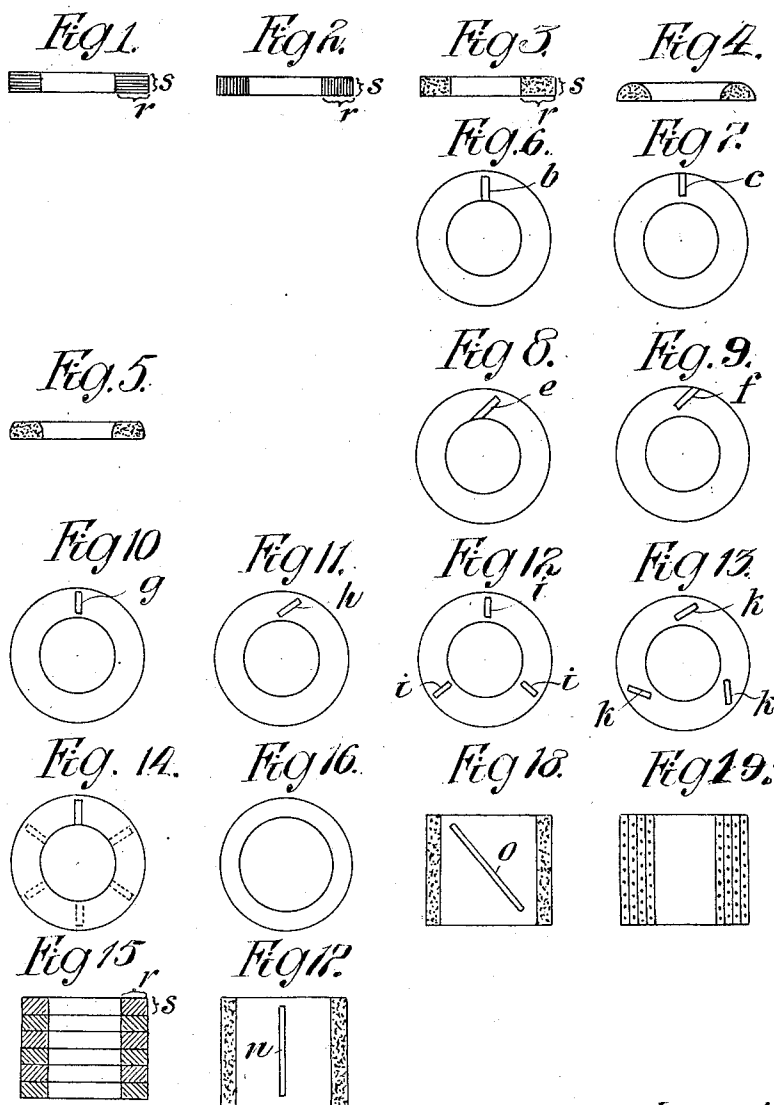


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 IRON CORE FOR INDUCTION COILS.
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1,318,787.

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Witnesses

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHANNES SÓRENSEN MÓLLERHÓJ, a subject of the King of Denmark, residing at Frederiksberg, near Copenhagen, Denmark, have invented new and useful Improvements in Iron Cores for Induction-Coils; and I do hereby declare the following to be a full, clear, and exact description of the same.

The present invention relates to iron cores for electric transformers, inductances, loading coils, and the like, to be used in the weak current technics in circuits for essentially weak quickly alternating currents, and more particularly relates to such cores as are composed of a plurality of adjoining elements or sections formed after closed curves.

In cores of this type it has been proposed to provide each element or section with one complete non-magnetic gap. In such cores the individual elements are each provided with one complete non-magnetic gap or cutting of all of the fibers of the element, and possess certain disadvantages, owing to the elastic properties of the layers of thin iron plate lamina, or other material used in making the sections or elements of the iron cores. The adjacent cut surfaces at the non-magnetic gap of the individual element will withdraw more or less from each other, whereby the magnetic resistance of the core section in question will vary. Furthermore the complete non-magnetic gaps of the various sections will frequently offer different magnetic reluctances, the magnetic properties of the whole core then being uncertain and deviating from those calculated.

According to the present invention this defect is remedied by producing each element with one or more partial cuttings, that is to say, one or more cuttings of part of the fibers of the element whereby an unchangeable, not too large distance, between the two partition surfaces of the individual cut is obtained, and besides the cuttings of the individual elements are magnetically shunted through non-cut fibers in the element in question.

The invention is shown in the drawing, where—

Figures 1—5 show sectional views of five different modifications of core components or elements, a certain number of which may be arranged one upon another to form a coil core.

Figs. 6—13 illustrate various ways in which such elements may be provided with notches or slots.

Figs. 14 and 15 show an end view and a sectional view respectively of a modification of a core made of elements.

Figs. 16 and 17 show in end view and section respectively, a form of cut elements which are to be arranged around one another, in order to form a core.

Fig. 18 shows in section another form for a cut element of the same type, and

Fig. 19 shows a section through a core consisting of elements of the kind shown in Fig. 17 or 18.

The core according to the present invention may advantageously be built up of annular core cylindrical elements.

Fig. 1 shows an annular core element consisting of pressed thin annular punched plates. Such an element, however, might give rise to more intense Foucault currents than the element shown in Fig. 2, which is coiled up from a strip of plate. Finally Figs. 3, 4 and 5 show three different shapes of elements made from thin wire.

Elements of the form shown in Figs. 1, 2 and 3 may be assembled into cores, as shown in Figs. 14 and 15, with a rectangular cross section, these elements having the same inside and outside diameters. All elements of the kind shown in Figs. 1—5 would be formed of elements arranged side by side, and from such elements cores of any desired shape of cross section may be produced.

Figs. 16, 17 and 18 show another kind of element which is produced by coiling up thin wire or strips of plate, and which can be used for cores to be arranged outside one another, the outward diameter of each of the elements being of about the same size as the inward diameter of the adjacent larger element. In Fig. 19 is shown a core with a rectangular cross section and consisting of such elements of the same length. Through the use of special forms of such elements which are arranged outside one another, cores of any desired shape of cross section may be obtained.

Finally cores can be produced by combining the two kinds of elements. In Fig. 19 all of the elements with exception of the outermost and of the innermost elements may be substituted by a group of the elements shown in Figs. 1—5 connected in the

manner shown in Fig. 15. The group of elements of even lengths shown in Fig. 19 and arranged outside one another may be combined with elements arranged in both ends of the kind shown in Figs. 1, 2, 3, 4 or 5.

According to the invention all of the elements or all of the elements with a few exceptions are provided with partial notches or slots. Figs. 6-9 show partial cuttings or notches in all of the elements shown in Figs. 1-5. Figs. 10-13 show notches essentially meant for elements of the kind shown in Fig. 1. The notches as shown in Figs. 6, 7, 10 and 12 are essentially directed in accordance with the meridian planes of the elements whereas the notches as shown in Figs. 8, 9, 11 and 13 form a suitably large angle to the same.

Figs. 6, 7, 8, 9, 10 and 11 show partial cuttings or apertures respectively *b*, *c*, *e*, *f*, *g*, and *h*. One or more of such apertures may be used according to desire. Thus in Figs. 12 and 13 are shown three notches *i* and *k* of the kind shown in Figs. 10 and 11 at *g* and *h*.

In assembling the elements into cores the notches of the individual elements are preferably displaced in relation to notches or apertures of the neighboring elements. Thus in Figs. 14 and 15 is shown a core consisting of 6 elements, each with the aperture shown in Fig. 6 at *b*, which as shown in dotted lines in Fig. 14 and is displaced from element to element evenly divided over the entire circumference of the core. But generally it may be said that the offsetting of the notches or apertures may be varied at will within the two limits, which are determined by the notches or apertures being arranged so as to substantially aline with each other or being evenly dissipated over the entire circumference as shown in Fig. 14 respectively.

Through use of the elements shown in Figs. 16, 17 and 18 which are arranged around one another for producing of cores, notches in or cuttings through the cross section of the element are effected in all of the elements or in all of the elements with the exception of the innermost and outermost elements of the core. One of the notches or apertures *n* and *o* shown in Figs. 17 and 18 may advantageously be used, reaching over the entire cross section of the element with exceptions of the outermost fibers in both ends, and which are directed along the generatrices of the cylindrical element, as shown in Fig. 17 at *n*, or form a suitable large angle with the same respectively, as shown in Fig. 18 at *o*. One or more such partial cuttings may be used according to wish, but in such manner that the notches or apertures in the individual elements are preferably not found opposite to the notches or apertures in the neighboring elements.

It will be seen that the notches or apertures in the individual elements in the cores here described are magnetically shunted through the surrounding elements, and also through the non-cut fibers of the element in question.

Iron cores produced in the manner here described may be given any demagnetizing co-efficient wanted, as the distance between the cut surfaces in the individual elements, found opposite to one another and appearing by the cuts may be varied at will as well as the shunting effect due to the surrounding elements, and the non-cut fibers in the cut places. The shunting effect from the surrounding elements is contingent partly on the dimensions of the cross-section of the element which can be varied at wish, and partly on the distance of the surrounding elements from the element in question in the places of cutting, which distance can be controlled by suitable insertion between the elements or in some other way before the elements are lashed together into a core by means of tape or the like. The shunting effect from the fibers, which are not cut through is contingent on the cross section of the same, which may likewise be varied at will. Furthermore the shunting effect is dependent upon the degree of offsetting of the apertures of the individual element with respect to the apertures of the neighboring elements. Finally the arrangement of elements without notches is also of influence on the demagnetizing coefficient of the core and in such a manner that this influence is contingent on the manner of arrangement and dimensions of these elements, which may also be varied at will.

Through cutting and arrangement of the individual elements in the manners above described, especially the oblique cuttings, the possibility of generation of noticeable Foucault currents is substantially prevented.

The elements for producing the novel core are here shown to be formed as cylindrical bodies, but may of course be given other closed shapes without departing from this invention.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent:

1. A core for induction coils comprising a plurality of iron laminations, each lamination having a non-magnetic path or gap formed therein by an incomplete punching of the lamination, in such a manner as to avoid distortion or enlargement of the non-magnetic path so produced.

2. A core for induction coils comprising a plurality of iron ring laminations, each lamination being provided with a non-magnetic gap formed therein by an incomplete punching of the ring to prevent distortion

of the lamination and avoid enlargement of the non-magnetic gap so produced.

3. An annular core for induction coils comprising a plurality of iron ring laminations, each lamination being provided with a plurality of non-magnetic paths formed therein by an incomplete cutting of the ring to prevent distortion of the lamination and to avoid enlargement of the non-magnetic gaps so produced, the said non-

magnetic gaps of laminations being displaced with relation to the gaps of adjoining laminations.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHANNES SØRENSEN MØLLERHÓJ.

Witnesses:

VIGGO BLOM,
CECIL V. SCHOU.