

C. LE G. FORTESCUE.
TRANSFORMER.

APPLICATION FILED NOV. 19, 1908. RENEWED JUNE 15, 1911.

1,013,150.

Patented Jan. 2, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

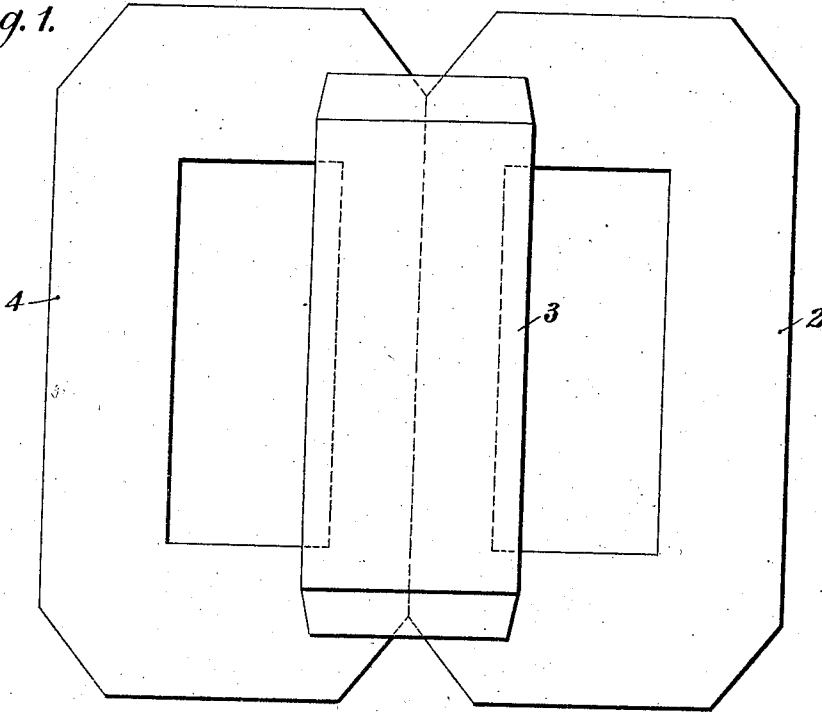
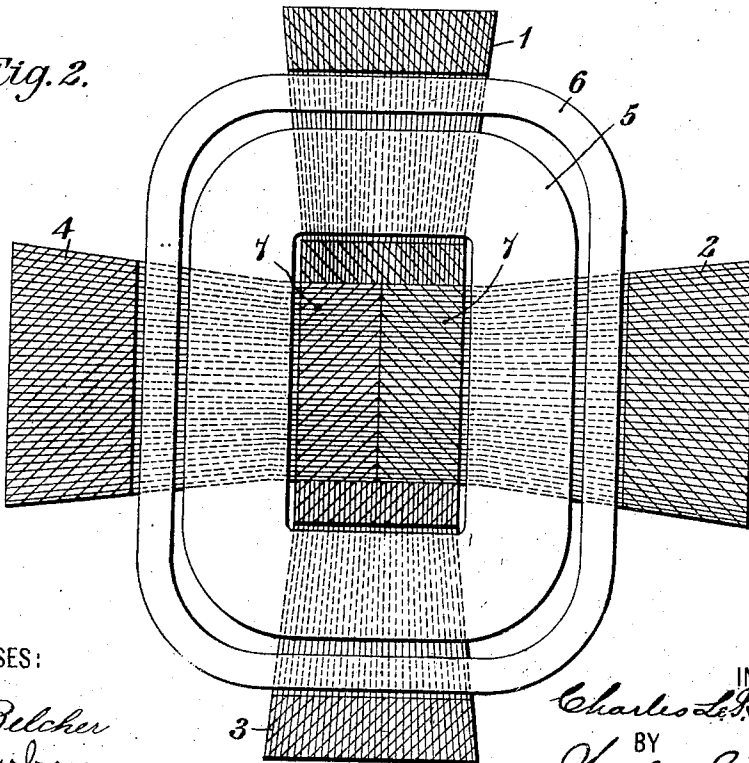


Fig. 2.



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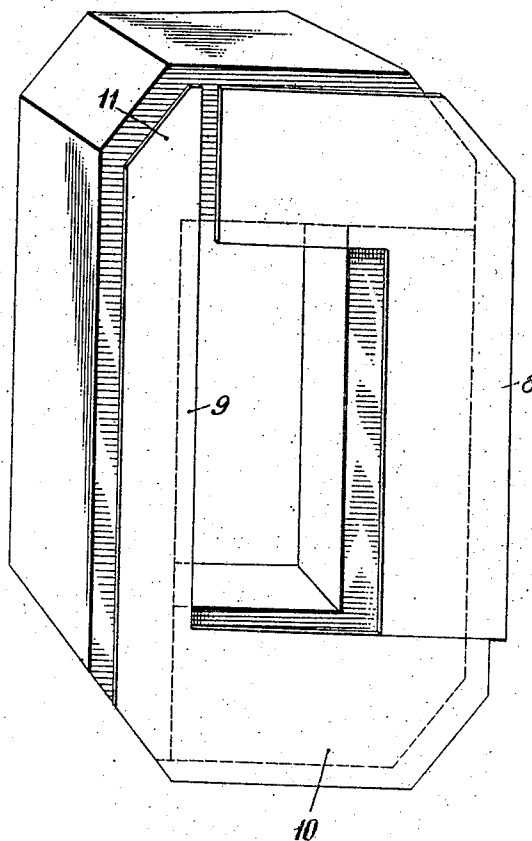
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Fig. 3.



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CHARLES LE G. FORTESCUE, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

TRANSFORMER.

1,013,150.

Specification of Letters Patent.

Patented Jan. 2, 1912.

Application filed November 19, 1908, Serial No. 463,486. Renewed June 15, 1911. Serial No. 633,248.

To all whom it may concern:

Be it known that I, CHARLES LE G. FORTESCUE, a subject of the King of Great Britain, and a resident of Wilkesburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Transformers, of which the following is a specification.

My invention relates to stationary inductive apparatus, and it has for its object to provide an improved transformer core structure, by the use of which the expenses of operation and the losses in the transformer may be reduced.

In order to reduce the mean length of turn in the transformer windings, it has been found desirable to reduce the cross-sectional area of the portions of the core structure which are disposed within the coils. The flux density of the portions having the reduced section is, of course, increased, and it is my aim to so construct the laminated core members as to minimize the losses in the transformer by entirely avoiding air gaps in the reduced sections referred to.

In order to illustrate my improvement more fully, a substantially rectangular core member may be considered. Assuming that the structure is built up in the usual way, by assembling a plurality of L-shaped plates or punchings, the complete structure may be considered as comprising a plurality of magnetic circuits in parallel, each of which contains two air-gaps. The importance of arranging these air gaps in any special manner, except for mechanical convenience, has not heretofore been appreciated. It will, of course, be understood that, in core members of uniform cross-section, the location of these air gaps would have no effect, provided the plates are thoroughly interleaved in order to produce a solid and compact structure. On the other hand, when a portion of the core member is reduced in cross section, the effect produced by a favorable arrangement of the punchings is very marked. For example, I have found that, in a system of distribution having a large lighting or other peak load, the line losses may be materially reduced and the all-day efficiency of the system improved by using transformers in which the punchings

are so formed and arranged in the core structure that the joints formed by abutting edges shall all be of maximum length.

Figure 1 of the accompanying drawings is an elevation and Fig. 2 is a sectional plan view of a transformer core and winding, such as is largely used in commercial service, and Fig. 3 is a detail view of one of the core members shown in the other figures, certain of the punchings being displaced to more clearly illustrate the position and arrangement of the air-gap between the laminæ in the same plane.

Referring to the drawings, the structure illustrated comprises a plurality of transformer core members 1, 2, 3 and 4 and coils 5 and 6. The core members 2 and 4 are similar to each other and are each provided with side portions 7, the cross-section of which is materially less than that of the remaining side and ends. The two sides 7 abut against each other and two corresponding sides of the core members 1 and 3 abut against the sides of the first two, as illustrated in Fig. 2 of the drawings. By this means, the mean length of turn in the coils 5 and 6 is materially reduced and the expense of the transformer correspondingly diminished.

Referring to Fig. 3, the core member, as here shown, is built up of a plurality of L-shaped plates or punchings 8 and 9 which are interleaved in a well known manner to produce a substantial core structure. The L-shaped punchings 9 are each provided with arms 10 and 11 of unequal width, the arm 11 being equal in length to the longest dimension of the structure and forming the portion of the completed core having the reduced cross-sectional area. The arms of the punching 8 are equal in width and its ends abut against the inner edges of the punching 9 so that the air-gaps formed between the two always lie in those portions of the core which have the full cross-sectional area, the arrangement of parts being such that it is impossible for any of the air-gaps to lie in the reduced core portion.

It is obviously immaterial whether the arm 10 of the punching 9 is made equal in length to the full width of the core or whether or not its end abuts against the inner edge of the punching 8, so long as the

proper relation exists between the arm 9 and the shorter arm of the punching 8 to insure a proper location of the air-gap, as indicated above.

5 I claim as my invention:

1. A magnetizable core having an eccentric coil-receiving opening and composed of layers each comprising a plurality of sections one of which has a relatively narrow
10 side limb that extends the full length of the core.

2. A magnetizable core having an eccentric coil-receiving opening and composed of
15 layers each of which comprises two unlike sections that make substantially equi-length butt joints with each other, one of said sec-

tions having a relatively narrow limb that extends the full length of the core.

3. A magnetizable core composed of multi-section layers and having an eccentric
20 coil-receiving opening, one section of each layer having a relatively narrow limb against the inner edge of which abuts the relatively side end of an adjacent section.

In testimony whereof, I have hereunto
25 subscribed my name this 10th day of November, 1908.

CHARLES LE G. FORTESCUE.

Witnesses:

W. M. McCONAHEY,
BIRNEY HINES.