No. 829,780. PATENTED AUG. 28, 1906.

W. A. HALL.

TRANSFORMER.

APPLICATION FILED MAY 12, 1904.

Fig. 1.

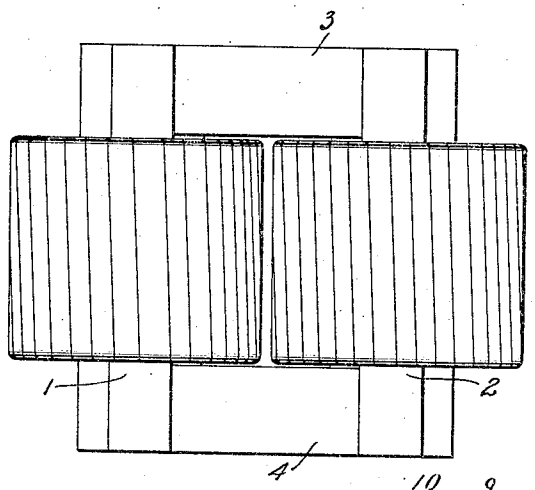


Fig. 2.

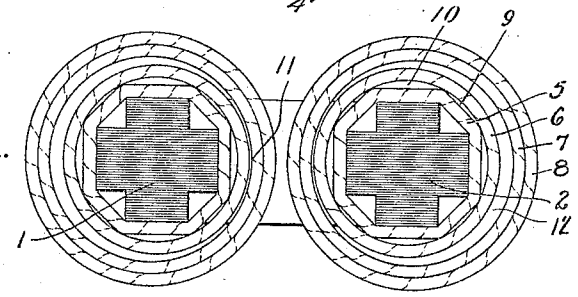
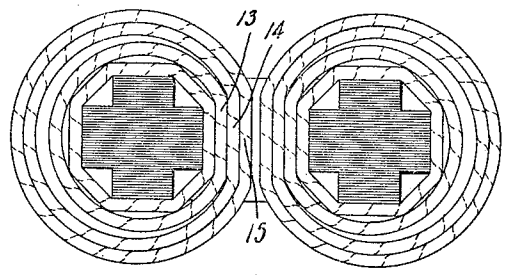


Fig. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

WALTER A. HALL, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

TRANSFORMER.

No. 829,780. Specification of Letters Patent. Patented Aug. 28, 1906.

Application filed May 12, 1904. Serial No. 207,684.

To all whom it may concern:

Be it known that I, WALTER A. HALL, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Transformers, of which the following is a specification.

My present invention relates to improvements in alternating-current apparatus—such as reactance-coils, transformers, or the like—and comprises an advantageous arrangement of the coils whereby the same may be well ventilated. The construction which I employ permits me also to reduce the amount of iron in the core.

Briefly characterized, the invention comprises an eccentric mounting of the coils with respect to each other, whereby there is a greater space between adjacent coils at one side of the leg of the core than at the other side of said leg.

The features of novelty characteristic of my invention are pointed out with particularity in the appended claims. The invention itself, however, will be better understood by reference to the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of a transformer embodying my invention. Fig. 2 is a plan view of the same, and Fig. 3 is a plan view of a modification.

The transformer shown in Fig. 1 as illustrative of my invention is of the so-called "core" type. It has a rectangular core with two upright legs 1 and 2 of cruciform cross-section, as shown in Fig. 2, connected at top and bottom by members 3 and 4. The core is of course laminated, as usual in this type of apparatus. High and low potential windings are placed over each of the two legs of the core. The windings on each leg are subdivided, so as to form four coils, as at 5, 6, 7, and 8. The coils may be of any desired depth, measured axially, either thin or thick, and being flat in lateral extension may be termed "uniplanar."

The inner and outer coils 5 and 8 form one winding, in this case the low-potential one, while the two inner coils 6 and 7 constitute the high-potential winding. The inner coil 5 is octagonal in cross-section and closely surrounds the core 2, as indicated. The inner half 6 of the high-potential winding is circular in cross-section and fits over the coil 5. The coils practically come together at the corners of the inner coil 5 and at other points ventilating-spaces, as at 9, 10, &c., are formed. The outer half 7 of the high-potential winding and the outer half 8 of the low-potential winding are fitted one within the other, as shown, and surround the two inner coils 5 and 6. Instead, however, of being located concentrically, as heretofore, the two outer coils are arranged so that a wider ventilating-space is formed at one side of the core than at the other. In the arrangement shown the two sets of coils practically come together where they pass through the opening of the core, as at 11. Outside of the core, however, the coils are widely separated, and thus form an efficient ventilating-space 12, the width of which gradually decreases as the inside of the core is approached. The arrangement of the coils thus described affords very efficient ventilation and at the same time by minimizing ventilating-spaces in those portions of the windings inside of the core permits the top and bottom connecting members 3 and 4 of the core to be shortened. Thus the weight of the core may be appreciably reduced and at the same time good ventilation of the coils as a whole secured. Instead of making the coils, with the exception of the innermost ones, circular in cross-section I may make portions thereof where they pass through the opening of the core somewhat flattened, as indicated at 13, 14, and 15 in Fig. 3. In this case practically the same advantages are secured as above mentioned, but to a greater extent.

It will be evident to one skilled in the art that numerous changes may be made in the embodiments of my invention without departing from the spirit thereof, for which reason I do not wish to be limited to the exact details shown and described.

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

1. In a transformer, the combination with a hollow rectangular iron core, of a plurality of uniplanar, primary and secondary coils on a leg of said core, adjacent coils being in contact with one another on one side of said leg and having an intervening space on another side of said leg, substantially as described.

2. In a transformer, the combination with a hollow rectangular iron core providing a

single magnetic circuit, of a plurality of uniplanar, primary and secondary coils on a leg of said core, adjacent coils being in contact with one another on one of said leg and having an intervening space on another side of said leg, substantially as described.

3. In a transformer, the combination with a hollow rectangular iron core, of a plurality of uniplanar, primary and secondary coils on a leg of said core, there being a greater space between adjacent coils at one side of said leg than at the other side of said leg.

4. In a transformer, the combination with a hollow rectangular iron core providing a single magnetic circuit, of a plurality of uniplanar, primary and secondary coils, on a leg of said core, there being a greater space between adjacent coils at one side of said leg than at another side of said leg.

5. In a core type transformer, the combination of a core, and coils on a leg of said core mounted eccentrically with respect to each other.

6. In a transformer, the combination of a core, and coils on said core one inside of another, and arranged eccentrically with respect to each other.

7. In a transformer, the combination of a core, and a coil or coils mounted eccentrically on said core.

8. In a transformer, a core-leg, and a plurality of coils mounted thereon and unsymmetrically placed with respect to each other.

9. In a transformer, a core-leg, and a pair of similarly-shaped coils surrounding said core-leg, said coils being unsymmetrically placed with reference to each other whereby ventilating-passages are formed between portions of the coils.

In witness whereof I have hereunto set my hand this 10th day of May, 1904.

WALTER A. HALL.

Witnesses:
DUGALD McK. McKILLOP,
JOHN A. McMANUS.