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J. A. COMSTOCK

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LAMINATED MAGNETIC CORE AND METHOD OF MAKING

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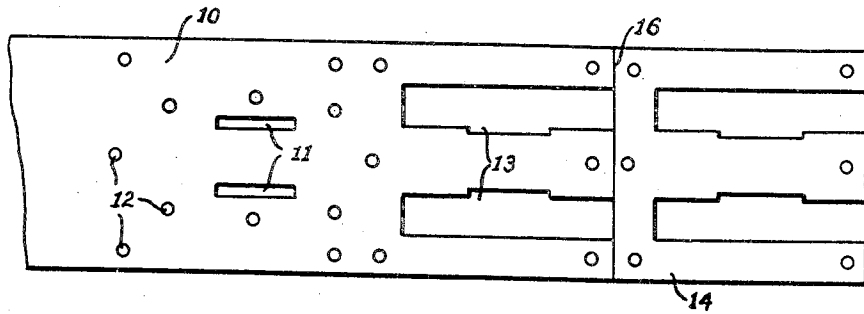


Fig. 1

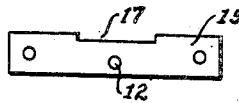


Fig. 2

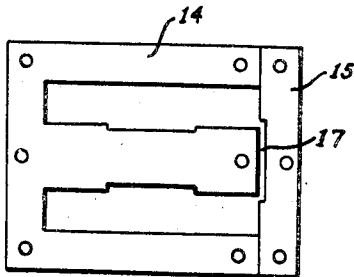


Fig. 3

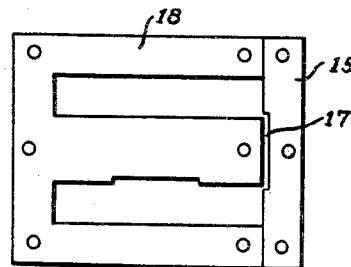


Fig. 5

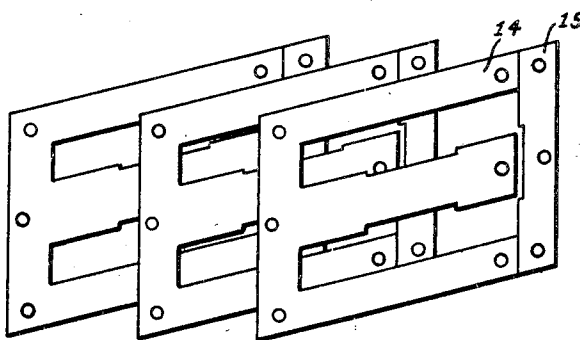


Fig. 4

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UNITED STATES PATENT OFFICE

2,451,202

LAMINATED MAGNETIC CORE AND METHOD
OF MAKINGJames A. Comstock, Clyde, N. Y., assignor, by
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3 Claims. (Cl. 175-356)

1

My invention relates in general to transformer or reactor cores and in particular to the design and method of forming E-shaped laminations.

It is an object of my invention to construct a laminated core, having a small gap between the end of the center arm and the end piece, by punching both the E-shaped lamination and the end piece from a strip of sheet metal, thus conserving material.

Another object of my invention is the process of constructing from a strip of sheet metal, an E-shaped lamination, having a recess on at least one side edge of the center arm, and an end piece having a recess on one side by punching rectangular openings to form the recesses and blanking the end piece, thus forming the arms of the E-shaped laminations.

Another object of my invention is to provide an air gap core for a reactor by having a gap between the center arm of an E-shaped lamination, and the end piece.

Another object of my invention is to provide an air gap core for a reactor by having a gap between the center arm of an E-shaped lamination and the end piece, the gap being formed by a recess in the side edge of the end piece adjacently disposed at the end of the center arm.

A further object of my invention is to form from a strip of sheet metal, an E-shaped lamination and an end piece, the end piece being formed from material between the arms of the E-shaped lamination.

Other objects and a fuller understanding of my invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a layout of the strip of sheet metal showing the progressive formation of the E-shaped lamination and end piece;

Figure 2 is a view of the end piece as it is punched from the material between the center arm and a side arm of the E-shaped lamination;

Figure 3 is a layout of one complete lamination showing the relative position of the E-shaped lamination and the end piece;

Figure 4 is a perspective showing of an exploded view of a section of the laminated core; and

Figure 5 is a modification of the E-shaped lamination described in the other view.

With reference to the drawing, and in particular to Figure 1, the reference character 10 represents a strip of sheet metal from which the E-shaped laminations 14 and the end pieces 15 are constructed. The width of the strip of metal 10 is the same as the length of the base of the E-shaped

2

lamination 14. As the strip of metal progresses through the die, the holes 12 located for fastening means are punched. Also the substantially rectangular shaped openings 11 are punched. These openings 11 are located to become the recesses 13 in the center arm and the recess 17 in the end piece. The recess in the center arm is located substantially intermediate the ends of the arm, thus also locating the recess 17 substantially intermediate the ends of the end piece. A further operation, as the strip progresses through the die, is the blanking of the two end pieces 15, thus forming the arms of the E-shaped lamination. In blanking these end pieces the cutting line between the center arm and the end piece divides the opening 11, thus the recess 13 and the recess 17 are substantially equal in width. The formation of the recess in the center arm prevents slivering during the blanking operation. The strip of sheet metal 10 is then cut along the cutting line 16, thus severing the lamination from the strip. Since the arms of the E-shaped lamination illustrated in Figure 3 have equal length, the gap between the end of the center arm and the adjacent side edge of the end piece is formed by the recess 17.

In the blanking operation two end pieces are constructed, but only one is used. The extra end piece may be used in the construction of other laminated cores. The only waste is the material from the openings 11 and the fastening holes. The elimination of one of the slots 11 in the strip 10 results in E-shaped lamination 18 as illustrated in Figure 5. The lamination 18 is a modification of the lamination 14, the modification resulting from having a recess 13 on only one side of the center arm. It is apparent that other modifications may be made without going beyond the scope of the invention.

Figure 4 is a perspective showing the relation of several laminations to each other in a laminated core. The drawing is an exploded view of a section of the laminated core.

In the prior art, the usual procedure is to provide a uniform air gap, which in the case of E-I type laminations results in three air gaps, one at the center leg and also an air gap at each outer leg of the E lamination. This results in stray flux emanate from the outer legs of the lamination and, in turn, this magnetic flux flows through any surrounding medium such as the enclosure case, and in turn, results in an energy loss due to eddy currents plus the shunt effect of ferrous metal surrounding the air gap that changes the electrical characteristic of the unit

mounted within the enclosing case. There is one other great disadvantage of the usual three air gap arrangement that results in flux flowing through the ferrous metal case, thus causing vibration and creating an objectionable audible noise.

Describing the purpose briefly, my invention embodies two main features. One is a design that provides a strapless punching means and the other a construction which makes possible an air gap in the center leg only of an E-I lamination design. Therefore, the stray flux is confined around the center core leg, thus resulting in a reduction in losses and hum level which are objectionable for the reasons outlined above.

Although I have described my invention with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

I claim as my invention:

1. The method of constructing E-shaped laminations and endpiece laminations from a strip of material in the successive steps of punching spaced elongated openings in the strip of material, punching endpiece laminations from the strip of material with a part of the elongated openings disposed in and thereby forming air gap recesses in a side edge of the endpiece laminations, and cutting the E-shaped laminations from the strip of material with the remainder of the elongated openings disposed in the middle leg of the E-shaped lamination.

2. The method of constructing E-shaped laminations and endpiece laminations from a strip of material in the successive steps of punch-

ing an elongated opening in the strip of material, punching the endpiece lamination from the strip of material with a part of the elongated opening disposed in and thereby forming an air gap recess in a side edge of the endpiece lamination, and cutting the E-shaped lamination from the strip of material with the remainder of the elongated opening disposed in one leg of the E-shaped lamination.

3. In a laminated core, an E-shaped lamination having a base and having side arms and a center arm of equal length with an edge of one of said arms having a recess therein, and an endpiece lamination having a side edge abutting against the ends of the side arms of the E-shaped lamination and having an air gap recess in said side edge positioned to form an air gap between said center leg of the E-shaped lamination and said endpiece lamination, each of said laminations having flat surfaces on each side thereof, said endpiece lamination having dimensions substantially equal to the dimensions of the open space between two next adjacent arms of the E-shaped lamination.

JAMES A. COMSTOCK.

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