(No Model.)

E. THOMSON.

ARMATURE FOR DYNAMO ELECTRIC MACHINES.

No. 356,902. Patented Feb. 1, 1887.

Fig. 1.

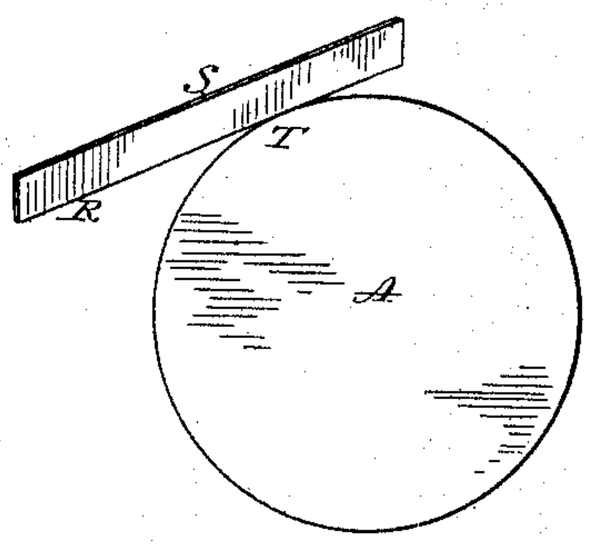


Fig. 2.

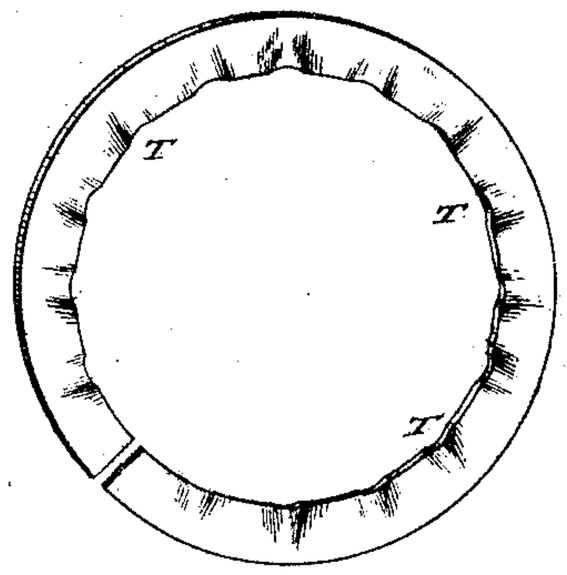


Fig. 3.

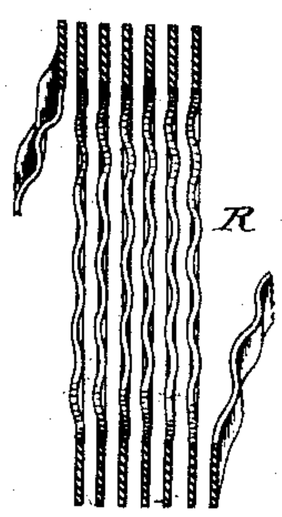


Fig. 4.

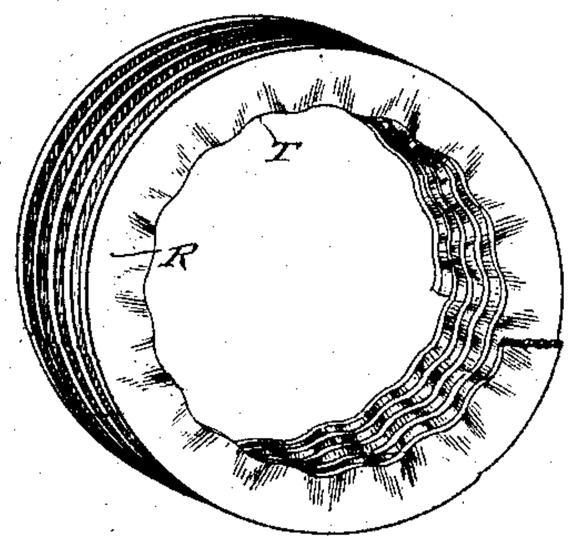


Fig. 7.

Fig. 5.

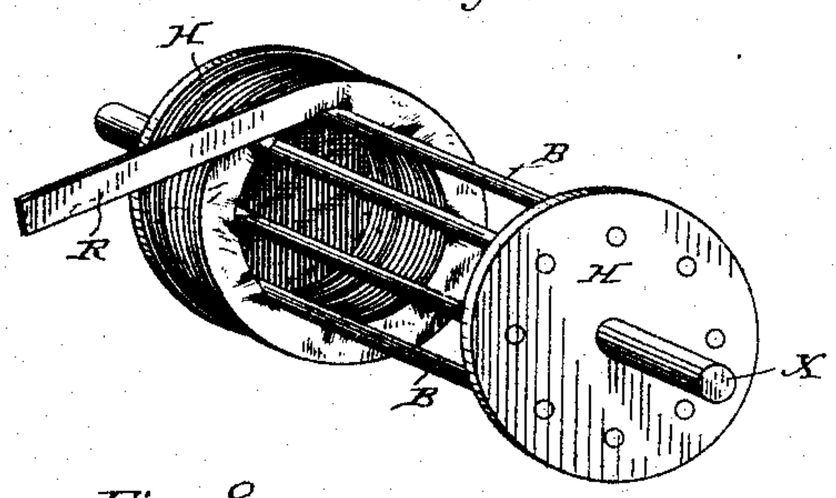


Fig. 6.

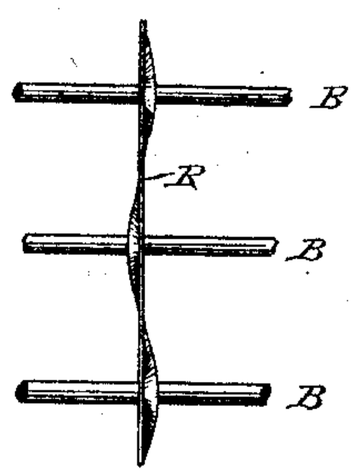


Fig. 8.

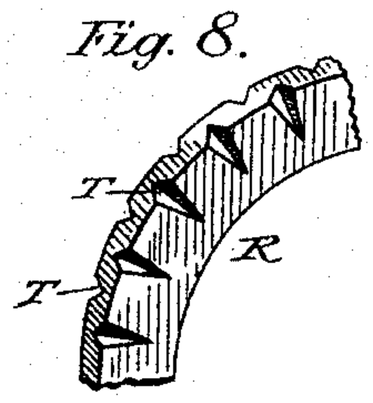


Fig. 9.

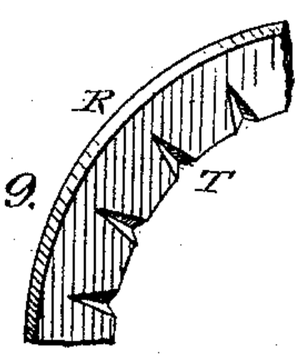


Fig. 11.

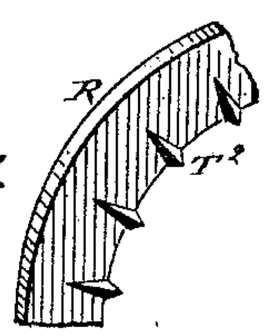
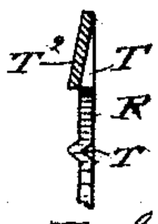


Fig. 10.



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By his Attorney: H. L. Townsend

UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF BOSTON, MASS.

ARMATURE FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 356,902, dated February 1, 1887.

Application filed May 25, 1883. Serial No. 96,091. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Armatures for Dynamo-Electric Machines, of which the following is a specification.

My invention relates to the armature cores or carriers upon which the coils or bobbins for the armatures of a dynamo-electric machine are wound, and more especially to a carrier formed of metallic tape or ribbon made of fine iron or homogeneous soft steel and wound on edge on suitable supports.

My invention consists of a cylindrical or annular core or carrier for the armature-coils of a dynamo-electric machine composed of one or more helices of iron of any convenient cross-section, but preferably made of thin sheet-iron plates or ribbons set on edge and wound or otherwise formed into a helix concentric with the armature-shaft in any desired manner.

My invention also consists in certain details in the form of a ribbon or plate on an armature of this description, the object of which is to avoid the difficulty in winding or bending the plate or ribbon to the circumference of the armature, owing to the difference in circumferential length of the inner and outer edges when so wound. This difficulty is obviated by my invention, which consists in giving to either or both edges of the tape or ribbon a sinuous, undulating, or other irregular form in the plane of its width, so as to compensate for the difference in the circumferential lengths of the curves which they follow. This may be accomplished by bending the inner edge to one side and the other of the general circumferential line which it follows, such bending being done in the act of winding or placing the tape or ribbon on its supports, so that when in place the inner portion of the tape will have a sinuous or undulating form; or, if desired, an irregular or wavy shape may be given to both edges of the ribbon before winding, so that the outer sinuosities will straighten when the tape is wound, the inner remaining, so as to produce the required compensation; or the edge, one or both, of the tape may be indented at intervals in a direction transverse to its plane, or formed in other ways, as will be hereinafter described. The tape used is by preference coated with a flexible insulator before use, or may be "scaled," "blued," "enameled," or otherwise treated, so as to form an insulating film upon it, or the various turns may be separated by interposed insulation.

Some of the various methods of carrying out my invention are herein described specifically and shown, but the general method admits of many modifications, and consists, broadly, in making the inner and outer edges of the tape as wound dissimilar in course, so as to compensate for the difference in length of the circumferential spaces covered by them.

In the accompanying drawings, Figure 1 illustrates a tape as applied on edge to a circular form over which it is to be wound. Fig. 2 shows one turn of the tape in the form which I give it to enable it to encompass the circular form or carrier. Fig. 3 is a cross-section of a portion of a spirally-wound tape wound edgewise, and shows several of the spiral convolutions. Fig. 4 is a perspective view of an annular band made according to my invention and designed for use as an armature-core. Fig. 5 is a perspective view of a portion of the spiral tape-windings when applied to a support and designed for use as a cylindrical armature-carrier. Fig. 6 illustrates the method of winding the tape or ribbon upon bars provided for it. Figs. 7, 8, and 9 illustrate other forms that may be given to the tape for carrying out my invention. Figs. 10 and 11 are different views of the form shown in Fig. 9, and will be described in detail farther on.

In Fig. 1, A is a supposed circular form upon which a ribbon, R, is to be wound. Ordinarily this is difficult, but may be accomplished by stretching the outer edge, S, and correspondingly compressing the inner edge, T. According to one method of carrying out my invention I give the inner edge or portion a wavy or crimped outline, while the outer edge or portion, S, is plain or uniform, whereby the winding may be easily and readily effected and a core be built up either of sepa-

rate rings formed of one or more convolutions of tape and piled upon one another or placed side by side upon the same axis, or of a continuously and spirally wound tape. One of these rings formed by a single convolution is shown in Fig. 2 in side view, in which the sinuosities or irregularities of the inner portion of the tape are indicated at T T T.

Fig. 3 shows in section a portion of a core made of a tape or ribbon of sufficient length to be wound spirally, while Fig. 4 shows the same in perspective.

The inner portion of the tape is crimped, corrugated, or sinuous, as before. The sinuosities may match one another in the contiguous turns, or not, as desired.

In Fig. 5 X indicates an armature-shaft carrying heads, flanges, or frames H H, connected by bars B B, of any desired number sufficient to give a general cylindrical form to the completed structure. Eight such bars are here shown. Upon these bars is wound the ribbon R, set edgewise upon the frame, and covering the bars so as to produce a cylindrical armature-core, upon which wire may be wound longitudinally in the ordinary way. In this case the bars B B, which may be replaced by any ribbed support, afford a help in giving a wavy outline to the ribbon or tape as it is wound, as indicated in Fig. 6, where the inner edge is alternately deflected to one side or the other as it passes successive bars B.

Fig. 7 shows a crimped ribbon, the waves or corrugations in which are produced in any suitable manner and are equal at the two edges. When wound on a curved frame, the inner edge only retains its full waviness, while the other is drawn more or less straight during the winding. This is the simplest form of my invention, and requires the least attention in winding the tape.

In Fig. 8 the outer edge or portion of the ribbon or tape is indented, bent, or crimped at intervals, which may be done by pressure between suitable rolls or surfaces, so as to spread or lengthen the outer edge and at the same time weaken its resistance to stretching, thus permitting it to be wound on a curved form. The same result may be accomplished by indenting or crimping the inner portion, as indicated in Fig. 9, thus weakening the inner edge, so as to permit a ready compression thereof for the same purpose.

Fig. 10 is a section of Fig. 9, and shows more clearly the crimp or dent formed at the inner edge of the tape.

Fig. 11 is a back view of Fig. 9, showing that the indentations may have their corresponding projections, T^2, which will form during the making of the notches or indentations or during winding, according to well-known mechanical principles.

It will be seen that my invention is applicable to forming cores having all kinds of outlines, consisting wholly of curves or combinations of curved and straight lines. Annular, cylindric, spherical, ellipsoidal, or other forms may be originated by winding the ribbon upon a form or frame-work of the pattern desired.

What I claim as my invention is—

1. An armature core or body consisting of thin or flexible iron ribbon or tape set edgewise to the axis of the armature, and formed, as described, at one or both edges so as to compensate for the difference in the length of its inner and outer circumference.

2. An armature made up with flat wire or tape set on edge and curved to the outline of the armature, said tape having a sinuous or indented surface upon its inner portion, as and for the purpose described.

3. An armature-core made up of tape or ribbon set edgewise and crimped, curved, or corrugated at its inner portion, so as to lessen the circumferential space covered thereby.

4. In an armature, the combination, with a frame having longitudinal bars or ribs, of flat ribbon or tape wound edgewise thereupon, as and for the purpose described.

5. In an armature, the combination, with the longitudinal supporting-ribs, of the ribbon or tape wound edgewise upon the same and given a crimped or wavy form by impingement upon the ribs.

6. An annular or cylindrical armature core or carrier formed of a helix of thin iron plate or ribbon set on edge concentric with the armature-shaft and having its successive turns insulated from one another.

7. A hollow cylindrical armature-core composed of iron spirals or helices concentric with and suitably supported upon an armature-shaft, and having their convolutions respectively insulated from each other, so as to prevent the circulation of induced currents in the core when said core is provided with induction-coils and rotated in a magnetic field.

8. In a dynamo-electric machine, a hollow cylindrical armature, the core of which is composed of one or more helices adapted to receive armature-coils traversing said helices parallel with the shaft, and means for supporting the said cylinder and induction-coils upon the shaft.

Signed at Boston, in the county of Suffolk and State of Massachusetts, this 23d day of May, A. D. 1883.

ELIHU THOMSON.

Witnesses:
HARRY B. ROGERS,
E. C. WHITNEY.