July 22, 1930. J. C. HOWES 1,771,297

TRANSFORMER

Filed May 3, 1929

Fig. 1.

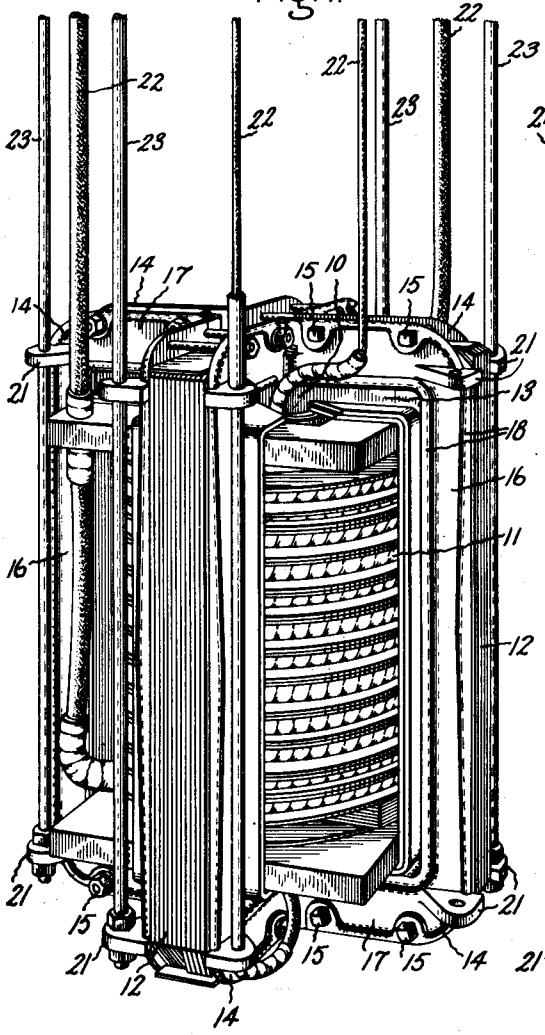


Fig. 2.

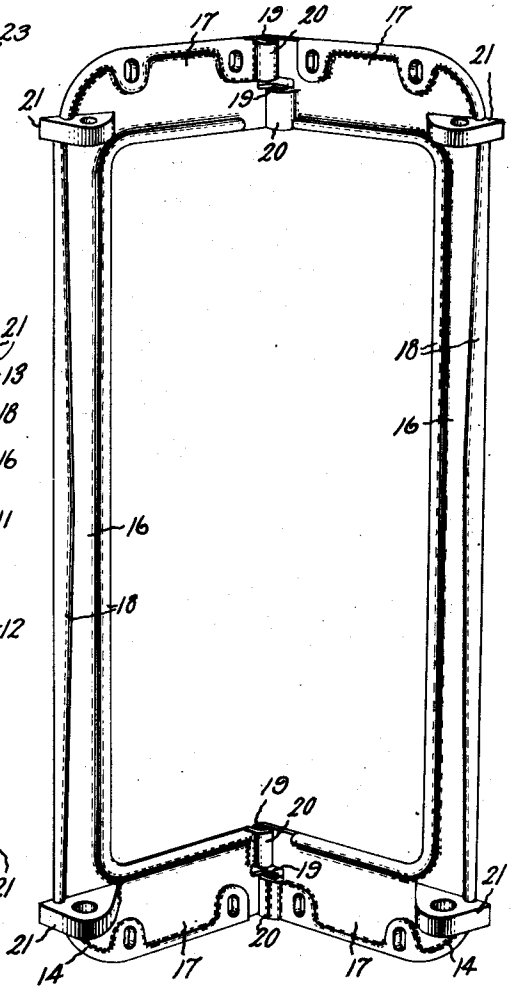


Fig. 3.

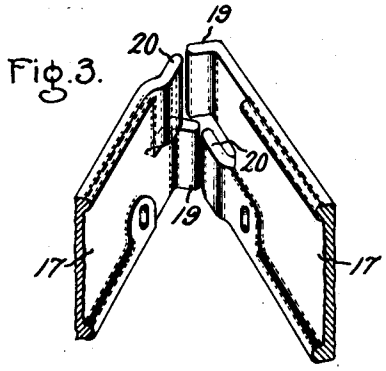
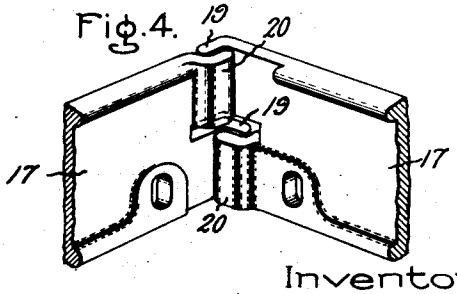


Fig. 4.



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UNITED STATES PATENT OFFICE

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TRANSFORMER

Application filed May 3, 1929. Serial No. 360,963.

My invention relates to transformers and more particularly to clamping means for transformer cores of the distributed type. In the distributed type of transformer core, there is a central leg surrounded by the windings. The ends of this winding leg are connected by end yokes to three or more outer legs distributed outside of the windings and providing return paths for the magnetic core flux. It is common practice, of course, to form the core legs and yokes of thin superposed laminations which are insulated from each other to prevent excessive eddy currents, the whole core structure being bound together into a rigid unit by suitable clamps. The general object of the invention is to provide an improved form of clamping structure for a transformer core of the distributed type.

The invention with its various objects and advantages will be better understood from the following description taken in connection with the accompanying drawing in which Fig. 1 is a perspective view of a distributed core type transformer provided with a core clamping structure constructed and applied in accordance with the invention; Fig. 2 is an enlarged perspective view of part of the core clamping structure shown in Fig. 1, and Figs. 3 and 4 are enlarged perspective views of details of the clamping structure.

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

The invention will be explained in connection with the transformer shown in Fig. 1 which has a distributed type magnetic core with a central winding leg 10 surrounded by the windings 11 and with its ends connected by four outer core parts each including an outer core leg 12 and a pair of end yokes 13. The laminations of each of these outer core parts are compressed and clamped tightly together between two clamps 14 which extend slightly beyond the yokes 13 at the ends of the core where they are secured in place by bolts 15.

Each of the clamps 14 is formed of a single piece of suitable metal such as wrought or malleable iron and includes a straight intermediate section 16 with integral end sections 17 extending at right angles from the ends of the section 16. One face of the clamp is a plane flat surface and the other face has longitudinal strengthening ribs 18.

Two of the clamps 14 are applied to the two opposite faces of each of the outer core parts, the intermediate sections 16 of the clamps lying along the opposite faces of the outer core leg 12 and the end sections 17 of the clamps lying along the opposite faces of the two end yokes 13. The two clamps are applied with their plane flat surfaces against the outer core part which is between them. The outer edges of the end sections 17 of the clamps extend slightly beyond the end yokes 13 and have their openings for bolts 15 which secure the clamps in place and compress the core leg and yokes between them. Each outer core part with its pair of clamps is thus a strong rigid structure.

The several parts of the core and the clamps are further secured together as a single strong rigid structure by interlocked joints between the inner ends of the clamps on each outer core part and the inner ends of the adjacent clamps on the adjacent outer core parts. The inner end of each end section 17 of each clamp is formed to provide a hook 19 and an edge portion 20, the edge portion 20 being displaced or offset from the plane face of the clamp next to the core to provide space between this offset edge and the core for a hook 19 of the adjacent clamp. At each joint, the hook 19 of one clamp and the offset edge 20 of the other clamp are at the inner edges of the clamps while the offset edge 20 of the first clamp and the hook 19 of the second clamp are at their outer edges. Thus at each joint the hook of each clamp is arranged to engage the offset edge of the other clamp, the clamps being effectively secured together but being pivotally connected and entirely free to move angularly with respect to each other about their connecting joints.

Two clamps may be easily assembled or disassembled when the angle between them is small as is apparent from Fig. 3 in which one of the joints is shown with the adjacent parts of the two clamps slightly separated. After assembly with the offset edges 20 of

each clamp close to the bases of the hooks 19 of the other clamp, the clamps are opened out to a larger angle and become securely locked together as is apparent from Figs. 2 and 4. Two of these pivotally interlocked clamps are placed in the angle between each two adjacent outer core parts as shown in Fig. 1 and the two clamps on each face of each outer core part are secured in place by the bolts 15. The clamps thus bind the entire core securely together.

Bosses 21 for supporting the transformer leads 22 and for engaging the transformer supporting rods 23 may be formed integrally with the clamps if desired. If the hooks 19 and offset edges 20 of each clamp are arranged as shown in Fig. 2 so that the hook at one end of each clamp is at its outer edge and the hook at the other end of the clamp is at its inner edge, then all the clamps may be exactly alike.

In the commercial production of transformers, it is not practicable to assemble the core laminations with such precision that all the angles between the outer core parts will be exactly the same. The pivotally interlocked clamps which have been described, however, adjust themselves readily to different angles throughout a wide range. A further advantage of the invention is that the entire clamping structure comprises very few parts and these few parts may be very easily and quickly assembled.

The invention has been explained by illustrating and describing a specific form thereof but it will be apparent that various changes may be made without departing from the scope of the invention as defined in the appended claims.

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

1. A transformer including a magnetic core having a winding leg and a plurality of outer core parts connecting the ends of said winding leg, and two core clamps secured respectively to two of said outer core parts, said core clamps being pivotally interlocked.

2. A transformer including a magnetic core having a winding leg and a plurality of outer core legs connected by yokes to the ends of said winding leg, and a core clamp secured to each face of each of said outer legs and its yokes, each of said clamps being pivotally interlocked with a clamp on an adjacent outer core leg and its yokes.

3. A transformer including a magnetic core having a winding leg and a plurality of outer core parts connecting the ends of said winding leg, and two core clamps secured respectively to two of said outer core parts, each clamp having an inner end formed with a hook and an edge portion, the hook of each clamp engaging the edge portion of an adjacent clamp.

4. A transformer including a magnetic core having a winding leg and a plurality of outer core parts connecting the ends of said winding leg, and two core clamps secured respectively to two of said outer core parts, each clamp having an inner end formed with a hook and an offset edge portion, the hook of each clamp engaging the offset edge portion of an adjacent clamp.

5. A transformer including a magnetic core having a winding leg and a plurality of outer core legs connected by yokes to the ends of said winding leg, and a core clamp secured to each face of each of said outer legs and its yokes, each of said clamps having an intermediate section on its outer core leg and two integral end sections on its yokes, the inner end of each of the end sections of each clamp being formed with a hook and an offset edge portion, and each of said hooks engaging the offset edge portion of an adjacent clamp.

In witness whereof I have hereunto set my hand this first day of May, 1929.

JOHN C. HOWES.