Nov. 14, 1933. H. M. ACLY 1,935,426

MAGNETIC CORE

Filed Nov. 22, 1932

Fig. 1.

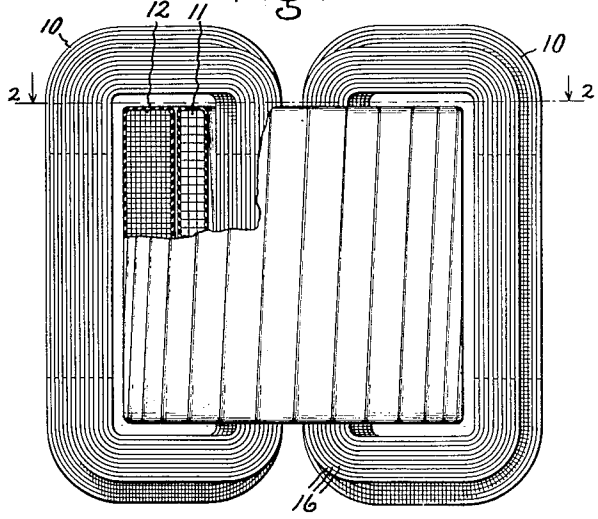


Fig. 2.

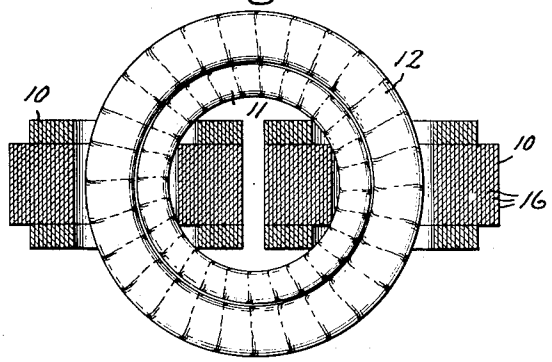


Fig. 3.

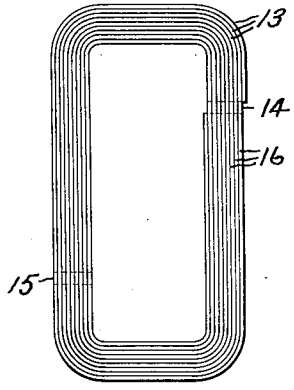


Fig. 4.

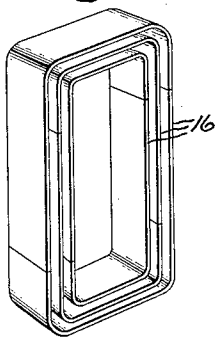


Fig. 5.

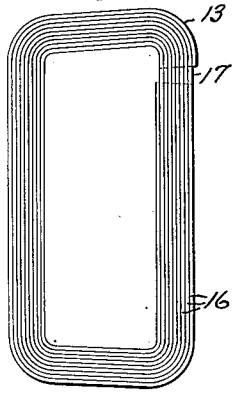


Fig. 6.

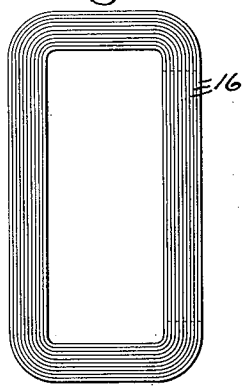
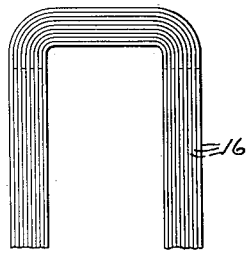


Fig. 7.



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UNITED STATES PATENT OFFICE

1,935,426

MAGNETIC CORE

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Application November 22, 1932
Serial No. 643,857

2 Claims. (Cl. 175—356)

My invention relates to magnetic cores such as are used in transformers, reactors and similar electrical apparatus. It has already been suggested that a magnetic core be formed by winding a strip of flat magnetic sheet material into a spiral coil with a center opening for the winding or windings. One of the advantages of such a core is that it may be formed rapidly and with simple tools. Magnetic sheet material for magnetic cores is produced by a rolling process and its magnetic properties in a core are best if the path of the magnetic flux is in the direction in which the material was rolled. Another advantage of a magnetic core of the wound type is that the strip of magnetic material forming the core may be easily arranged so that the path of the magnetic flux in all parts of the core will follow the direction in which the strip was rolled. It is not convenient, however, to assemble a winding with a magnetic core of the wound type. The general object of the present invention is to provide an improved method for forming a magnetic core having substantially the advantages of a wound type core with the additional advantage that it may be easily assembled with its winding or windings.

The invention and its advantages will be explained in the following description taken in connection with the accompanying drawing in which Fig. 1 shows a transformer, partly broken away, with a magnetic core constructed in accordance with the invention; Fig. 2 is a sectional view on the line 2—2 of Fig. 1, and Figs. 3 to 7 inclusive are explanatory views, on a somewhat reduced scale, indicating the construction of the magnetic core shown in Figs. 1 and 2 and modified forms thereof.

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

The transformer shown in Figs. 1 and 2 includes a two-part magnetic core 10 with windings 11 and 12 surrounding the adjacent sides of the two parts. Each of the two parts of the core 10 includes a large center section with a smaller section at each side to fill in more completely the cylindrical space surrounded by the windings 11 and 12. The sections of the core may be alike except as to size.

Each section of the core 10 is formed from a flat strip 13 of magnetic sheet material of suitable width. This strip 13 is wound flatwise into a hollow coil, preferably on a suitable form, with enough turns to give the coil the required thickness and cross section.

In forming the core indicated in Figs. 1 to 4 inclusive, the wound magnetic coil is separated into two parts by two cuts 14 and 15 as indicated in Fig. 3. These cuts may be made by a saw so that some of the material of the coil is removed and a gap is formed at each cut, the material removed and the length of each gap being indicated in Fig. 3 between the two broken lines at each cut. The results of any previous annealing process are apt to be at least partly destroyed by cutting the coil and the coil is therefore preferably annealed after the cuts 14 and 15 are made.

The cuts 14 and 15 separate each of the turns 16 of the magnetic coil into two sections. The turns are then reassembled around the windings 11 and 12 as indicated in Figs. 1 and 2 with part of the turns reversed in position so that the joints between their sections are displaced. As shown in Fig. 1, alternate turns are reversed. Fig. 4 is a perspective diagrammatic view of three successive turns showing how the joints between the sections of these turns are offset after alternate turns are reversed. After the coil has been wound as shown in Fig. 3 but before the cuts 14 and 15 have been made, the turns are arranged end to end in the coil with adjacent ends of the turns offset as indicated at the cut 14 in Fig. 3. The turns are reassembled as indicated in Figs. 1 and 4 with the ends of each turn meeting each other and close together. Thus, the two parts of the coil are reassembled to form a magnetic core which includes two parts connected by interleaved joints and with each turn closed.

When reassembled as indicated in Figs. 1 and 4, each turn and therefore the completed core is shorter than the wound coil by an amount equal to the length of each gap formed by the cuts 14 and 15. The strip 13 is therefore wound to form a coil longer than the desired length of the completed core by an amount equal to the length of the gaps formed by the cuts.

The magnetic strip 13 may also be wound as shown in Fig. 5 to form a coil with the length of one side equal to the desired length of the completed core but with the other side longer. A cut 17 is made in the longer side of the coil. The cut 17 removes some of the material of the coil and forms a gap in the longer side of the coil and of each turn, the length of the gap being equal to the amount by which the length of the coil exceeds the desired length of the completed core. The turns are reassembled with part of them reversed in position and with the ends of each turn formed by the cut 17 brought close together. The reassembled turns are shown in Fig. 6 with alternate turns reversed endwise and in Fig. 7 with alternate turns reversed sidewise. With the

single cut 17 of Fig. 5, there is the advantage that each turn in the completed core has only a single joint instead of two joints as with the cuts 14 and 15 of Fig. 3. With the two cuts 14 and 15, however, there is the advantage that the turns may be reassembled about the windings 11 and 12 without bending the turns as is necessary with the single cut.

The invention has been explained in connection with an elongated rectangular core and the method of producing it but the invention is of course equally applicable to other forms. Other changes will also be apparent without departing from the spirit of the invention and the scope of the appended claims.

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

1. The process of forming a hollow magnetic core, said process including the steps of winding a strip of magnetic sheet material flatwise to form a coil, forming a gap in at least one side of said coil, and reassembling the turns of said coil with the ends of each turn meeting end to end and the ends of said turns interleaved.

2. The process of forming a hollow magnetic core, said process including the steps of winding a strip of magnetic sheet material flatwise to form a coil longer than the desired completed core, forming in at least one side of said coil a gap equal in length to the excess length of said coil, and reassembling the turns of said coil with the ends of each turn meeting end to end and the ends of said turns interleaved.

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