

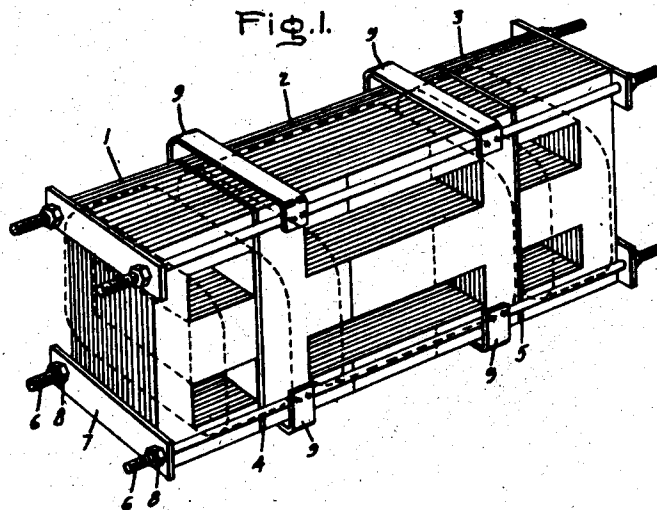
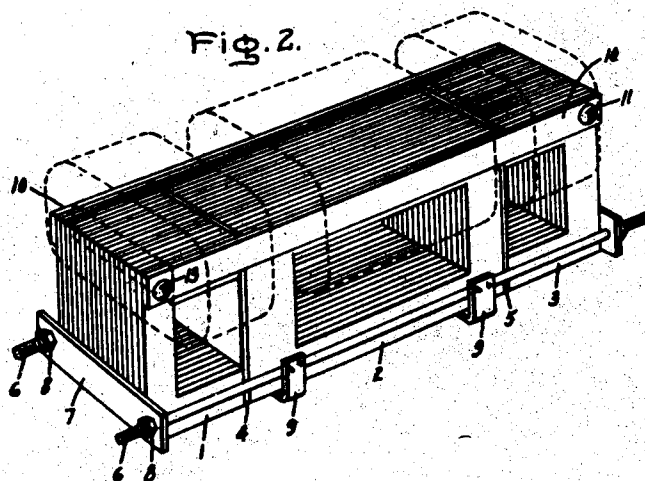
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COMBINED TRANSFORMER AND REACTOR

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COMBINED TRANSFORMER AND REACTOR

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This invention relates to electric induction apparatus, and more particularly to improvements in multiple core type electric induction apparatus.

An example of a multiple core type electric induction apparatus is a combined transformer-reactor for energizing and ballasting two fluorescent lamps. A typical apparatus of this kind has a transformer and two reactors, one for each lamp. The three units are aligned with the transformer between the two reactors, there being butt joints or gaps between the transformer core and the reactor cores.

It is desirable to hold these units together firmly, in such a way that (1) they stay properly aligned, so as to provide the proper gaps between the cores, and (2) their laminations are adequately clamped together, so as to prevent excessive noise due to vibration.

In accordance with this invention, there is provided a novel and simple clamping construction consisting of tensioned tie members which extend the entire length of the aligned cores, on opposite sides thereof, in combination with cross brackets or keepers which serve the double purpose of clamping the core laminations together and also clamping the tie members to the aligned core structure. In this manner the tie members need have negligible rigidity and need only have strength under tension. The necessary rigidity is supplied by the action of the cross brackets or keepers.

An object of the invention is to provide the new and improved electric induction apparatus.

A further object of the invention is to provide a simple and inexpensive clamping structure for multiple aligned core type electric induction apparatus.

An additional object of the invention is to provide a novel and simple elongated multiple core type electric induction apparatus.

The invention can be better understood from the following description, taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

In the drawing, Fig. 1 is a perspective view of an embodiment of the invention in which the cores are of the shell type, and Fig. 2 is a modification having core type cores.

Referring now to the drawing, and more particularly to Fig. 1, there is shown therein an electric induction apparatus consisting of three shell type cores: 1, 2 and 3. These three cores are all made up of stacked punchings, the center core 2 being shown, by way of example, as comprising

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interleaved E shaped punchings. The two outer cores 1 and 3 consist of aligned E punchings and the magnetic circuits of these outer cores are closed by the end yoke members of the core 2, there being gaps between the core 2 and the cores 1 and 3, which gaps are preferably filled by suitable spacers 4 and 5 which may be of paper.

As shown in phantom by dashed lines, the center leg of each of the three cores is surrounded by a separate coil.

In order firmly to hold the structure in alignment, four tie-bolts 6 are provided, there being two on each side of the core, and all of the bolts extend the entire length of the aligned structure. The corresponding ends of bolts which are on opposite sides of the core, that is to say which have the core punchings between them, are connected by brackets or mechanical yoke members 7, and nuts 8 are provided for putting the bolts 6 under tension and thus hold the unit together.

I have found, however, that a structure as thus far described will not stay in alignment but will weave or zig-zag, thus disturbing the adjustment or calibration of the gaps between the cores and also reducing the support of certain of the outside laminations at places where the weave tends to move the cores away from the tie bolts. I have also found that this zigzagging can be corrected by means of keepers or cross clamping members 9 which extend across the laminations and clamp the tie-bolts 6 to the core structure. Preferably, although not necessarily, these clamping members 9 are attached in a suitable manner, as by welding, to the tie bolt 6, and such welds are indicated by the dots at the ends of the members 9.

Ordinarily the clamping members 9 should be adjacent to but not over the gaps between the cores, as to prevent a magnetic bridging action by the clamping member. However, they can be on either side of the gaps, that is to say they can clamp the core 2 or the cores 1 and 3. Also, if they are made of non-magnetic material, such as brass or stainless steel, they can be mounted directly over the clamps.

In the modification shown in Fig. 2 the three cores: 1, 2 and 3 are of the so-called core type and the three coils, which are shown in phantom, are on one leg respectively of the cores.

In order to hold the winding leg sides of the cores together, thin clamping strips 10 are provided, which extend through the coils and lie flat against the outer edges of the winding legs of the cores. These strips are held in position by bolts 11 and 12, which pass through the cores 1 and 3, and thus serve to clamp the laminations of these

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cores tightly together. The strips 10 should be made of non-magnetic material so as to prevent magnetic bridging of the gaps between the cores.

On the opposite side of the core, the clamping structure consisting of the tensioned tie rods 8, end yokes 7, and the cross clamping brackets or keepers 9 are the same as in Fig. 1.

While there have been shown and described particular embodiments of the invention, it will be obvious to those skilled in the art that changes and modifications can be made without departing from the invention, and, therefore, it is aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

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

1. In combination, a plurality of electric induction devices each having a laminated magnetic core composed of stacked punchings, said cores being aligned parallel to their laminations with magnetic gaps between said cores, at least one tensioned tie member on each side of said aligned cores and extending the entire length of said aligned cores, said punchings being between said members, clamping members between the ends of said aligned cores for clamping said tie members to said aligned cores, and cross members extending between corresponding ends of said tie members.

2. In combination, a plurality of electric induction devices each having a laminated magnetic core composed of stacked punchings, said cores being aligned parallel to their laminations with magnetic gaps between said cores, at least one tensioned tie member on each side of said aligned cores and extending the entire length of said aligned cores, said punchings being between said members, clamping members adjacent to said gaps for clamping said tie members to said aligned cores, and cross members extending between corresponding ends of said tie members.

3. In combination, at least three electric induction units each having a square edged core, said units being in abutting relation, a pair of tensioned parallel tie members extending along said cores on opposite sides thereof, means for clamping said tie members to at least one of said

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cores adjacent to the butt joints therebetween, and mechanical yoke members interconnecting the corresponding ends of said tie members for applying pressure to the end core members.

4. In combination, a transformer having a core provided with opposite yoke members having flat parallel outer surfaces, a pair of reactors having open magnetic circuit core members provided with flat surfaces which make effective butt joints with said opposite transformer core surfaces whereby said yoke members close said magnetic circuit, a pair of parallel tie bolts on each side of said cores, means for clamping said tie bolts to said transformer core and mechanical yoke members interconnecting the corresponding ends of said tie bolts on opposite ends of said core.

5. In combination, a single-phase transformer with a shell type core, a pair of reactors each having an E shaped core, said reactor cores being aligned with opposite sides of said shell type core so that the yoke portions of the latter complete the magnetic circuits of the reactor cores, tie rods extending along the sides of said aligned cores, means for clamping said tie rods to said transformer core, and cross members for interconnecting the corresponding ends of said tie rods.

6. In combination, a three core electric induction apparatus, said cores being aligned with butt joints between the center one and both end ones, tie bolts extending along opposite sides of said cores, clamp members for clamping said tie bolts to the center core, and yoke member between the corresponding ends of said tie bolts.

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