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J. DESLOGE

METHOD OF MAKING LAMINATIONS FOR TRANSFORMER CORES

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Fig. 1

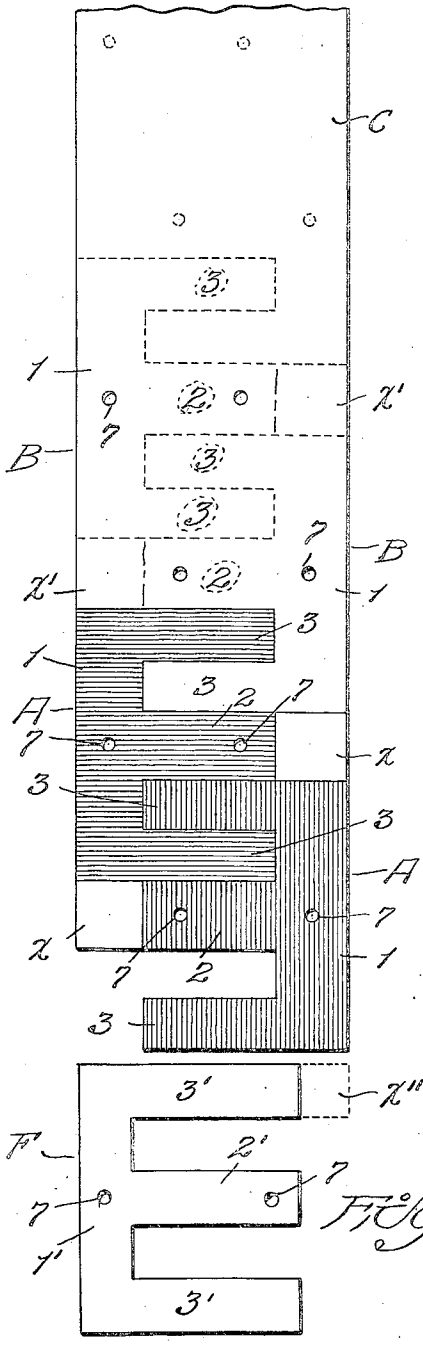


Fig. 3

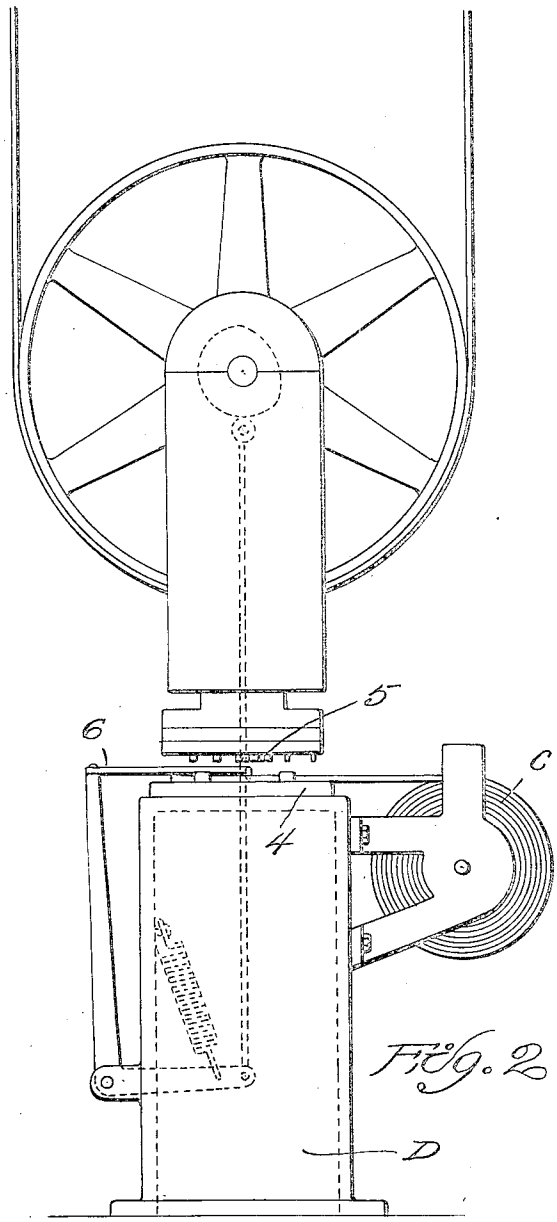


Fig. 2

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UNITED STATES PATENT OFFICE.

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METHOD OF MAKING LAMINATIONS FOR TRANSFORMER CORES.

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To all whom it may concern:

Be it known that I, JOSEPH DESLOGE, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Method of Making Laminations for Transformer Cores, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

This invention relates generally to transformers and analogous electrical devices and, more particularly, to a certain new and useful method of making the laminations for the cores thereof.

The cores of transformers and similar electrical devices are usually of laminated or built-up structure. So far as I am aware, the laminations of such cores are today successively one by one punched from a ribbon or tape of suitable sheet-metal and are of such configuration or contour that considerable waste and consequent loss results in their production.

My present invention has for its chief object not only the economical elimination of this waste and consequent loss, but also the more rapid and uniform production of core-laminations, and to such end my invention resides in the production of core laminations of novel form and structure in such manner that the former "cut-out" portion or waste of one lamination forms integral structure parts of other laminations, the laminations so formed being substantially of identical configuration or contour for ready and convenient assemblage in superposed relation in the building-up of the finished or complete core.

In the accompanying drawing,

Figure 1 illustrates a fragment of a suitable sheet steel ribbon or strip, showing by solid and dotted lines pairs of matching core-laminations produced in accordance with my invention, said pairs of laminations being punched from the strip on two successive die-operations;

Figure 2 is a somewhat conventional front elevation of a punching-press for producing at successive operations in accordance with my invention the pairs of matching laminations illustrated in Figure 1; and

Figure 3 shows a slightly modified form of core-lamination produced in accordance with my invention.

Referring now more in detail and by reference characters to the drawing, A, A and B, B indicate four of the core-laminations, all of which are substantially of E-shape in plan view and identical or matching in contour and dimensions, and each of which integrally includes a head or yoke 1, a center tongue 2, and a pair of end tongues 3, 3, the center tongue 2 and end tongues 3 projecting in parallel suitably spaced relation from the inner margin of yoke 1.

The laminations A and B are preferably formed from a ribbon or strip C of suitable sheet steel. For the elimination of waste, the ribbon or strip C is of such width as more fully hereinafter appears; and the production of the laminations A and B involves the employment preferably of a suitable punch-press D having a lower die 4, an upper die 5, and a feeding mechanism 6, the ribbon or strip C being suitably guided and fed over the lower die 4. The dies 4 and 5 are of such relative preferably compound form and construction that, when the upper die 5 is lowered upon the lower die 4, the upper die 5 functions with the lower die 4 to first punch from the strip C small approximately rectangular sections x on opposite margins of the strip, so that in the finished laminations, the center tongue 2 and the end tongues 3 shall be of equal length, that is to say, of equal size in their greater dimension, and I may state here that the strip-sections x constitute the only waste of material in the production from the strip C of the laminations A and B. On such operation, the dies 4 and 5 then function to punch from the strip the two laminations A, A and to perforate the same, as at 7, 7, for assemblage, as will be understood, in the formation of the complete core.

Obviously, the first die operation leaves the end of the ribbon or strip C as outlined or shown in Figure 1. The feeding mechanism 6 of the press then functions to feed the strip C a distance equalling the total length of the yoke or head 1 of one lamination A plus the width only of the stem or center tongue 2 of the second lamination A, or to a position from one cut or punching, shown by full lines in Figure 1, to the second cut or punching position, shown by dotted lines in Figure 1, when, on the next successive operation of the dies 4 and 5, the strip sections (waste) x' and the second pair of laminations B, B will in like man-

ner be punched from the strip C, and so on throughout the operations of the press D and the feeding of the strip C. Thus on each operation of the machine, there is produced with but a minimum of waste two complete core-laminations substantially identical in contour not only with each other, but also with the core laminations similarly produced on the successive operations of the machine. As so produced, it will be observed for the elimination of waste that the ribbon C is preferably of such width that the outer margin of the yoke 1 of one lamination is defined by and co-incident with one margin of the strip C and that the outer margin of the next lamination is defined by and co-incident with the opposite margin of strip C, that the total width of one lamination equals the width of the strip C less the width or crosswise dimension of the yoke 1 of its next or companion lamination, that the center tongue 2 and end tongues 3 of one lamination are all of equal length, and that, while the stem or center tongue 2 has preferably a slightly greater width or crosswise dimension than have the end tongues 3, 3, the end tongues 3, 3, of the several laminations are not only of equal width or crosswise dimensions with one another, but also that the tongues 3, 3 of the several laminations have a width or crosswise dimension substantially equal to the width of the spaces therebetween and the stem or center tongue 2. In such manner, the material, heretofore waste, punched from the strip C in forming the spaces between the center and end tongues of one lamination becomes and forms the integral end tongues of the adjacent laminations, and thus also the several laminations A and B are all substantially identical in form, contour, and dimensions and lend themselves to the rapid and convenient formation of most efficient cores, in the building up of which the several laminations A and B are superposed in staggered relation and suitably bolted together.

Slightly modified forms of core laminations, such as the core lamination F shown in Figure 3, may equally well be produced in like manner by the employment of the press D and the proper dies, the lamination F similarly comprising a head or yoke 1', a stem or center tongue 2', and spaced tongues 3', the end and center tongues being of equal length and the end tongues 3' and the space or cut-out between each tongue 3' and the center tongue 2' being of equal width. In this form of lamination, however, the waste-sections x'', in order that the several tongues of each lamination shall be of equal length, are cut from one of the end tongues 3' instead of from the center tongue 2, as in the laminations A and B of Figure 1.

I might add that I have also found that efficient cores may be built-up of my new laminations having center and end tongues of unequal length, and it will be evident that with such laminations I omit the cutting off of sections, such as sections x, x', and x'', x'', and thereby entirely eliminate all waste and at the same time simplify the dies employed in the formation of the laminations.

I am aware that changes in my new method of making core laminations may be made and substituted for those herein shown and described without departing from the nature and principle of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. The method of producing similar substantially E-shape core-laminations, each integrally comprising a yoke and center and end tongues projecting in parallel spaced relation from the inner margin of the yoke, which comprises the feeding of a metallic ribbon between co-operating dies of a suitable press and by die-operations on successive strokes of the press punching the laminations in individual E-shape from the ribbon.

2. The method of producing similar substantially E-shape core-laminations, each integrally comprising a yoke and center and end tongues projecting in parallel spaced relation from the inner margin of the yoke, which comprises the feeding of a metallic ribbon between co-operating dies of a suitable press and by die-operations on successive strokes of the press punching the laminations in individual E-shape from the ribbon in such manner that the material cut out in forming the space between the center and one end tongue of one lamination forms one of the end tongues of the second lamination.

3. The method of producing similar substantially E-shape core-laminations, each integrally comprising a yoke and center and end tongues projecting in parallel spaced relation from the inner margin of the yoke, which comprises the feeding of a metallic ribbon between co-operating dies of a suitable press and on successive strokes of the press punching the laminations in individual E-shape from the ribbon in such manner that the material cut out in forming the spaces between the center and end tongues of one lamination form the end tongues of adjacent laminations.

4. The method of producing similar substantially E-shape core-laminations, each integrally comprising a yoke and center and end tongues projecting in parallel spaced relation from the inner margin of the yoke, which comprises the feeding of a metallic ribbon between co-operating dies of a suitable press and on successive strokes of the

press punching the laminations in individual E-shape from the ribbon in such manner that the material cut out in forming the spaces between the center and end tongues of one lamination form the complete end tongues of adjacent laminations.

5. The method of producing similar substantially E-shape core-laminations each comprising a yoke and center and end tongues projecting in parallel spaced relation from the inner margin of the yoke, which comprises the feeding of a metallic ribbon of definite width between co-operating dies of a suitable press and on each successive stroke of the press punching one entire individual lamination of E-shape and a portion of an adjacent lamination from the ribbon in such manner that the material cut out in forming the space between the center and one of the end tongues of the entire lamination forms one of the complete end tongues of said part lamination.

6. The method of producing similar substantially E-shape core-laminations each comprising a yoke and center and end tongues projecting in parallel spaced relation from the inner margin of the yoke, which comprises the feeding of a metallic ribbon of definite width between co-operating dies of a suitable press and then by die operation punching the laminations in individual E-shape from the ribbon in such manner that the width of the ribbon defines without waste the combined total width of one lamination, including its yoke and legs and the width only of the yoke of the other lamination.

7. The method of producing similar substantially E-shape core-laminations each comprising a yoke and center and end tongues projecting in parallel spaced relation from the inner margin of the yoke, which comprises the feeding of a metallic ribbon between co-operating dies of a suitable press and then by die operations on successive strokes of the press punching the laminations in individual E-shape from the ribbon in such manner that the material punched from between the center and end tongues and at the outer ends of the end tongues of one lamination forms one of the end tongues and a portion of the yoke of the respective two adjacent laminations.

8. The method of producing similar substantially E-shape core-laminations, each integrally comprising a yoke and center and end tongues projecting in parallel spaced relation from the inner margin of the yoke, which comprises the feeding of a metallic ribbon between co-operating dies of a suitable press and by die-operations on successive strokes of the press punching the laminations in individual E-shape from the ribbon in such manner that the tongues of one lamination alternate in direction relatively to the width of the ribbon with the tongues of the next adjacent lamination.

In testimony whereof, I have signed my name to this specification.

JOSEPH DESLOGE.