Feb. 14, 1933. D. R. CLEMONS 1,897,604

ELECTROMAGNETIC DEVICE

Filed Sept. 23, 1930

Fig. 1.

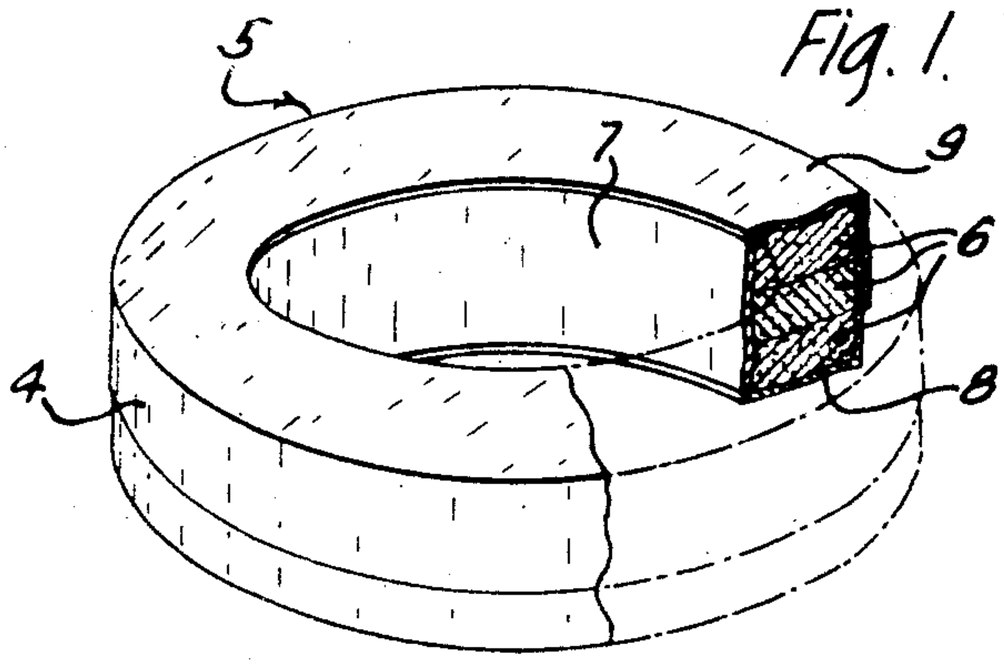


Fig. 2.

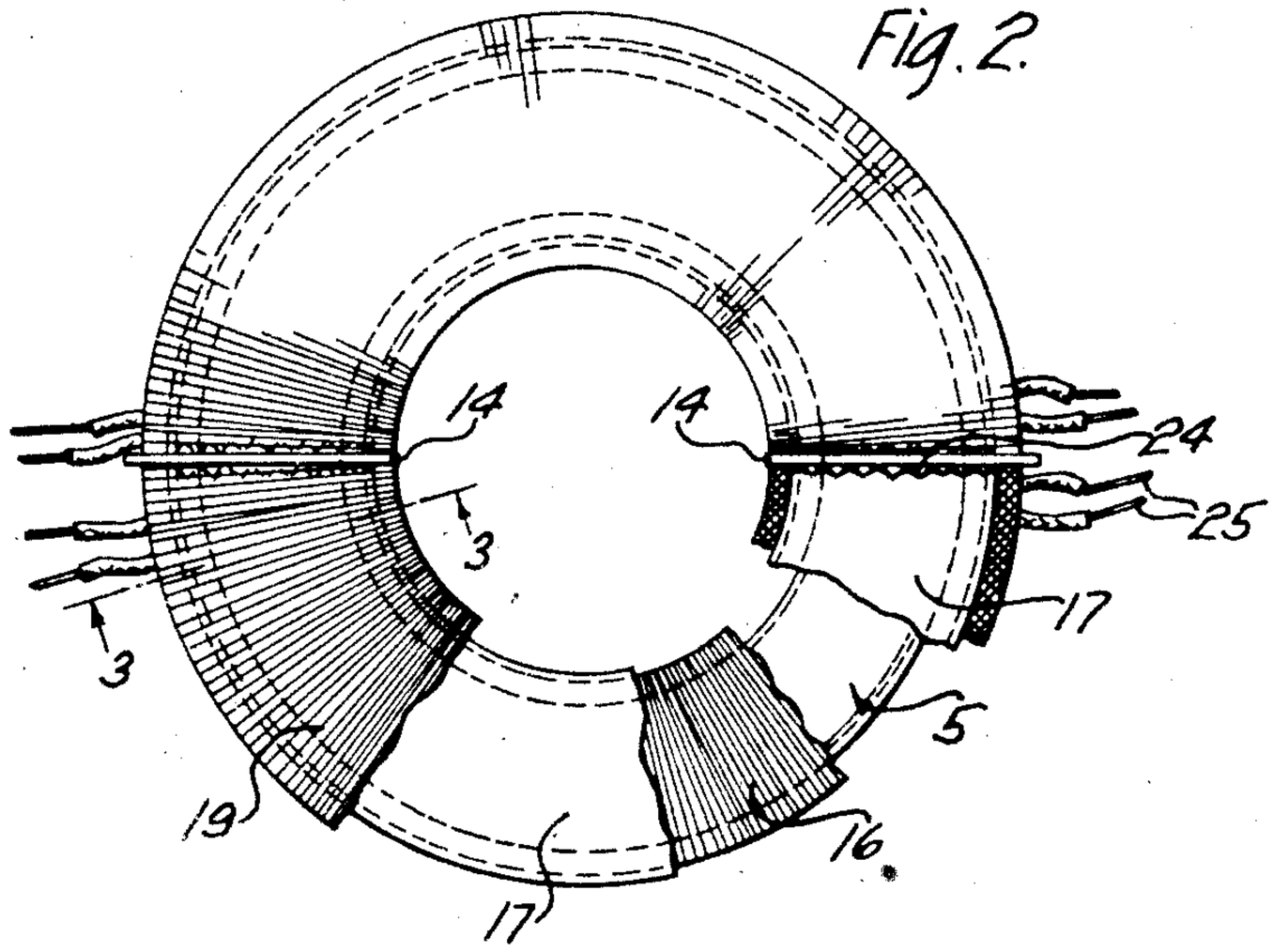


Fig. 3.

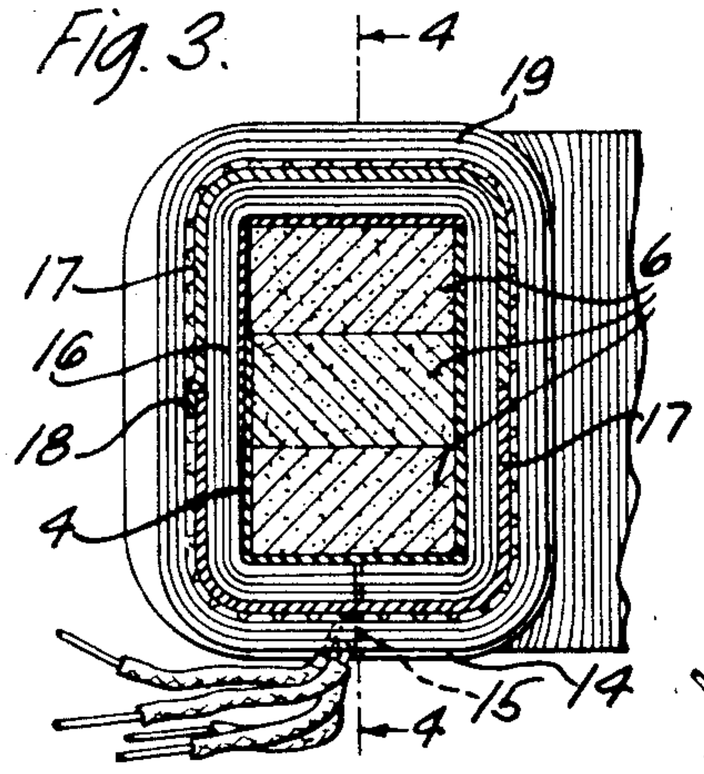
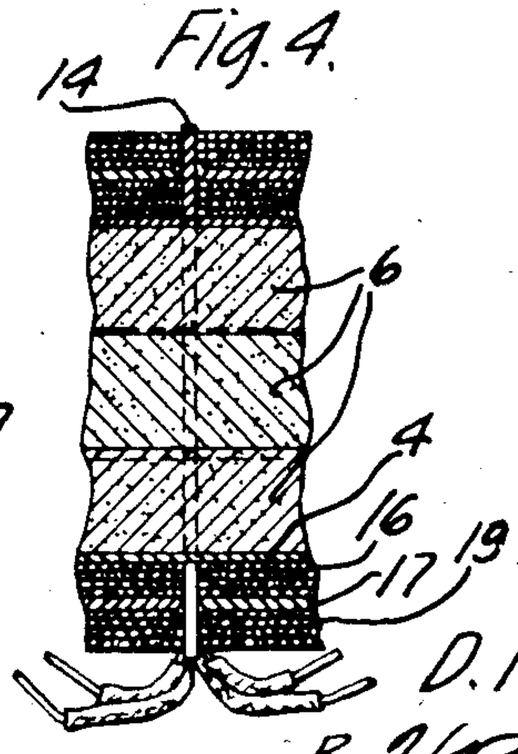


Fig. 4.



Inventor
D. R. Clemons
By H. B. Whitfield Atty.

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1,897,604

UNITED STATES PATENT OFFICE

DALE R. CLEMONS, OF RIVERSIDE, ILLINOIS, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

ELECTROMAGNETIC DEVICE

Application filed September 22, 1930. Serial No. 483,783.

This invention relates to electromagnetic devices, and more particularly to toroidal inductance devices which are especially applicable to telephone transmission lines.

In the manufacture of toroidal inductance devices for use in telephonic communication systems, it has been determined that capacity unbalance, which tends to cause cross-talk, results from a lack of symmetry between sections of winding and the core and between inner and outer windings of the coil.

It is an object of the present invention to provide a simplified, less expensive, and more symmetrical electromagnetic device having a high degree of electrical efficiency.

In accordance with one embodiment, the invention contemplates providing toroidal inductance coils having molded paper containers for receiving and insulatively enclosing the core thereof and molded paper, semi-circular parts for separating the windings of the coil from each other. The semi-circular parts are provided with serrated edges to contact with separators spaced at diametrically opposite points of the core and serve to position accurately the separators and insulate the windings, the serrated edges being provided to prevent the servings of the winding adjacent the separators from lodging between the separators and the semi-circular parts.

A better understanding of the invention may be had by referring to the following detailed description when taken in conjunction with the accompanying drawing, wherein

Fig. 1 is a perspective view showing the core positioned in the molded paper container, part of the assembly being broken away to show the construction and association of the container and core;

Fig. 2 is a plan view of a completed toroidal inductance coil having the windings and insulation thereof broken away at intervals to show in detail the construction and relative position of the various parts of the coil;

Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 2 in the direction of the arrows, and

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3 in the direction of the arrows.

Referring now to the drawing wherein like reference characters designate the same parts throughout the several views, particular reference being had to Fig. 1, the numeral 5 indicates generally a toroidal inductance coil core enclosed in a container 4 which forms a part of the present invention. In the illustrated embodiment, the core is composed of a plurality of permalloy dust rings 6, but it will be understood that while this is the preferred form of core, the invention is not limited to any form of core and might be practiced by using any of the usual types of inductance coil cores. The rings are enclosed in the container 4, which is comprised of a ring 7 of molded paper interposed between the upper surface of an annular collar 8 having an L-shaped cross-section and the underside of a similar annular collar 9. The ring 7 and the collars 8 and 9 are of such size that the vertically extending portion of the collar 8 fits within the vertically and downwardly extending portion of the collar 9 and the inner peripheral surface of the ring 7 abuts the inner peripheral surfaces of the horizontally disposed portions of the collars 8 and 9.

A toroidal inductance coil core having been insulated by enclosing it in a container such as the container 4 may have positioned thereon at diametrically opposite areas, separators 14 which extend radially of the core and are annular in configuration for surrounding the core, being cut as shown at 15 (Fig. 3) so that they may be positioned around the core. The spacers 14 are held in the desired position by clamps or other known means (not shown) and one or more servings of insulated wire 16 are applied to the core between the separators 14 while the latter are held in position. After a predetermined number of turns of insulated wire have been applied to the container 4 enclosing the core, semi-circular molded paper insulators 17 which are U-shaped in cross-section, are applied to the serving 16 in overlapping relation as shown at 18 at the outer surface of the coil and in abutting relation at the inner surface of the coil, and another serving 19 of insulated wire may be applied upon the

insulators 17. The semi-circular molded paper insulators 17 have their edges serrated as shown at 24 so that they may be forced into very intimate engagement with the separators 14, the serrations being bent upwardly since the insulators are slightly larger than the space between the separators 14, thereby preventing the servings 19 of wire from becoming lodged between the edge of the molded paper insulators 17 and the separators 14 and maintaining a definite separation between sections of the coil.

In the winding of a coil such as that described hereinbefore, suitable leads 25 may be taken from the windings 16 and 19 during the operation of applying the servings to the core. In the specific embodiment of the invention described hereinbefore, an insulating container has been provided for receiving the coil core and insulators have been positioned between the various windings of the core, the dimensions of which are uniform throughout the circumference of the coil, and therefore the geometrical symmetry of a coil manufactured in this manner is limited only by the accuracy with which the servings of wire may be applied to the core and which, as is well known, can be applied with extreme accuracy. By manufacturing toroidal inductance coils for telephonic communication systems in accordance with this invention, capacity unbalance in the coil due to lack of symmetry and uniformity may be reduced to a minimum and the efficiency of the coil materially increased.

Although the invention has ben described as relating to inductance coils of the type used in loaded telephone circuits, it is to be understood that the invention is to be limited only by the scope of the appended claims.

What is claimed is:

1. In an electromagnetic device, a core, molded paper collar sections and an annular member positioned between the sections for enclosing the core, and toroidal windings over the enclosed core.

2. In an electromagnetic device, a core, molded paper collar sections and an annular member positioned between the sections for enclosing the core, a series of toroidal windings over the enclosed core, and formed paper insulators between the various windings.

3. An electromagnetic device comprising a core, an insulator composed of cooperating annular collars enclosing the core in overlapping relation, an annular insulating member positioned between the collars, and a toroidal winding over the insulators.

4. An electromagnetic device comprising a core, an insulator composed of cooperating annular collars enclosing the core in overlapping relation, an annular insulating member positioned between the collars, toroidal windings over the insulators, and formed paper insulators between the various windings.

5. An electromagnetic device comprising a core, cooperating annular collars of paper and a paper ring for enclosing the core, servings of insulated wire applied over the core, semi-circular molded paper insulators between the various windings of the coil, and molded separators for separating sections of the coil.

6. In an electromagnetic device, a core, an insulator for the core composed of cooperating annular paper collars for receiving the core, and an annular insulating member positioned between the collars, the inner peripheral edge of the annular paper collars abutting the edge of the inner peripheral surface of the flat member, and servings of insulated wire applied over the insulator.

7. In an electromagnetic device, a core, an insulator for the core composed of cooperating annular paper collars for receiving the core, an annular insulating member positioned between the collars, the inner peripheral edge of the annular paper collars abutting the edges of the annular member, servings of insulated wire applied over the insulator, separators for separating sections of the coil, and semi-circular molded paper insulators having serrated edges for engaging the separators to insulate the various servings of the device.

8. In an electromagnetic device, a paper insulated core, windings of insulated conductors applied thereon, and means for separating the various windings of the device comprising molded paper separators, and molded semi-circular paper members having serrated edges for engaging said separators to prevent windings of the device adjacent the separator from contacting with other windings.

9. In an electromagnetic device, a core, a covering therefor comprising a plurality of molded paper members, and a winding over the covering.

10. In an electromagnetic device, a core, a covering therefor comprising a plurality of molded paper members, windings disposed in sections on the covering, and insulators disposed between the sections.

11. In an electromagnet device, a core, a winding thereon, spacing members to delimit the winding, a second winding over the winding, and a molded covering interposed between the first winding and the second winding.

12. In an electromagnetic device, a core, a winding thereon, spacing members to delimit the winding, a second winding over the winding, and a molded covering interposed between the first winding and the second winding, comprising a plurality of preformed parts.

13. In an electromagnetic device, a core, a

winding thereon, spacing members to delimit the winding, a second winding over the winding, and a molded covering interposed between the first winding and the second winding and having serrated ends for cooperation with the spacing members to prevent intrusion of turns of the second winding into the space for the first winding.

14. In an electromagnetic device, a core, a preformed sectional covering therefor, and a winding over the covering.

15. In an electromagnetic device, a preformed covering therefor, a winding over the covering, and a preformed covering over the winding.

In witness whereof, I hereunto subscribe my name this 13th day of September A. D., 1930.

DALE R. CLEMONS.