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CORE FOR ELECTRICAL APPARATUS.

APPLICATION FILED NOV. 21, 1918.

1,310,299. Patented July 15, 1919.

Fig. 1.

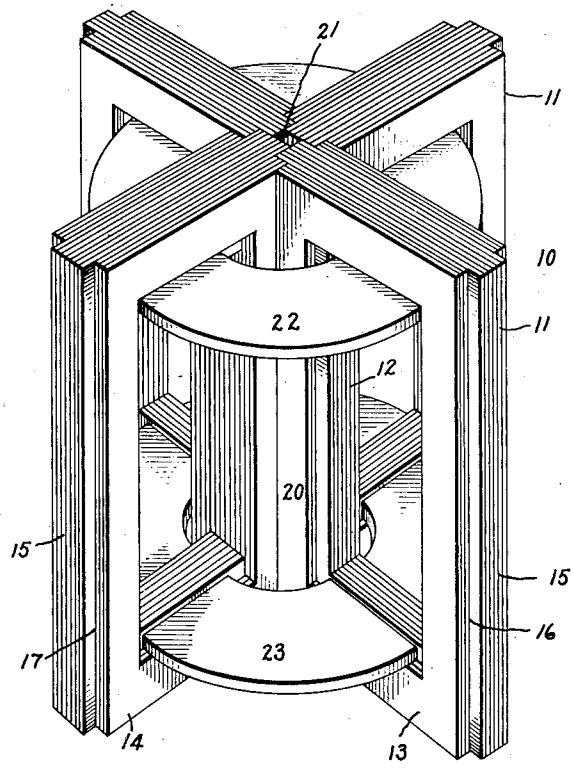


Fig. 2.

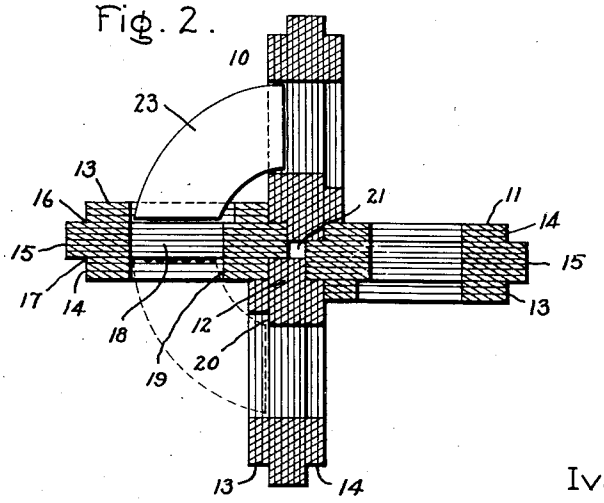
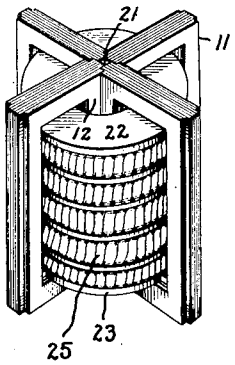


Fig. 3



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UNITED STATES PATENT OFFICE.

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CORE FOR ELECTRICAL APPARATUS.

1,310,299. Specification of Letters Patent. Patented July 15, 1919.

Application filed November 21, 1918. Serial No. 263,612.

To all whom it may concern:

Be it known that I, IVANHOE H. SCLATER, a citizen of the United States, residing at Pittsfield, in the county of Berkshire, State of Massachusetts, have invented certain new and useful Improvements in Cores for Electrical Apparatus, of which the following is a specification.

My invention relates to cores for electrical apparatus, such as transformers, reactors and the like and has for its object the provision of an improved arrangement of the core parts for securing not only desirable magnetic properties but at the same time improved facilities for mounting and supporting the windings thereon.

In the construction of electrical apparatus such as transformers having what are generally styled in the art, "distributed cores," it has been the practice to build the windings up about the central leg of the distribution core and secure them in place with collars and supporting clamps attached to the frame of the core. The adaptation of the core to resist the mechanical strains occasioned by the coil clamping, in addition to the main bracing required to resist the strains occasioned by the magnetic forces, often resulted in bulky cores in which the magnetic material was not used to the best advantage or in cores having undesirable magnetic properties.

In the practice of my invention, however, this provision of exterior bracing and clamps for the windings is unnecessary for I arrange the laminations out of which the core is built up, in a manner not only adapted to secure the desired magnetic properties but at the same time to furnish a configuration such that when in place, the necessary supports for the windings are provided by the laminations themselves in their assembled relation.

For a more complete understanding of the nature and objects of my invention reference should be had to the following detailed description when taken in connection with the accompanying drawing in which;

Figure 1 is a perspective view of a core embodying my invention. Fig. 2 is a section taken on a central horizontal plane through the core in Fig. 1; and Fig. 3 is a perspective view, on a reduced scale, showing the core having windings mounted thereon in assembled relation.

Referring now to the drawing, the core 10 is shown as made up of four laminated sections, one side of each section forming an outer leg 11, the other side being placed to abut another along one edge to form the central leg 12. The yoke portions thus gave a cruciform configuration as shown in Fig. 2.

Each of these sections are similar and are formed of laminations of different sizes, the outer laminations, as 13 and 14, of each section having less marginal width than the middle laminations 15. This mode of grouping the laminations gives a stepped formation to the core, of which advantage is taken to provide the means for supporting the windings hereinafter described.

The outer portions 13 and 14 of each section, which have the narrow marginal width, are formed to have a more or less uniform marginal width throughout, so that the reluctance of all parts of each lamination will be more or less uniform thereby avoiding the tendency for the magnetic flux to pass from one lamination into another.

This tendency of flux to pass from one lamination into another is not avoided by merely making the reluctance of all parts more or less uniform where the core is made up of portions, as in this case, having different marginal widths; unless precaution is taken to provide the various portions, as 13, 14 and 15 with the same mean path for the magnetic flux.

To get the same mean path in the portions 13 and 14 as in the central portion 15, I step them in as indicated at 16 and 17 respectively along the outer edge of the legs 11, and step the yoke member of this portion up and down from the top and bottom respectively of the window opening 18 in the central portion 15. By this outward displace-

ment of the yoke members the mean path is lengthened for the laminations of portions 13 and 14, which otherwise would be shortened by forming them with a narrower marginal width than the laminations in portion 15. The result of this construction is a core, in each section of which the ratio of the length to the cross sectional area is substantially constant for each part.

The central leg 12, of course should have an exterior stepped formation, as indicated in order to afford a short mean length of conductor in the windings which are to surround this leg.

In order that the complete core, composed of sections abutting along one edge or what is generally termed a distributed core, shall have the requisite strength when assembled, the central leg 12 has the various portions composing each section intermeshed as shown; the inner members 19 of portion 14 being slipped in behind the inner members 20 of portion 13. A central opening 21 may be left in the leg 12 for ventilating purposes if desired.

The offset radial ledge formed, as described, at top and bottom of the window 18 by the stepped yoke members of the laminations 13 and 14, provide excellent abutments upon which to support upper and lower quadrantal sectors 22 and 23 respectively.

These sectors are made from any suitable material, are made of such thickness as to form a flush surface with that of opening 18, and are designed with sufficient strength to support and retain the windings, shown at 25 in Fig. 3, in place.

The laminations, which are generally L-shaped placed in staggered relation to form the rectangular sections, are in the first instance assembled to form the base portions of the core and the central leg.

When the sectors 23 have been put in place the windings 25 may be assembled thereon and then pressed into place by the sectors 22 which are subsequently secured by interleaving among the laminations already in place, those additional laminations forming the outer legs and upper members of the core. A complete electrical device can in this manner be assembled having its windings securely supported in place without external clamps or bracing.

The core itself, however, is clamped in assembled relation by any suitable clamping device, the showing of which has been omitted from the drawing in the interest of clearness; an example of one such form of clamping device being shown in the U. S. Letters Patent to Johannesen No. 1,101,027, issued June 22, 1914.

It will of course be apparent to those skilled in the art that cores to embody my invention need not be made up of only four sections but may comprise any number of sections desirable, the sectors being modified to correspond.

Having now described, what is at present the best means known to me for carrying out an embodiment of my invention, I would have it understood that such means are merely illustrative and that I do not mean to be limited thereby to the exact details shown nor in the choice of recognized equivalents except as defined in my claims hereunto appended.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. In an electrical apparatus, a core comprising a plurality of abutting sections arranged to form a central leg, each section having a window and composed of laminations of different widths assembled in stepped formation to provide radial supporting ledges offset from the window opening, and sectors arranged between said sections and supported in place by said ledges.

2. In an electrical apparatus, a core comprising a plurality of abutting sections arranged to form a central leg, each section having a window and composed of laminations of different widths, each lamination being proportioned to have substantially the same magnetic reluctance in all its parts, said laminations being assembled in stepped formation to provide radial supporting ledges offset from the window opening, and sectors arranged between said sections and supported in place by said ledges.

3. In an electrical apparatus, a core comprising a plurality of abutting sections arranged to form a central leg, each section having a window and composed of laminations of different widths, each lamination being proportioned to have substantially the same mean path for the magnetic flux as every other lamination in the section, said laminations being assembled in stepped formation to provide radial supporting ledges offset from the window opening, and sectors arranged between said sections and supported in place by said ledges.

4. In an electrical apparatus, a core comprising a plurality of abutting sections arranged to form a central leg, each section having a window and composed of laminations of different widths, each lamination being proportioned to have substantially the same magnetic reluctance in all its parts and to have substantially the same mean path for the magnetic flux as every other lamination in the section, said laminations being assembled in stepped formation to provide radial supporting ledges offset from the window opening, and sectors arranged between said sections and supported in place by said ledges.

5. In an electrical apparatus, the combination with a core comprising four abutting sections each having a window and arranged

to form a central leg and four outer legs, said sections being composed of laminations of different widths assembled in stepped formation to provide radial supporting ledges offset from the window opening, of a winding surrounding said central leg and threading through said windows, and quadrantal sectors supported on said ledges between said sections and arranged to retain said winding in place.

In witness whereof, I have hereunto set my hand this eighteenth day of November 1918.

IVANHOE H. SCLATER.