Nov. 8, 1949 G. W. RAWLINGS 2,487,180

MANUFACTURE OF IMBRICATED ELECTROMAGNETIC ELEMENTS

Filed July 25, 1947

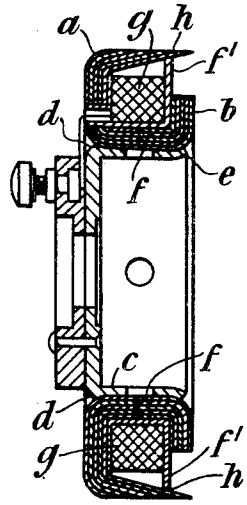


Fig.2.

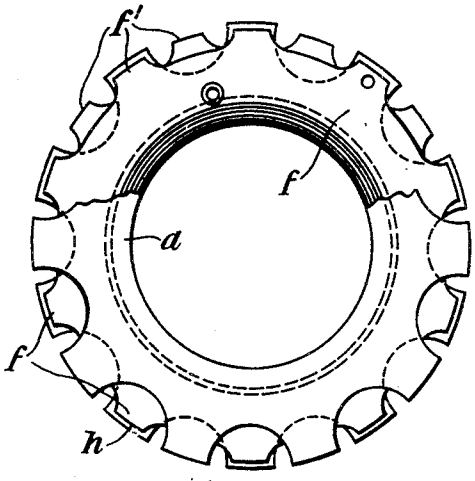


Fig.1.

Fig.4.

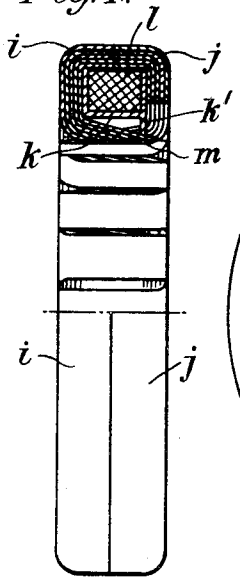
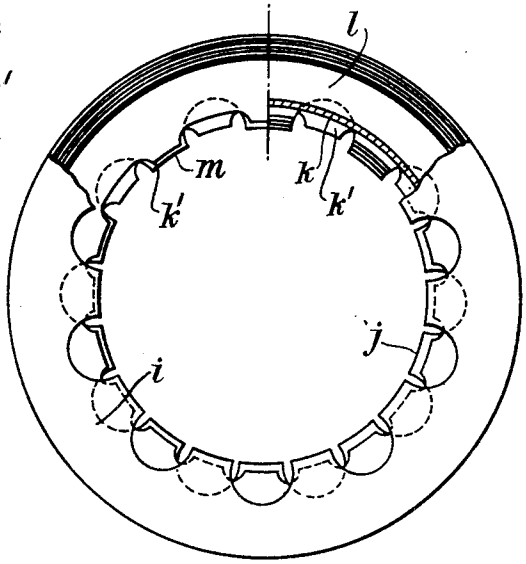


Fig.3.



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MANUFACTURE OF IMBRICATED ELECTRO-MAGNETIC ELEMENTS

George William Rawlings, Kenilworth, England

Application July 25, 1947, Serial No. 763,523
In Great Britain December 15, 1938

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14 Claims. (Cl. 171—252)

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This invention relates to the manufacture of laminated imbricated magnetic elements, and constitutes an improvement in or modification of the invention forming the subject of my U. S. Patent No. 2,243,318.

In the construction of such a laminated imbricated field magnet or armature of an electric motor or generator, the finishing operation, after the imbricated parts have been fitted and secured together, is to grind the armature tunnel or periphery. This operation of grinding is relatively slow owing to the flexibility or spring in those parts of the laminations, particularly the inner one with its longer parts, consequent upon the overhanging nature of their design, which flexibility or spring reduces the depth of cut or pressure that can be applied and also further increases the time taken because to obtain a reasonable degree of accuracy, the grinding operation must be continued at the finish whilst only very light grinding contact occurs.

The object of the present invention is to overcome the above stated disadvantages of laminated imbricated magnetic elements.

According to the invention, supporting means of non-magnetic material are provided for the overhanging portions of the laminated imbricated structure.

In the accompanying drawings:

Fig. 1 is an end elevation with a part cut away, and

Fig. 2 is a diametrical section of one example of an imbricated armature made in accordance with this invention.

Figs. 3 and 4 show the invention applied to a laminated imbricated field magnet.

As illustrated in Figs. 1 and 2 of the drawings, the armature having 20 poles is laminated in accordance with the invention of U. S. Patent No. 2,243,318 and consists of two similar groups *a* and *b* of laminations constituting a yoke, secured together by a cup-shaped sleeve *c*, the ends of which are flared at *d* and *e*, the flare at *e* being formed by pressure after the laminations have been fitted thereon. When fitting the parts *a* and *b* onto such sleeve a bobbin *f* of vulcanite or other suitable insulating material having an electric coil *g* wound thereon, is placed between the parts *a* and *b* and such bobbin is formed with notched sides providing upstanding portions *f'*, arranged so that the notches on one side are opposite to the portions *f'* on the other side, and so that such portions *f'* engage and support the overhanging ends or castellated pole pieces of the innermost laminations, as shown at *h* in Fig. 2.

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By this construction the laminated poles are supporting during grinding against the pressure of the cut whereby the grinding operation is facilitated in regard to both speed and accuracy. If the bobbin is made of vulcanite or other thermo plastic material, the heat generated during grinding, whilst not excessive, is sufficient to give a bedding-in effect of the end laminations into the edge of the portions *f'* of the bobbin.

If desired, the laminations may be slightly sprung so that, when assembled and before grinding they press inwardly onto the edge of the bobbin projections *f'*, thus ensuring that all the laminations are effectively supported.

As shown in Figs. 3 and 4 the construction is applied to a built-up multi-polar field magnet comprising two like groups *i* and *j* of laminations enclosing a bobbin *k* carrying a winding *l*, the bobbin having extensions *k'* supporting the ends of the laminations at *m* in the same manner as in the other example. Obviously the invention is equally applicable to imbricated laminated pole pieces of, or forming part of, permanent magnets, it being a simple matter to include a bobbin or washer in the assembly, shaped so as to support the ends of the laminations.

The invention is obviously not limited to all the details of the particular examples above given, some of which are capable of modification without departing from the nature of the invention.

What I claim is:

1. A laminated magnetic element for an imbricated magnetic core, comprising a plurality of laminations having a yoke with an overhanging side castellated to provide pole pieces, the laminations being nested one within another and the ends of the several pole pieces being bevelled so as collectively to form a pole surface and non-magnetic means located within the element and adapted to provide an internal support for said pole surface during bevelling of the ends of said pole pieces.

2. A laminated imbricated magnetic core, comprising two separate interdigitated laminated magnetic elements each formed of a plurality of laminations having a yoke and pole pieces extending laterally therefrom, the laminations being nested together so that said pole pieces form poles each having its operative surface constituted by end portions of the several pole pieces, means for mounting both elements upon a spindle with the laminations of one element in magnetic contact with those of the other and with the two sets of poles in interdigitated spaced relation,

and non-magnetic means located within the core and adapted to provide an internal support for the two sets of poles.

3. A laminated magnetic element adapted to be mounted around a spindle, comprising a plurality of laminations nested one within another each lamination having a plurality of pole pieces and a yoke whose broad surfaces are transverse to the axis of said spindle, the ends of said pole pieces being inclined with respect to said yoke and being bevelled so as collectively to form a pole surface for the element and non-magnetic means located within the element and adapted to provide an internal support for said pole surface during bevelling of the ends of said pole pieces.

4. A laminated magnetic element adapted to be mounted around a spindle, comprising a plurality of laminations nested one within another each lamination having a plurality of pole pieces and a yoke whose broad surfaces are transverse to the axis of said spindle, said pole pieces overhanging said yoke and having surfaces of arcuate shape which collectively form poles for the element, the operative surface of each pole being constituted by the separate adjoining surfaces of said pole pieces and non-magnetic means located within the element and adapted to provide an internal support for said pole surface during bevelling of the ends of said pole pieces.

5. A laminated magnetic element, comprising a plurality of laminations nested one within another, each lamination having a yoke and pole pieces, a spindle upon which the nested laminations are mounted, each of said pole pieces extending laterally from said yoke and having a bevelled end surface of arcuate shape concentric with the axis of said spindle, said laminations being so arranged that when nested together their pole pieces are grouped to form poles each pole having a pole surface comprising the arcuate end surfaces of said pole pieces and non-magnetic means located within the element and adapted to provide an internal support for said pole surface during bevelling of the ends of said pole pieces.

6. A laminated magnetic element for an imbricated magnetic core adapted to be mounted around a spindle, comprising a plurality of laminations nested one within another, each lamination having a broad surface transverse to the spindle axis and two or more pole pieces which collectively form poles, said pole pieces being inclined to said broad surfaces and having their ends bevelled so as collectively to form pole surfaces and non-magnetic means located within the element and adapted to provide an internal support for said pole surface during bevelling of the ends of said pole pieces.

7. A laminated magnetic element for an imbricated magnetic core adapted to be mounted around a spindle, comprising a plurality of laminations nested one within another each lamination having a yoke whose broad surfaces are transverse to the spindle axis and two or more overhanging pole pieces, said pole pieces collectively forming poles each having an operative surface comprising end portions of said pole pieces, the area of said operative surface being at least twice the minimum cross-sectional area of the constituent laminations and non-magnetic means located within the element and adapted to provide an internal support for said pole surfaces.

8. A laminated magnetic element for an imbricated magnetic core, comprising a plurality

of laminations having a yoke with an overhanging side castellated to provide pole pieces, the laminations being nested one within another and the ends of the several pole pieces being bevelled so as collectively to form a pole surface, an energizing coil located within the element and a bobbin of non-magnetic material carrying said coil, parts of said bobbin providing an internal support for said pole surfaces during bevelling of the ends of said pole pieces.

9. A laminated imbricated magnetic core, comprising two separate interdigitated laminated magnetic elements each formed of a plurality of laminations having a yoke and pole pieces extending laterally therefrom the laminations being nested together so that said pole pieces form poles each having its operative surface constituted by end portions of the several pole pieces, means for mounting both elements upon a spindle with the laminations of one element in magnetic contact with those of the other and with the two sets of poles in interdigitated spaced relation, an energizing coil located within the element and a bobbin of non-magnetic material carrying said coil, parts of said bobbin providing an internal surface for the two sets of poles.

10. A laminated magnetic element adapted to be mounted around a spindle, comprising a plurality of laminations nested one within another each lamination having a plurality of pole pieces and a yoke whose broad surfaces are transverse to the axis of said spindle, the ends of said pole pieces being inclined with respect to said yoke and being bevelled so as collectively to form a pole surface for the element, an energizing coil located within the element and a bobbin of non-magnetic material carrying said coil, parts of said bobbin providing an internal support for said pole surfaces during bevelling of the ends of said pole pieces.

11. A laminated magnetic element adapted to be mounted around a spindle, comprising a plurality of laminations nested one within another each lamination having a plurality of pole pieces and a yoke whose broad surfaces are transverse to the axis of said spindle, said pole pieces extending laterally from said yoke and having surfaces of arcuate shape which collectively form poles for the element, the operative surface of each pole being constituted by the separate adjoining surfaces of said pole pieces, an energizing coil located within the element and a bobbin of non-magnetic material carrying said coil parts of said bobbin providing an internal support for said pole surfaces during bevelling of the ends of said pole pieces.

12. A laminated magnetic element, comprising a plurality of laminations nested one within another, each lamination having a yoke and pole pieces, a spindle upon which the nested laminations are mounted each of said pole pieces extending laterally from said yoke and having a bevelled end surface of arcuate shape concentric with the axis of said spindle, said laminations being so arranged that when nested together their pole pieces are grouped to form poles each pole having a pole surface comprising the arcuate end surfaces of said pole pieces, an energizing coil located within the element and a bobbin of non-magnetic material carrying said coil, parts of said bobbin providing an internal support for said pole surfaces during bevelling of the ends of said pole pieces.

13. A laminated magnetic element for an imbricated magnetic core adapted to be mounted

around a spindle, comprising a plurality of laminations nested one within another each lamination having a broad surface transverse to the spindle axis and two or more pole pieces which collectively form poles said pole pieces being inclined to said board surfaces and having their ends bevelled so as collectively to form pole surfaces, an energizing coil located within the element a bobbin of non-magnetic material carrying said coil, and parts of said bobbin providing an internal support for said pole surfaces during bevelling of the ends of said pole pieces.

14. A laminated magnetic element for an imbricated magnetic core adapted to be mounted around a spindle, comprising a plurality of laminations nested one within another each lamination having a yoke whose broad surfaces are transverse to the spindle axis and two or more pole pieces extending laterally therefrom, said pole pieces collectively forming poles each having an operative surface comprising end portions of said pole pieces, the area of said operative surface being at least twice the minimum cross-sectional area of the constituent laminations, an energizing coil located within the element, a bobbin of non-magnetic material carrying said coil and parts of said bobbin providing an internal support for said pole surfaces during bevelling of the ends of said pole pieces.

GEORGE WILLIAM RAWLINGS.

REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Country	Date
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