

Nov. 25, 1930.

W. J. MORRILL

1,783,050

MAGNETIC CORE

Filed April 22, 1930

Fig. 1.

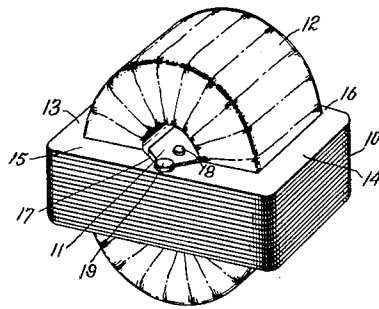


Fig. 2.

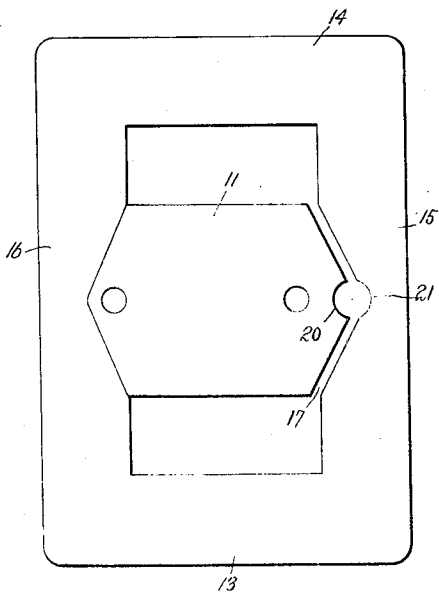


Fig. 3.

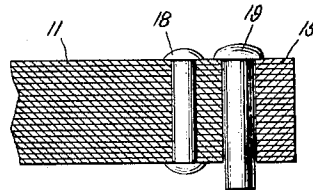
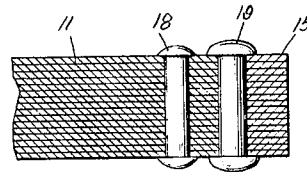


Fig. 4.



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UNITED STATES PATENT OFFICE

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MAGNETIC CORE

Application filed April 22, 1930. Serial No. 446,376.

My invention relates to magnetic cores for electrical induction apparatus such as transformers and reactors. Magnetic cores are often constructed with air gaps in their magnetic circuits to produce the effect of high reactance in their windings. The general object of the invention is to produce an improved core of this type which can be easily and quickly assembled and which will be mechanically strong and rigid.

The invention will be readily understood from the following description taken in connection with the accompanying drawing in which Fig. 1 shows a reactor having a laminated magnetic core constructed in accordance with the invention. Fig. 2 shows a single layer or lamination of the core shown in Fig. 1 and Figs. 3 and 4 are detail sectional views.

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

The reactor shown in Fig. 1 includes a laminated magnetic core 10 having a central winding leg 11 surrounded by a winding 12. The core has two outside legs 13 and 14 connected by end yokes 15 and 16, the outside leg and yoke sections of each lamination being integral and formed by punching an opening in a single piece of magnetic sheet material. The inner edge of each yoke section of each lamination is formed with a notch so that the inner face of each of the yokes 15 and 16 has a similarly shaped notch. The ends of the winding leg 11 are shaped to fit these notches but the winding leg is slightly shorter than the distance between the notches so that there is a nonmagnetic air gap 17 in the magnetic circuit at one end at least of the winding leg.

The lamination sections forming the winding leg 11 are secured together by two rivets 18. A number of outer lamination sections are assembled to form a stack of the same thickness or height as that of the winding leg 11 and, after placing the winding 12 on the winding leg 11, this winding leg is placed in position between the notches in the yokes 15 and 16, leaving a non-magnetic air gap between at least one end of the winding leg and the inner face of the adjacent

yoke. The winding leg 11 and the outer part of the core formed by the outer legs 13 and 14 and the yokes 15 and 16 are held tightly and rigidly together by a rivet 19. The end of the winding leg 11 next to the rivet 19 and the inner face of the adjacent yoke at the base of its notch are formed with opposed recesses 20 and 21 respectively to fit the rivet. The rivet 19 is of suitable non-magnetic material such as brass or copper so that it will not interfere with the effect of the air gap 17.

The size of the rivet 19 is such that it will pass readily through the air gap 17 and between the recesses 20 and 21 and without injury to the surfaces of the rivet and recesses. Fig. 3 is a sectional detail view through the axes of the rivets 18 and 19 and shows the rivet 19 in place and before being tightened. The rivet 19 may have a head at one end before being placed in position in the air gap as shown in Fig. 3. With the rivet 19 in place, a head is formed on the other end, preferably by a hydraulic press. Besides forming the second head on the rivet 19, this pressure upsets or expands the rivet throughout its length, the rivet being of some suitable metal such as brass or copper which may be thus expanded by the pressure. This expansion of the rivet 19 forces it tightly against every lamination on both sides of the air gap 17. This forces the opposite end of the winding leg toward the inner face of the yoke 16 and holds all the laminations of the winding leg and the outer portion of the core rigidly together without the necessity of any rivets in the outer part of the core. The rigid support for every lamination not only effectively prevents vibration and noise but also prevents displacement of the laminations and consequent variation of the air gap when the laminations are subjected to severe magnetic forces during short circuit or heavy load conditions in the winding.

The invention has been explained by describing and illustrating a particular form of reactor constructed in accordance therewith but it will be apparent that various changes and applications of the invention may be made without departing from the spirit of

the invention or the scope of the appended claims.

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

5 1. A laminated magnetic core for electrical induction apparatus, said core including a laminated outer part forming two outer legs and yokes connecting said legs, a laminated central leg part between said yokes, means
10 for securing the laminations of at least one of said parts together, there being a non-magnetic gap between at least one end of said winding leg and the adjacent yoke, and a rivet through said gap, said rivet being ex-
15 panded throughout its length against the adjacent leg and yoke laminations.

2. A laminated magnetic core for electrical induction apparatus, said core including a laminated outer part forming two outer
20 legs and yokes connecting said legs, the leg and yoke portions of each lamination being integral, a laminated central leg part between said yokes, means for securing the laminations of at least one of said parts together;
25 there being a non-magnetic gap between at least one end of said winding leg and the adjacent yoke, and a rivet through said gap, said rivet being expanded throughout its entire length against the adjacent leg and yoke
30 laminations.

3. A laminated magnetic core for electrical induction apparatus, said core including a laminated outer part forming two outer legs and yokes connecting said legs, the inner
35 faces of said yokes having notches, a laminated central leg part between said notches, means for securing the laminations of at least one of said parts together, there being a non-magnetic gap between at least one end of said
40 winding leg and the adjacent yoke, and a rivet through said gap, said rivet being expanded throughout its length against the adjacent leg and yoke laminations.

In witness whereof, I have hereunto set my
45 hand this 19th day of April, 1930.

WAYNE J. MORRILL.

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