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J. C. GRANFIELD

1,992,822

MAGNETIC CORE

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Fig. 1.

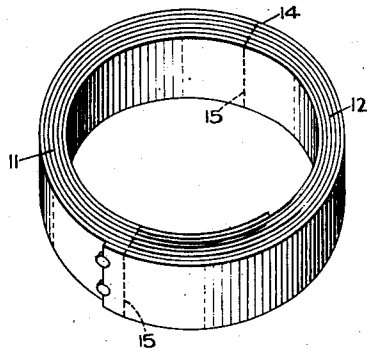


Fig. 2.

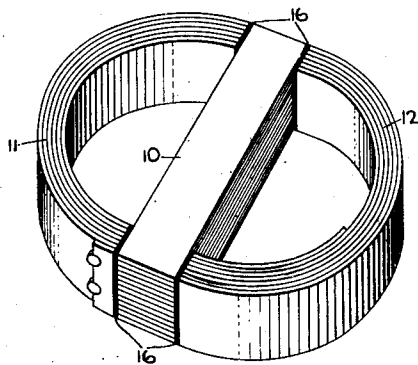
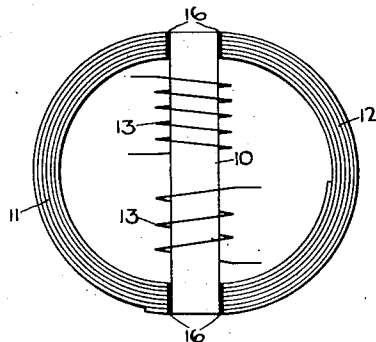


Fig. 3.



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UNITED STATES PATENT OFFICE

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MAGNETIC CORE

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1 Claim. (Cl. 175—356)

My invention relates to magnetic cores for electrical induction apparatus such as transformers and reactors. Magnetic cores of this kind are laminated and the laminations insulated from each other to prevent excessive eddy current losses. It is also desirable that a core be formed with as few joints as practicable as each joint increases the magnetic reluctance of the core and consequently the magnetizing current required to excite the core. The magnetic laminations are formed by a rolling process and this results in a granular structure with the grains arranged in the direction in which the laminations were rolled. It has been found that magnetic flux will flow more readily in such laminations in the direction with the grain than in the direction across the grain and it is therefore desirable that the laminations be so arranged in a core that so far as possible the magnetic core flux flow with the grain rather than across it. The general object of the invention is to provide an improved method for forming such a magnetic core.

The invention will be explained more fully in the following description taken in connection with the accompanying drawing in which Fig. 1 is a perspective view of a laminated ring used in forming the core, Fig. 2 is a perspective view of the completed core and Fig. 3 is another view of the completed core provided with windings which are shown diagrammatically.

Like reference characters indicate similar parts in the different views of the drawing.

The completed core as shown in Fig. 2 includes a straight center leg 10 formed by superposing a plurality of straight rectangular magnetic laminations. The core as shown also includes two side legs 11 and 12 connecting the ends of the center leg and forming return paths for the magnetic flux in the center leg. When the core is used in a simple, two-winding transformer, the windings 13 would be provided on the center leg 10 as indicated in Fig. 3.

The side legs 11 and 12 are formed by first winding a long strip of magnetic sheet material flatwise to form a laminated ring 14 as shown in Fig. 1. The ring 14 may be circular as shown or may be of other form if desired. The magnetic material in both the ring 14 and the center leg 10 should be annealed but this may be done at any time and by any process desired. After the ring 14 has been formed, it is separated at opposite sides and in a single plane as indicated by the dotted lines 15 into preferably equal curved parts or sections. Thus, the two end surfaces of each section are in the same plane. The ring may be severed by a metal saw if desired but this is apt to cause short circuits between the laminations and

it is considered better to use a thin abrasive wheel to cut through the ring.

The length of the center leg 10 and its rectangular laminations is approximately the same as the diameter of the ring 14 and therefore as the distance across the ends of the sections 11 and 12 of the ring after it has been severed. The ring sections 11 and 12 are assembled at opposite sides of the center leg 10 as shown in Fig. 2 with each ring section connecting the ends of the center leg and the end edges of the ring section laminations at right angles to the center leg laminations. A thin layer of insulation 16 such as fiber is preferably placed between each end of each ring section and the center leg to prevent short circuits between the laminations.

The rectangular laminations of the center leg 10 and the strip used to form the ring sections 11 and 12 are preferably produced with the grain in the longitudinal direction. With this arrangement the magnetic flux in all parts of the completed core will flow in the direction of the grain in the laminations except for very small distances at the ends of the center leg 10. Only one of the ring sections 11 and 12 but with greater cross section may be used, if desired, because a single section of sufficiently large cross section will of course provide a good return path for the magnetic flux in the core leg 10. However, the use of both ring sections 11 and 12 is considered preferable as the arrangement is more symmetrical and very probably more efficient because of better distribution of the magnetic flux in the end portions of the core leg 10.

The invention has been explained by describing and illustrating a particular magnetic core and the method of producing it but it will be apparent that changes may be made without departing from the spirit of the invention and the scope of the appended claim.

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

The method of producing a magnetic core, said method including the steps of winding strip magnetic material flatwise to form a laminated ring, severing said ring at opposite sides and in a single plane to form two sections, forming a straight laminated magnetic core leg with opposite plane sides at right angles to its laminations, and assembling the two ring sections at opposite sides of said core leg with the end edges of the ring section laminations at right angles to the core leg laminations whereby the plane end surfaces of the ring section fit said opposite plane sides of the core leg.

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