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K. J. G. AHLSTRAND

METHOD OF MANUFACTURING TOROID COILS

Filed March 25, 1927

Fig. 1.

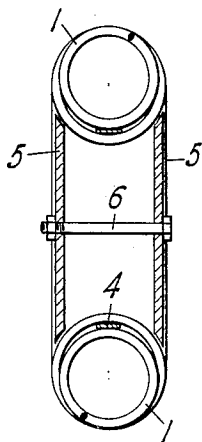


Fig. 2.

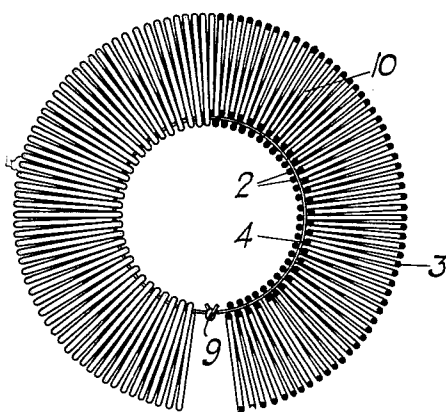


Fig. 3.

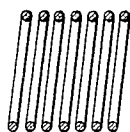


Fig. 4.

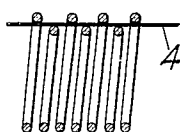


Fig. 5.

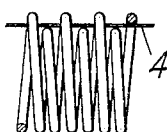


Fig. 6.

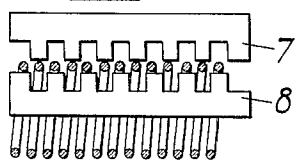


Fig. 7.

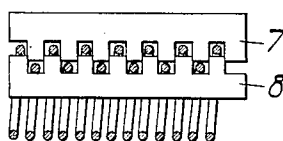


Fig. 8.

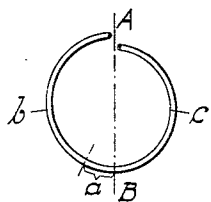


Fig. 9.

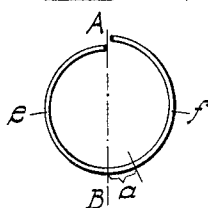
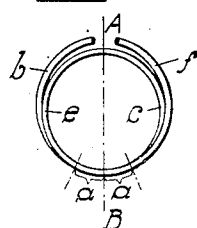


Fig. 10.



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UNITED STATES PATENT OFFICE.

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METHOD OF MANUFACTURING TOROID COILS.

Application filed March 25, 1927, Serial No. 178,377, and in Sweden June 8, 1926.

The present invention relates to an improved method of manufacturing toroid coils of the kind in which the windings form at the inner circumference of the coil a double layer and at the outer circumference of the coil a single layer. Such coils are as well known used for various purposes for instance in radio instruments.

The object of my invention is to provide a method by which coils of said kind can be manufactured in a convenient and easy manner, and by which the coils will obtain very good electric properties owing to the fact that the dielectric material used to secure the windings of the coil in position is reduced to a minimum.

In order to make my invention fully understood I will now describe it with reference to the accompanying drawing in which

Fig. 1 shows an axial cross section of a toroid coil.

Fig. 2 is a side view of the winding thereof.

Fig. 3 is a portion of a cylindrical winding in longitudinal section.

Figs. 4 and 5 show the same winding in section and side elevation after the turns thereof have been displaced in relation to each other.

Figs. 6 and 7 illustrate in side views a tool used for displacing the turns of the winding, the latter being shown in section.

Figs. 8-10 illustrate the movements of the turns of the winding when displaced in relation to each other.

Referring to Figs. 1 and 2 of the drawing the winding 1 of the toroid coil forms at the inner circumference a double layer 2 and at the outer circumference a single layer 3. Between the layers at the inner circumference is inserted a strap 4, a string or the like serving to keep the said layers in position. The winding 1 is adapted to be mounted in the usual manner between two discs 5, secured to each other by means of a bolt 6.

In manufacturing a toroid coil I first make in well known manner a straight winding (Fig. 3) of cylindrical or other desired cross section. Then I change the size of the turns of said winding so that every second turn is reduced in diameter while the diameter of the other turns is increased correspondingly. This may be accomplished in a convenient manner by means of the tool shown in Figs. 6 and 7. This tool consists of two combs 7 and 8 of which the one is

placed inside the winding, while the other is placed outside the latter. The teeth of said combs are disposed at a distance from each other corresponding to the distance between every second turn of the winding. When the combs from the position shown in Fig. 6 are pushed together to the position shown in Fig. 7, every second turn of the winding is pushed into a space between the teeth of the one comb, while the other windings are pushed into the spaces between the teeth of the other comb. Figs. 8-10 serve to illustrate what occurs in such displacement of the turns of the winding shown in Fig. 7. The left half *b* of the turn is increased by the portion *a* (Fig. 8), while the right half *c* of the same turn is decreased correspondingly. Fig. 9 shows a turn adjacent to that shown in Fig. 8. In this turn the right half *f* has been increased by the portion *a* while the left half *e* has been decreased correspondingly. In Fig. 10 the two turns shown in Figs. 8 and 9 are shown together. From this figure it is evident that the two halves *c* and *e* form together a turn of reduced diameter, while the halves *b* and *f* each form a portion of a turn having an increased diameter, the last mentioned halves each being increased by one of the portions *a* indicated in Fig. 10. Inasmuch as the decrease and increase of the turns takes place symmetrically in respect of the central line A-B shown in Figs. 8-10 no stresses tending to deform the winding will arise in the turns thereof. The stresses arising in the winding on account of the change of the diameter of the turns only tend to decrease the radial space between the turns at the one side of the winding. Such decrease is prevented by the strap 4 which preferably is inserted in said space after the combs 7 and 8 have been pushed together into the position shown in Fig. 7. After the strap 4 has been inserted and the tool 7, 8 removed the turns of the winding are pushed together in the longitudinal direction of the winding, whereby the turns at the one side of the winding form a double layer and the winding at the same time bends itself into the ring shown in Fig. 2. The free ends of the strap are finally secured to each other for instance by a knot 9 as is shown in Fig. 2.

Having now described my invention what I claim is:

The method of manufacturing a toroid coil, which consists in making a cylindrical

coil, decreasing the diameter of every second turn of said winding and increasing the diameter of the other turns correspondingly while at the same time displacing the turns of different diameters so as to form at one side of the winding a radial space, introducing into said space means for securing the turns in position in radial direction, and

pushing together the turns in the longitudinal direction of the winding until they form at the said side of the winding a double layer, substantially as described. 10

In testimony whereof I have hereunto subscribed my name this tenth day of March, 1927.

KARL JOHAN GERHARD AHLSTRAND.