C. E. LEE.

CORE FOR ELECTRICAL APPARATUS.

APPLICATION FILED OCT. 18, 1920.

1,380,983. Patented June 7, 1921.

Fig. 1.

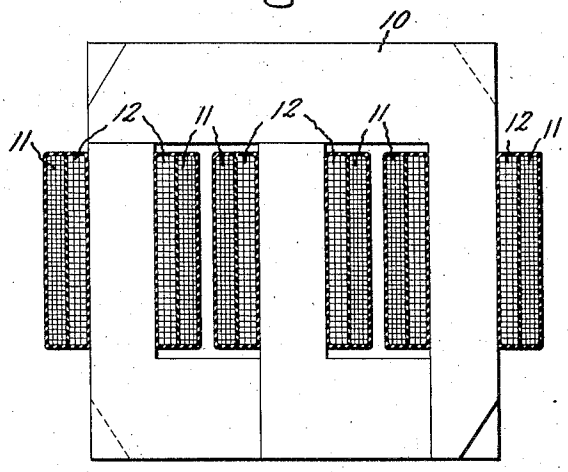


Fig. 2.

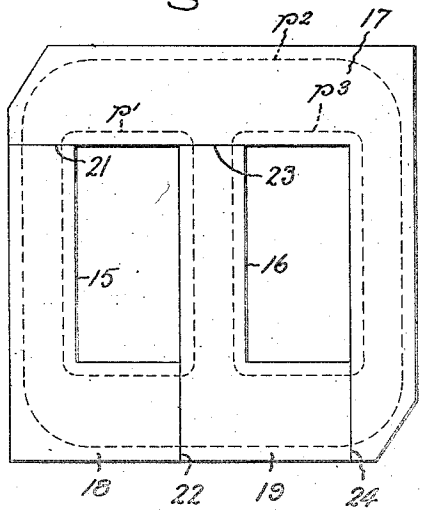
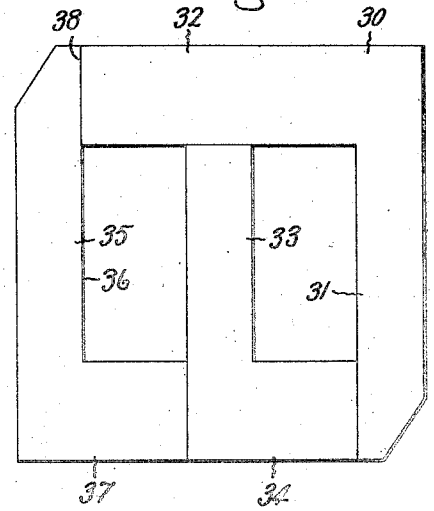


Fig. 3.



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UNITED STATES PATENT OFFICE.

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CORE FOR ELECTRICAL APPARATUS.

1,380,983. Specification of Letters Patent. Patented June 7, 1921.

Application filed October 18, 1920. Serial No. 417,714.

To all whom it may concern:

Be it known that I, CORLISS E. LEE, 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, some reactances and the like and has for its object an improved arrangement of parts which is economical and readily manufactured.

In electrical apparatus having magnetic cores, and particularly in transformers and the like, it is desirable to construct the cores with as few joints as possible in order to reduce the reluctance of the magnetic circuit and thereby reduce the losses and exciting current. The use of L-shaped elements or punchings is well adapted to this purpose in the construction of rectangularly shaped cores; arrangements of L's heretofore proposed for accomplishing this end being shown in the U. S. patent to Thomson No. 528,188.

In rectangular three legged cores adapted for three phase core-type transformer and for certain single-phase shell type transformers, the type of L-shaped elements which were in general previously used have on the average over three joints per path traversed by the magnetic flux of the group of magnetic circuits involved.

In the practice of my invention I employ only L's in the construction of core laminations with consequent savings in the sheet material from which they are cut; the L's themselves being proportioned and arranged in the novel manner hereinafter pointed out which reduces the number of joints to an average of approximately 2.6 thereby decreasing the power losses and exciting current to substantially a minimum.

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

Figure 1 is a view mainly in vertical section of a transformer having a core constructed in accordance with my invention; while Figs. 2 and 3 show arrangements of L's to form core laminations which are employed in the practice of my invention.

Referring now to the drawing, 10 denotes a three legged core having high and low voltage windings 11 and 12 on each of the respective legs.

The core carrying these windings is assembled from L's which are inserted in the windings, the latter being wound and first arranged; the arrangement of L's in the assembly shown in Fig. 1 being more clearly shown in Fig. 2.

Here two L's 15 and 16, which are identical in size and shape, are joined with and butted against a larger L 17 to form a lamination. The L-shaped lamination 15 forms one leg and a portion of one yoke, as denoted at 18. The same is true of L-shaped punching 16, which has a portion 19 coacting with the portion 18 to complete the lower yoke. The L 17 forms the third leg and the other yoke.

The average number of joints in the group of paths traversed by the magnetic flux for the circuits involved will be seen to be very approximately 2.6 from the following considerations: The flux from the winding about the leg of the L denoted 15 follows the paths P_1 and P_2. The path P_1 crosses a joint at 21, one at 22, and a third at 23, *i. e.*, it has three joints. The path P_2 crosses a joint at 21, one at 22, and another at 24, and likewise has three joints.

The flux from the winding about the middle leg follows paths P_1 and P_3; the first one of which has three joints while the latter has but two joints. The flux from the winding about the leg of L 17 follows paths P_3 and P_2 which have two and three joints respectively. The average number of joints of these six paths taken collectively is very approximately 2.6.

It will of course be understood that each alternate lamination or group of laminations of the type shown in Fig. 2 has the L's composing it reversely disposed in order to break joints. This, however, is an old practice well understood in the art, consequently further explanation is deemed unnecessary.

In Fig. 3 I have shown a lamination similar to that shown in Fig. 2 but composed of three different sized L's. The L shown at 30 is a large L adapted to provide one leg at 31, and one yoke as shown at 32. The second and smallest L 33 is butted against the L 30 and provides the central leg and a yoke portion 34. The third and intermedi-

ate sized L 35 provides the third leg 36 and the balance of the upper yoke portion 37. This arrangement permits the use of a vertical joint at 38 instead of a horizontal one; which vertical arrangement has the advantage of providing a joint at a point in the magnetic circuit which has a lower flux density than where the horizontal joint is used. The average number of joints for the group of flux paths involved is seen to be the same in Fig. 3 as in Fig. 2.

Having now described what is at present the best means known 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 restricted 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. A core for electrical apparatus comprising yoke members and n legs, assembled solely from L-shaped elements, each lamination in the core having one element arranged to form one leg and one yoke, and $n-1$ other elements each arranged to form another leg and part of a second yoke.

2. A core for transformers and the like, comprising two yoke members and three legs, assembled solely from L-shaped punchings; each lamination in the core having one punching arranged to form one leg and one yoke, and two other punchings each arranged to form another leg and a portion of the second yoke.

In witness whereof, I have hereunto set my hand this fourteenth day of October, 1920.

CORLISS E. LEE.