing the connections of the magnet for three-phase current. Fig. 5 is a section on the line z z of Fig. 1, showing the armature in top view. Fig. 6 shows in perspective one of the laminations of which the magnet-core is composed. Fig. 7 shows, in enlarged plan, one corner of the magnet-core, indicating the paper insulation between the several laminations and also between the groups of laminations which form, respectively, the four sides of the core.

Similar numbers of reference indicate like parts.

The magnet is constructed as follows:

1 is a supporting-ring carried by standards 2 3. The support for the magnet-coils is constructed in the following manner:

4 is a box secured by a threaded connection 5 to the under side of the supporting-ring 1. This box is here shown as quadrangular in horizontal section and provided on each side with a downward projection, one of which is shown at 6, Fig. 1.

7 is a quadrangular shell which surrounds the box 4 and which is also provided with a downward projection 8, corresponding to the downward projection 6 of said box. The shell 7 is considerably larger in transverse diameter than the box 4, so that in the space between them may be placed thin plates or laminations which make up the core of the magnet. One of these laminations is shown at Fig. 6. Each lamination has a broad upper portion 9 and a downward projection 10. The downward projection 10 is of the same transverse width as the downward projection 6 on box 4 and 8 on shell 7, so that when the laminations are placed face to face between box 4 and shell 7 their downward projections 10 will fill the interval between said downward projections 6 and 8. The laminations are made of different widths, measured in the direction from a to b, Fig. 6, so that when the several laminations forming one group or one side of the polygonal core 11 are put together the narrowest lamination will be inside and the broadest outside, with the result that beveled or mitered edges c d will be formed at each end of the group. Where the core is to be quadrangular in form, as shown, the angle of these edges is of course forty-five degrees, so that when the four groups 11 are formed they will completely fill the space between the box 4 and the outer shell 7. Preferably a thin layer of paper or other insulating material is placed between successive laminations, as shown at 12, Fig. 7, and a layer 13 of paper or other insulating material is placed between the faces of the abutting ends at the angles. The laminations fit closely in the space between the box 4 and the shell 7. Upon the four downward projections, each composed, as stated, of projections 6 on box 4, projections 10 on the several laminations, and the projections 8 on shell 7, is placed a bobbin 14, on which bobbins are wound the magnet-coils 15.

Outside of the shell 7 above the magnet-coils is a frame 16. Through each side of this frame, through shell 7, laminations, and wall of box 4 are driven plugs 17, of wood-fiber, which serve to prevent displacement of the laminations and also to hold the core in the frame 16. In order to center the com-

pleted core in the frame 16, I provide two set-screws 18, passing through each side of said frame and having their ends bearing against the facing sides of the shell 7. These screws are provided with jam-nuts 19. The frame 16, carrying the core, as aforesaid, is pivoted at its diagonally opposite angles between the standards 2 and 3 by the adjustable pivot-screws 20.

Centrally disposed in the box 4 is a sleeve 21, through which passes the rod 22, which rod below the magnet 15 is threaded to receive a sleeve 23, formed on the cup 24. This cup is quadrangular in section to correspond to the similar section of the magnet-core. It has a quadrangular upwardly-extending inner flange 25 and an outer flange 26. Between these flanges and just below the shell 7 is a frame 27. Between this frame and the flange 25 are packed the armature-laminations 28. These laminations are beveled at the ends in the same way as the laminations forming the magnet. To hold the frame 27 and laminations in place, plugs 29, of wood-fiber, similar to plugs 17, are driven through on each side, as shown in Fig. 5.

Extending from diagonally opposite angles of the flange 26 are guide projections 30, which enter guide-grooves 31 in standards 2 and 3. In order to center the frame 27, set-screws 32, similar to set-screws 18, are arranged in the flange 26. The position of the armature with respect to the magnet is adjusted by the nut 33 on rod 22. The rod 22 at its upper end has a bell-shaped stop 34, and on the upper side of the ring 1 is a dovetail groove containing a cushion 35, of rubber or leather, which forms an elastic seat for the stop 34.

When the magnet-coils 15 are not energized, the armature drops into the position shown in Fig. 1, the stop 34 then resting on the elastic cushion 35. When, however, the coils are excited, they raise the armature into contact with the pole-pieces of the magnet. The winding of the magnet having four pole-pieces, as above described, is indicated in Fig. 4, in which *e f g* represent conductors of currents of different phase.

It is to be understood that I do not limit myself to a four-sided magnet-core having four pole-pieces, as here shown, but include in my invention any core constructed, as described, of polygonal cross-section in contradistinction to cylindrical. It will be noted that the axis of the coils 15 are always parallel to and symmetrically disposed around the axis of the core, which is the longitudinal axis of the rod 22.

I claim—

1. An electromagnet having a polygonal core and a plurality of symmetrically-disposed coils thereon, the said coils having their individual axes parallel to the axis of said core and means for producing currents of different phase in said coils.

2. An electromagnet having a polygonal core with symmetrically-disposed pole-pieces at one end thereof, coils on said pole-pieces and means for producing currents of different phase in said coils.

3. An electromagnet having a polygonal laminated core with integral symmetrically-disposed pole-pieces at one end thereof, coils on said pole-pieces and means for producing currents of different phase in said coils.

4. In an electromagnet a core in the form of a polygonal frame with projecting pole-pieces receiving the magnet-coils, the sides of said frame being formed of groups of laminations mitered together at their ends.

5. In an electromagnet, a core in the form of a polygonal frame with pole-pieces receiving the magnet-coils; said frame being formed of groups of laminations, a polygonal inner support for said laminations and an outer inclosing shell.

6. In an electromagnet, a laminated polygonal core, pole-pieces receiving the magnet-coils, an inclosing frame for said core, means for centering said core in said frame, a support and means for pivoting said frame in said support.

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.