July 17, 1951 E. D. TREANOR 2,561,250

MAGNETIC CORE

Filed Sept. 23, 1949

Fig. 1

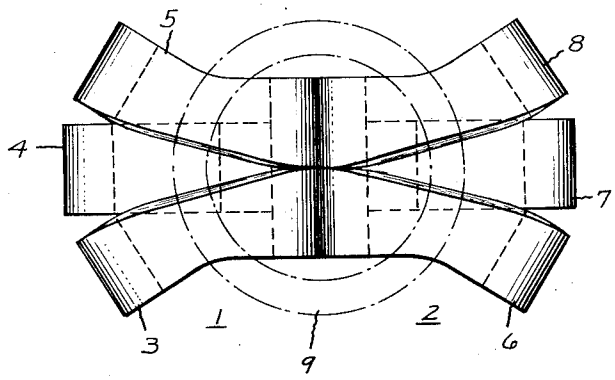
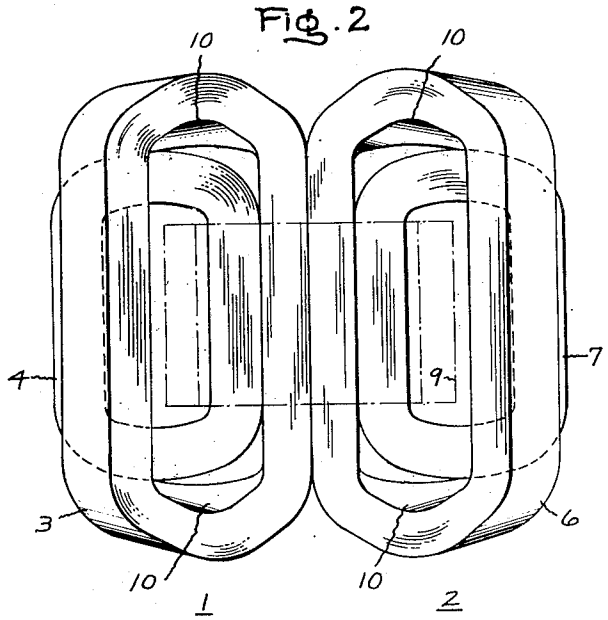


Fig. 2



Inventor:
Edward D. Treanor
by Ernest C. Britton
His Attorney

Patented July 17, 1951

2,561,250

UNITED STATES PATENT OFFICE

2,561,250

MAGNETIC CORE

Edward D. Treanor, Pittsfield, Mass., assignor to General Electric Company, a corporation of New York

Application September 23, 1949, Serial No. 117,308

3 Claims. (Cl. 175—356)

1

This invention relates to magnetic cores, and more particularly to improvements in shell type cores for single phase stationary electromagnetic induction apparatus.

Conductive windings of circular shape have certain well known advantages in comparison with windings of non-circular shape. For best utilization of a coil its window should be substantially filled with the magnetic material which constitutes the core winding leg, but it is more difficult to make a magnetic core having a winding leg of circular or approximately circular cross section than it is to make one having, say, a rectangular cross section.

In accordance with this invention, I provide a novel core construction in which the winding leg is of cruciform cross section which, therefore, approximates more closely a circular cross section than does an ordinary rectangular cross section core winding leg. At the same time the remaining portion of the core is so arranged that the overall core will have a minimum external diameter and a minimum outside thickness so that the core and coil assembly may be fitted into a circular cross section, or cylindrical, tank of minimum diameter. The invention is characterized by the use of a plurality of generally rectangular magnetic loops, certain of which fit inside others and said others have portions thereof bent or curved sidewise at their ends so as to reduce the overall outside dimensions of the core.

An object of the invention is to provide a new and improved magnetic core.

A further object of the invention is to provide a novel multi-part shell type core for single phase stationary electro-magnetic induction apparatus.

A still further object of the invention is to provide a core having a cruciform cross section central winding leg and oppositely extending yoke parts which are curved sidewise in such a manner as to reduce the overall outside dimensions of the core.

The invention will be better understood from the following description taken in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

In the drawing Fig. 1 is a plane view of an embodiment of the invention, and Fig. 2 is a side elevation thereof.

Referring now to the drawing in which like reference numerals designate the same part in the two views, the core comprises two back to back related groups 1 and 2 of three generally rectangular magnetic loops in each group. The magnetic loops in group 1 are shown at 3, 4

2

and 5 and the magnetic loops comprising group 2 are shown at 6, 7 and 8.

Each loop has two side legs and two end yokes. These parts may all be made integral by winding up each loop from a long strip of magnetic material such as cold rolled high reduction silicon steel. When so made the loops will consist of radially nested lamination layers. The loops may be provided with any number of joints in any well known manner but this is not essential. All the loops have generally the same width but the center loop 4 of group 1 and the center loop 7 of group 2 are generally shorter than the other four loops. The loops may all be wound of magnetic strip material of the same width but this is not essential although it has certain manufacturing advantages.

As shown more cleary in Fig. 1, one leg of the loop 4 has its outer surface symmetrically located with respect to the inner surface of side by side related legs of the loops 3 and 5. The same thing is true of the relationship between one of the legs of smaller loop 7 and the two larger loops 6 and 8 of the group 2 so that a six part central cruciform cross section winding leg is provided. As shown this winding leg is surrounded by a winding 9, the outline of which is shown in phantom.

The end yokes of the long loops 3, 5, 6 and 8 are curved or bent sidewise in diverging directions. This is not an edgewise bending of the lamination layers because as shown more clearly in Fig. 2 the portions of the yokes of the larger loops which are furthest away from the small central loops 4 and 7 tend to buckle lengthwise of the core loops as indicated at 10. As a result of this divergent sidewise bending of the yokes of the larger loops the six remaining or outer legs of the loops all touch a common circumscribing cylinder or circle so that the core can fit into a relatively small cylindrical tank whose diameter need exceed the outer diameter of the core window by little more than the cross sectional thickness of the legs of the loops.

While there has been shown and described a particular embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications can be made therein without departing from the invention and therefore it is aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

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

1. A magnetic core comprising, in combination, six generally rectangular loops of magnetic

material arranged in two back to back related groups of three each, each loop having two sides and two ends, one loop in each group being symmetrically located generally inside the other two which are side by side so as to form a generally cruciform cross section centrally located winding leg which is made up of one side each of all six loops, the two outer loops in each group having their ends divergingly curved so that the other sides of all six loops lie generally on the same circumscribing circle.

2. A magnetic core comprising, in combination, six radially laminated generally rectangular magnetic loops each having two relatively long legs and two relatively short yokes, the legs of two of said loops being the same length and shorter than the legs of the other four loops, a leg of each of a pair of long legged loops being side by side, a leg of each of the other pair of long legged loops being side by side and back to back related to the side by side legs of the first pair of long legged loops, a leg of a short legged loop having the center line of its outer surface along the line of contact of the inner sides of the pair of side by side long legs of one pair of

long legged loops, a leg of the other short legged loop having the center line of its outer surface along the line of contact of the inner sides of the side by side long legs of the other pair of long legged loops, the yokes of each pair of long legged loops being divergingly curved to such an extent that their respective remaining long legs are on opposite sides of the respective remaining leg of a short legged loop whereby all of said remaining legs lie substantially in the same imaginary circular cylinder.

3. The core defined in claim 2 in which the magnetic cross section of all of the loops have the same area and same rectangular shape.

EDWARD D. TREANOR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,344,006	Steinmayer	Mar. 14, 1944
2,498,747	Wiegand	Feb. 28, 1950