Aug. 25, 1964 F. KNOBEL 3,146,420

PLURAL PART CORE INDUCTOR COMPRISING EDGE-WOUND CORE SECTION

Filed Feb. 19, 1962

Fig. 1

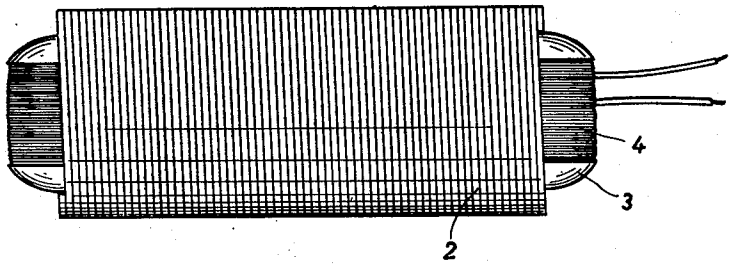


Fig. 2

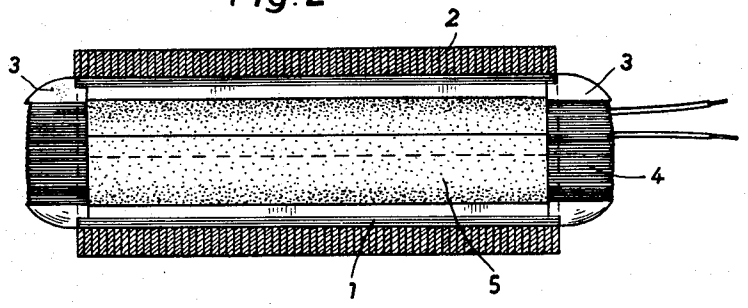


Fig. 3

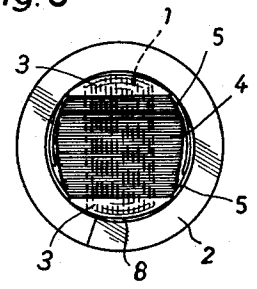
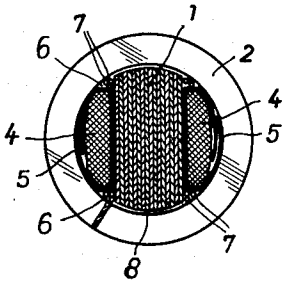


Fig. 4



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PLURAL PART CORE INDUCTOR COMPRISING EDGE-WOUND CORE SECTION

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The present invention relates to a method of producing a magnetic core. Such magnetic cores are used for choke-coils and transformers, particularly as series units for discharge lamps and also for electromagnets, transductors and the like.

The usual magnetic cores generally comprise a longitudinally extending inner web upon which a coil is wound in such manner that the axis of the winding coincides with the longituduinal axis of the web. The whole magnetic core is built-up of punched metal laminations stacked upon each other. Owing to the limited sectional area of the web a comparatively large requirement of copper results and accordingly also high material costs for the unit. If it were possible to reduce the copper weight, lower total costs for the unit would result even when the weight of the iron part increases, since the price of copper is substantially higher than the price of iron. The known iron cores, moreover, usually are inserted in a tube-shaped steel housing.

A type of magnet core has already been proposed, in which the copper requirement is considerably lower since there are provided an inner core portion adapted to be cross-magnetized by means of a longitudinal winding, and also an outer tube-shaped return portion likewise cross-magnetized. In such a known arrangement the outer return-flow portion is built-up of punched metal laminations which are stacked one upon the other. However, in punching these laminations waste pieces are produced, which for example in case of a circular-cylindrical shape of the return portion become so great that such a shape practically cannot be made for economic reasons, though it would be desirable.

The method according to the invention for producing a magnet core having an inner bar-shaped core portion and an outer tube-shaped return portion, which portions are magnetized by a longitudinal winding crosswise to their longitudinal extension, consists in forming the tube-shaped return portion by edgewise winding a band made of ferromagnetic material. In this production of the outer tube-shaped return portion the copper proportion is also low and no sheet metal scrap as in punching operations does accumulate, even when the return portion is of circular-cylindrical shape. Furthermore, a tube-shaped steel housing is in this case no longer required. Thus a very simple and cheap production of such a magnet core will be possible.

A further object of the invention is a magnetic core produced according to the method of the invention, said magnetic core comprising an inner core portion and an outer tube-shaped return portion, which can be magnetized transversely to the longitudinal extension of the core by means of a longitudinal winding, the outer tube-shaped return flow portion consisting of an edgewise wound band of ferromagnetic material.

The present invention will now be described more fully with reference to the accompanying drawings illustrating, by way of example, a magnetic core produced according to the method of the invention. In these drawings:

FIGURE 1 is a laterial view of a choking coil;
FIGURE 2 is a longitudinal sectional view;
FIGURE 3 is a front view, and
FIGURE 4 is a cross-sectional view of the choking coil.

An inner core portion of the illustrated coil consists of a bundle of sheet metal strips **1** stacked one upon the other and extending in longitudinal direction of the coil. Surrounding this inner core portion **1** is an outer tube-shaped return flow portion **2** which is produced by edgewise coiling a sheet metal band, e.g. on a machine similar to one used for producing springs. The individual windings of the sheet metal band **2** abut each other and form a circular cylinder. As it is evident from FIGURE 4, the thickness of the stacked layer of the core portion **1** amounts to approximately twice the width of the band **2** of the return flow section. Furthermore, the width of the metal strips forming the core portion **1** is such that these strips approximately correspond to the internal dimensions of the tube-shaped return flow part **2**. As it is evident from FIGURES 3 and 4, the sheet metal strips are somewhat smaller, in order to provide an air gap **8** between the core portion **1** and the return flow portion **2**. The sheet metal strips **1** forming the inner core portion are held together on both ends by means of a plastic body **3**, and if necessary the strips are adhesively affixed or riveted to each other. The winding **4** made of copper wire extends over the length of the metal strips **1** and the plastic body **3** in such a manner that, by means of this longitudinal winding **4**, the inner core portion will be magnetized transversely and that also the magnetic flux extends transversely in the outer tube-shaped return flow portion **2**. Insulating means **5** are provided between the inner core part **1** and the winding **4** and completely cover the lateral parts of the winding on both sides. Steel wires **7** of ferromagnetic material may be inserted into the longitudinally extending cavities **6** which will remain between the inner core portion **1**, when the winding **4** is applied, and the outer return flow portion **2**. A fine adjustment of the choking coil for desired electrical rated data may thus be effected by varying the number, length and thickness of the inserted wires **7**.

The tube-shaped return flow section **2**, instead of being made from a helically wound and edgewise positioned band, could also consist of a plurality of individual rings tightly held one against the other, which rings are produced of edgewise bent ferromagnetic band material.

Moreover, the sectional area of the tube-shaped return flow section **2**, instead of following a circular course, could also be of oval or square shape, having rounded corners.

In addition, instead of comprising a bundle of stacked lengthwise extending sheet metal strips, the inner core portion **1** could also consist of punched transversely extending armature discs.

I claim:

1. A magnetic core reactor coil for use as a choke or transformer particularly with a fluorescent tube, said reactor coil comprising an elongated inner core of magnetic material, a winding about said inner core having an axis transverse thereto, and an outer tubular member sur-

rounding said winding and being an edgewise coiled, continuous, rectangular band of ferromagnetic material whose axis is parallel to said inner core, said band being helically wound and having its adjacent convolutions contiguous and touching each other.

2. A magnetic core reactor coil according to claim 1, in which said tubular member is of circular cross-section, said inner core and winding together presenting a cylindrical outer surface having a close sliding fit within the bore of said tubular member.

3. A magnetic core device according to claim 2, in which said inner core is a longitudinal stack of sheet

metal strips, said stack having curved sides and a width substantially equal to the interior diameter of said outer tubular member, said stack having a thickness substantially equal to twice the width of said rectangular band comprising the outer tubular member.

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