Nov. 27, 1956 C. G. DUENKE 2,771,664

MAGNETIC CORES FOR ELECTRICAL INDUCTION APPARATUS AND THE METHOD OF PRODUCING SAME

Filed March 14, 1952

FIG. 1.

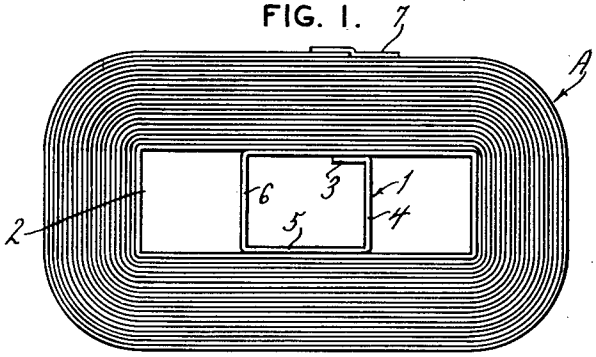
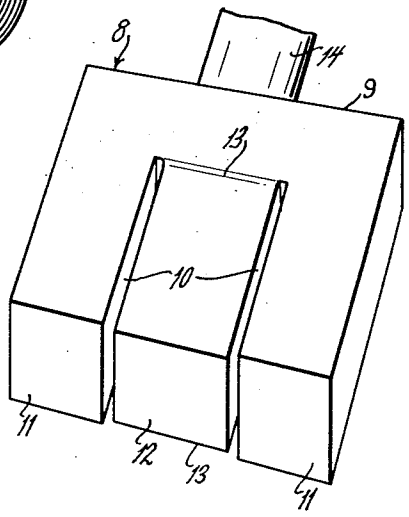


FIG. 2.



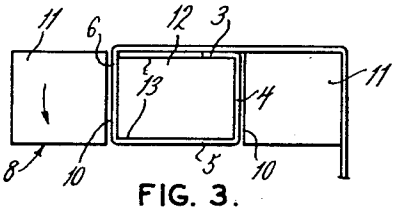


FIG. 3.

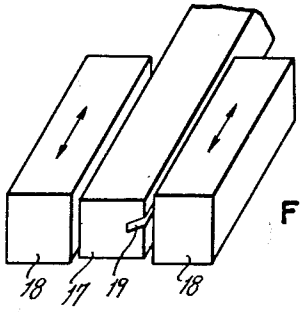


FIG. 4

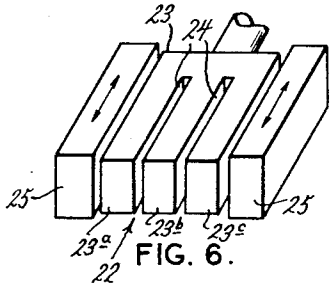


FIG. 6.

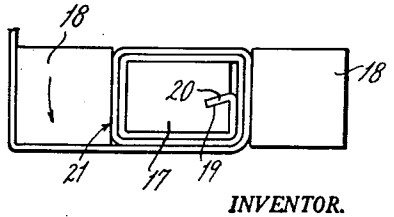


FIG. 5.

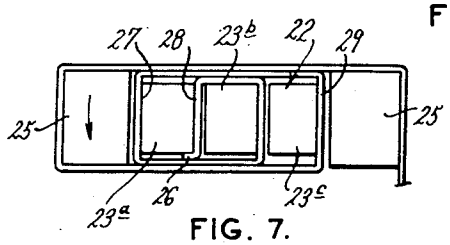


FIG. 7.

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United States Patent Office 2,771,664 Patented Nov. 27, 1956

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MAGNETIC CORES FOR ELECTRICAL INDUCTION APPARATUS AND THE METHOD OF PRODUCING SAME

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Application March 14, 1952, Serial No. 276,618

4 Claims. (Cl. 29—155.57)

In producing magnetic cores of the continuous, tape wound construction it has been necessary heretofore to use forms or internal formers of some type to preserve the shapes of the cores during various steps in the processing thereof, such, for instance, as strain annealing, bonding, etc., and the present invention has for its predominant object the provision of a method which eliminates the need for costly formers with a resultant substantial saving in cost of production and in labor, and the elimination of the cost of heating the added weight of the formers during portions of the manufacturing process which would involve heating.

Fig. 1 is a side elevation of a core construction in accordance with this invention.

Fig. 2 is a perspective view of a form employed in producing a core in accordance with this invention.

Fig. 3 is a schematic view showing an early stage of the core winding operation when the form shown in Fig. 2 is employed.

Fig. 4 is a fragmentary perspective view illustrating a form employed for producing a core in accordance with a modified form of the invention.

Fig. 5 is a schematic view illustrating an early stage of the winding of a core with the aid of the form shown in Fig. 4.

Fig. 6 illustrates still another type of form for producing a core having three stiffening structures in the window thereof.

Fig. 7 is a schematic view illustrating an early stage of the winding of a core with the aid of the form shown in Fig. 6.

In the drawing, wherein are shown for purposes of illustration, merely, several embodiments of the invention, A designates in Fig. 1 a magnetic core loop made in accordance with this invention. The core loop A is of the continuous, tape wound construction and it is characterized by being provided with a box-like rectangular stiffening element or structure 1 located within the window 2 of the core which is formed from the leading end of the magnetic tape material of which the core is formed. By referring to Fig. 1 it will be noted that the box-like stiffening structure 1 comprises a short leg portion 3 from which is extended a leg portion 4 that extends from one side of the window 2 of the core loop A to the opposite side thereof. The leg portion 4 merges into a leg portion 5 which parallels the short leg portion 3 at the opposite side of the core window, and said leg portion 5 merges into a leg portion 6 that parallels the leg portion 4. From the leg portion 6 the magnetic tape material of which the core loop A is formed is extended to produce in a continuous manner the core loop, the outer free end portion of the tape material being temporarily held in place by a short length of suitable adhesive tape 7. By providing a core loop with a stiffening structure within the window thereof, as described above, the core loop is supplied with sufficient rigidity to withstand the handling to which it is subjected during processing thereof without the use of costly formers for supplying the required rigidity.

In producing core loops in accordance with this invention a core winding machine (not shown) is employed and this machine is provided with a form 8, such as that shown in Fig. 2. The form 8 of Fig. 2 comprises a body portion 9 in which is formed a pair of parallel slots 10, these slots being open at the forward end of the body portion 9 of the form 8 and being closed at their rear ends, and said slots provide the form with a pair of forwardly extended arms or form portions 11, and an intermediate or central, forwardly extended arm or form portion 12 which is disposed between said form portions 11. By referring to Figs. 2 and 3 it will be noted that the intermediate form portion 12 of the form 8 is recessed or depressed at its top and bottom faces, as is indicated at 13, this being for a purpose to be hereinafter set forth. The form 8 is provided also with a spindle 14 which is arranged in cooperation with a part of the core winding machine with which the form 8 is associated for core winding operations so as to cause the form to be rotated by the core winding machine.

In producing a core loop in accordance with this invention an end portion of the tape from which the core loop is to be formed is bent relative to the adjacent part of said tape and is disposed in either of the recesses or depressions 13 of the intermediate portion 12 of the form 8, this bent portion being the tape portion 3 shown in Figs. 1 and 3. The portions 4, 5, and 6 of the box-like structure 1 are then arranged in place by hand, the portions 4 and 6 being disposed in the slots 10 of the form, and the portion 5 being extended across the face of the intermediate form portion 12 opposed to the face thereof with which the tape portion 3 contacts. When the leading portion of the tape has been arranged with respect to the form 8 as shown in Fig. 3, the core winding machine is set in motion and the form 8 is rotated. Thus the tape is drawn from a reel (not shown) and is wound on the rotating form to produce the core loop A shown in Fig. 1, the free end of the tape being secured in place by the strip of adhesive tape previously mentioned herein.

From the foregoing it is plain that a core loop provided within its window with a stiffening structure, such as that designated by the reference character 1 in Fig. 1, is braced so that it is able to withstand the handling and processing to which the core loop is subjected during production thereof. It is to be understood that the stiffening structure 1 of the core loop A is not a permanent part of the finished core, but, instead, this stiffening structure serves its function only during the processing of the core, after which said stiffening structure is stripped out of the core window and is disposed of.

The modified form of the invention illustrated by Figs. 4 and 5 contemplates the use in winding a core loop of a form structure which includes a fixed form member or portion 17 and a pair of slidable form members or portions 18, the fixed form portion 17 having an inclined groove 19 formed therein. In producing a core loop with the aid of the form illustrated by Figs. 4 and 5, the form portions 18 are retracted and a bent end portion 20 of the magnetic tape material from which a core loop is being formed is inserted into the inclined groove 19 of the fixed form portion 17. The form is then subjected to rotation and the tape of material is wound about the form portion 17 for one or two turns to produce a stiffening structure 21, the form portions 18 being then moved forwardly of the fixed form portion 17 and the core loop being wound about the three form portions to the desired number of turns to produce a core loop having a stiffening structure in the window thereof.

In accordance with the modified form of the invention illustrated by Figs. 6 and 7, a form structure 22 is employed which comprises a portion 23 having three pro-

jected form portions **23***a*, **23***b*, and **23***c*, these three form portions being produced by providing the form portion **23** with a pair of slots **24**. As is shown in Fig. 7 the form portions **23***a*, **23***b*, and **23***c* are of less height than the form portions **25**, said form portions **25** being slidable relative to the form portion **23**. In producing a core loop with the aid of the form illustrated by Figs. 6 and 7, a bent end portion **26** of the magnetic tape material from which a core loop is being formed is disposed in contact with a face of the form portion **23***a*. The magnetic tape material is then extended through one of the slots **24** and along a face of the form portion **23***b*, the tape then being extended through the other slot **24**. At this time the form portions **25** are retracted and the magnetic tape material extends from said other slot and about the form portions **23***a* and **23***b* and finally is extended about the form portion **23***c*. The slidable form portions are then moved forwardly with respect to the form portions **23***a*, **23***b*, and **23***c* and the tape of magnetic material is wound about the entire form structure so as to produce a core loop having the desired number of turns. From the foregoing it is plain that a core loop is finally produced which is provided in the window thereof with three box-like stiffening structures, these stiffening structures being designated in Fig. 7 by the reference characters **27**, **28**, and **29**.

I claim:

1. The method of producing a magnetic core loop from magnetic tape comprising forming the leading end of said tape into a rectangular stiffening element, winding the tape as a coil around a core form having a recess in which said stiffening element is disposed, securing the trailing end of said tape to the outside of said coil, separating said core form from said coil thereby forming a central window of said coil in which said stiffening element is disposed, one pair of oppositely facing surfaces of said stiffening element bracing opposite interior surfaces of the coil with sufficient rigidity to withstand the effects of forces produced incident to processing said coil, the remaining pair of stiffening element surfaces being spaced from the other interior surfaces of said coil, heat treating said coil and the integral stiffening element assembly at annealing temperatures, and removing the stiffening element from said coil window.

2. The method of producing a magnetic core loop from magnetic tape comprising winding the leading end of said tape around a central arm of a three-armed rectangular core form, then winding the tape as a coil around said core form, securing the trailing end of said tape to the outside of said coil, separating said core form from said coil thereby forming a central window of said coil in which said stiffening element is disposed, one pair of oppositely facing surfaces of said stiffening element bracing opposite interior surfaces of the coil with sufficient rigidity to withstand the effects of forces produced incident to processing said coil, the remaining pair of stiffening element surfaces being spaced from the other interior surfaces of said coil, heat treating said coil and the integral stiffening element assembly at annealing temperatures, and removing the stiffening element from said coil window.

3. The method of producing a magnetic core loop from magnetic tape comprising winding several turns of the leading end of said tape around a first rectangular core form member to produce a rectangular stiffening element, positioning additional rectangular core form members at opposite sides of said element as wound on said first core form member, then winding the tape as a coil around the assembled core form members and stiffening element, securing the trailing end of said tape to the outside of said coil, separating all of said core form members from said coil thereby forming a central window of said coil in which said stiffening element is disposed, one pair of oppositely facing surfaces of said stiffening element bracing opposite interior surfaces of the coil with sufficient rigidity to withstand the effects of forces produced incident to processing said coil, the remaining pair of stiffening element surfaces being spaced from the other interior surfaces of said core loop, heat treating said coil and the integral stiffening element assembly at annealing temperatures, and removing the stiffening element from said coil window.

4. The method of producing a magnetic core loop from magnetic tape comprising passing the leading end of said tape through a slot in a rectangular core form member having at least one slot therein, winding the tape on the form to produce a rectangular stiffening element, positioning additional rectangular core form members on opposite sides of said element as wound on said first core form member, then winding the tape as a coil around the assembled core form members and stiffening element, securing the trailing end of said tape to the outside of said coil, separating all of said core form members from said coil thereby forming a central window of said coil in which said stiffening element is disposed, one pair of oppositely facing surfaces of said stiffening element bracing opposite interior surfaces of the coil with sufficient rigidity to withstand the effects of forces produced incident to processing said coil, the remaining pair of stiffening element surfaces being spaced from the other interior surfaces of said core loop, heat treating said coil and the integral stiffening element assembly at annealing temperatures, and removing the stiffening element from said coil window.

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