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E. M. FRASER

2,164,738

INDUCTOR WINDING

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Fig. 1.

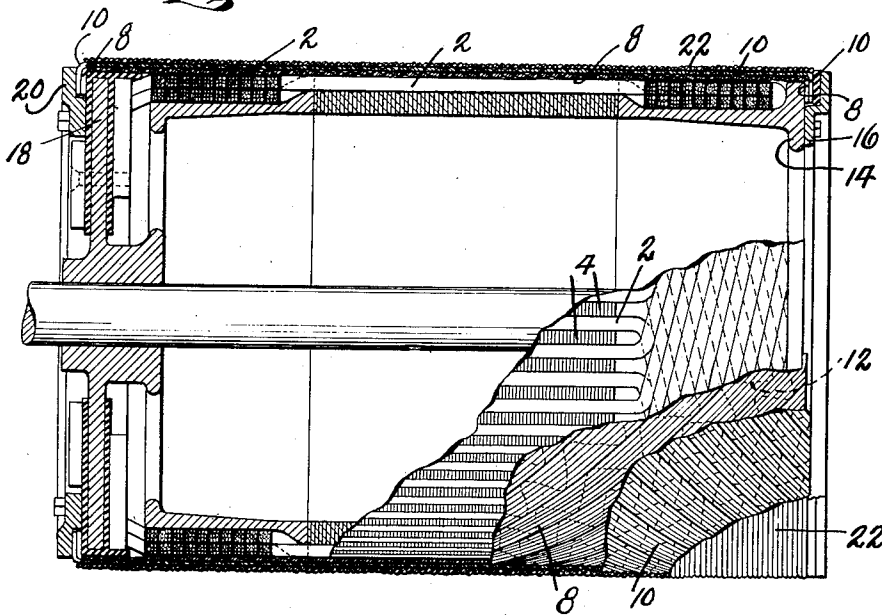


Fig. 2.

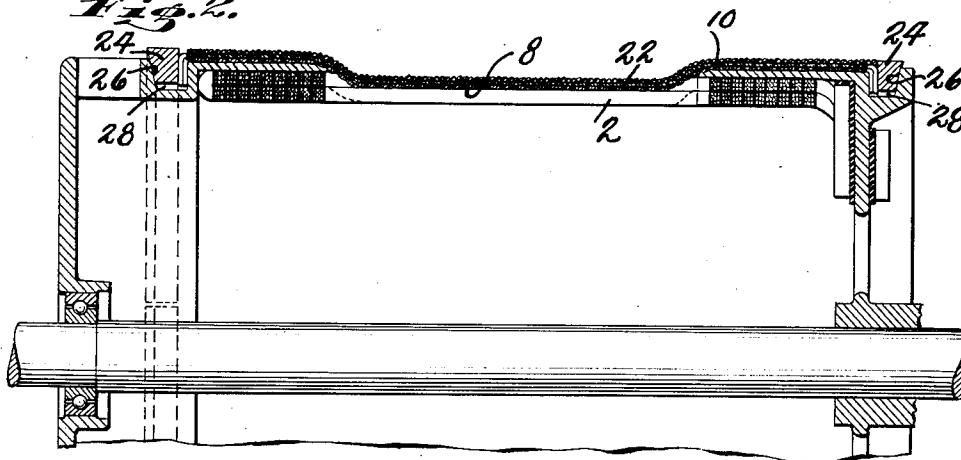


Fig. 3.

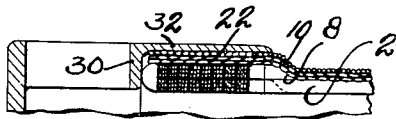
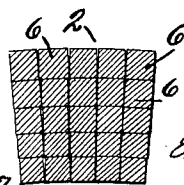


Fig. 4.



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UNITED STATES PATENT OFFICE

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INDUCTOR WINDING

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Application December 27, 1937, Serial No. 181,894

8 Claims. (Cl. 171—206)

This invention relates to inductor windings, and has for one of its objects the provision of a self-sustaining inductor winding in which a very simple construction is employed whereby torsional and centrifugal stresses are successfully resisted.

More specifically the present invention provides an inductor winding construction in which strong ribbons or tapes of metal or of composite material such as wire and cotton are spirally wrapped about the outside of the winding in superimposed relation and in opposite direction to provide resistance to torsional stresses set up in the winding when the same is rotated. In addition metal bands are applied about the ribbons to resist centrifugal stresses set up in the winding when the same is rotated. The metal bands may be wire of high tensile strength wound spirally about the winding, or other convenient form of banding.

Additionally to the foregoing the present invention provides novel means for anchoring the ends of the metal ribbons.

Furthermore, in one embodiment of the invention to be described herein laminated iron teeth are interposed between adjacent coils of the winding, these teeth being wedge shaped, the sides of the teeth being on radial lines from the axis of the winding.

The coils of the winding may also be of a novel strand construction as distinguished from solid copper bars.

The accompanying drawing illustrates several embodiments of the invention.

Fig. 1 is a longitudinal part sectional elevation of one embodiment of the invention;

Fig. 2 is a fragmentary longitudinal view of another embodiment of the invention;

Fig. 3 shows a fragmentary sectional view of another modification; and

Fig. 4 shows on an enlarged scale the novel construction of the coils.

Referring to the drawing in detail and first of all to Figs. 1 and 4: It will be seen that the inductor winding comprises coils 2 and iron teeth 4. These teeth, as will appear from Fig. 1, are of laminated construction and wedge shaped, the sides of the teeth being on radial lines from the axis of the winding.

The coils 2 may be of stranded construction, as illustrated in Fig. 4, each strand 6 being substantially rectangular in cross section, the strands being laid up as illustrated to provide a wedge-shaped structure which conforms to the space between adjacent teeth 4, the sides of the wedge

being on radial lines from the axis of the winding.

The coils 2 and teeth 4 are assembled on any suitable form or fixture and coil connections completed and soldered.

To resist torsional stresses set up in the winding, ribbons or tapes of metal or of composite material such as wire and cotton are wound about this assembly. The inner ribbon or tape is designated 8 and is wound spirally about the assembly in one direction. The other ribbon or tape is designated 10 and is wound about the assembly in the opposite direction.

These ribbons may be metal as above mentioned or they may be composed of high tensile strength wires laced together with threads of cotton, for example, shown at 12.

These ribbons or tapes are of such a length and wound with such a pitch as completely to cover the outside of the assembly.

As above mentioned one layer is wound in one direction and the superimposed layer in the opposite direction so as to provide resistance to torsional stresses in both directions of rotation of the winding.

The ends of the ribbons or tapes 8 and 10, at one end of the winding, are bent over a rigid metal ring 14 and clamped thereto by a rigid ring 16. At the commutator end of the winding the ends of the ribbons are bent over ring 18 and clamped thereto by ring 20.

Applied about the outside of the assembly thus produced are rigid metal bands, which are conveniently provided by wrapping piano wire 22 or some other suitable high tensile strength wire about the assembly, this banding being employed to resist centrifugal stresses in the winding and to aid in clamping the spirally wound ribbons 8 and 10.

Upon the completion of the assembling of the coils, teeth, metal ribbons and banding the winding is preferably impregnated with a varnish or other suitable impregnating material and baked or otherwise heated. This material serves to bind the various components of the winding together and seals the winding against the entry of water or other deleterious materials.

In the embodiment of the invention illustrated in Fig. 2 the laminated iron teeth have been omitted, otherwise, however, the winding is similar to the one already described, comprising coils 2, metal ribbons 8 and 10 and the banding 22. The metal ribbons 8 and 10 in this embodiment of the invention are clamped in place at each end of the winding by split rings 24. One face of

each of these rings is bevelled as shown at 26 and the wall of the slot 28 which receives the ring is similarly shaped. This imposes a very high clamping action upon the bent over ends of the ribbons 8 and 10 securely to hold the same in place.

In the embodiment of the invention illustrated in Fig. 3 a ring 30 is provided at each end of the winding, each of these rings being provided with a flange 32 which is pressed over the coils 2, ribbons 8 and 10 and the bands 22.

It is to be understood that the windings of Figs. 2 and 3 are finally impregnated with varnish or other suitable material and baked or otherwise heated, as described in connection with Fig. 1.

Various changes may be made in the details of construction and arrangement of parts hereinabove described without departing from the spirit and scope of this invention.

What is claimed is:

1. An inductor winding comprising a hollow cylindrical structure made up of conductors, metal ribbons wrapped about the conductors, and a wrapping of wire about the ribbons, the structure being impregnated and coated with a binding material.

2. An inductor winding comprising a hollow cylindrical structure made up of conductors, metal ribbons spirally wrapped about the conductors in opposed directions, and an outer spiral wrapping of wire, the ribbons resisting torsional stresses, the wire resisting centrifugal stresses, the assembly being impregnated and coated with heat hardened binding material.

3. An inductor winding comprising a hollow cylindrical structure made up of spaced conductors, metal bands disposed in superimposed relation about the assembled conductors for resisting torsional stresses, wire bands about the exterior of the metal bands for resisting centrifugal stresses, and a binder filling the interstices of the assembly.

4. An inductor winding comprising a hollow cylindrical structure made up of coils and lami-

nated metal teeth filling the spaces between the coils, metal ribbons wrapped in opposite directions about the assembly, wire wrapped about said ribbons, and a binding material filling the interstices of the assembly.

5. An inductor winding comprising a hollow cylindrical structure made up of coils and laminated metal teeth filling the spaces between the coils, the coils being made up of strands substantially rectangular in cross section and assembled to provide a wedge-shaped structure adapted to fill the spaces between said teeth, the side walls of the latter being on radial lines from the axis of the winding, metal ribbons wrapped in opposite directions and in superimposed relation about the assembly, wire wrapped spirally about said ribbons and binding material filling the interstices of the winding.

6. An inductor winding comprising a cylindrical structure of spaced coils, tapes wrapped in opposed directions about the coils, the ends of said tapes being bent over the ends of the assembly, rings at the ends of the assembly for clamping the tape ends, metal bands about the exterior of the tapes and heat hardened binding material filling the interstices of the structure.

7. An inductor winding comprising a cylindrical structure of spaced coils, tapes wrapped spirally in opposed directions about the coils, the ends of said tapes being bent over the ends of the assembly, split rings at the ends of the assembly for clamping the tape ends, metal bands about the exterior of the tapes and a binding material filling the interstices of the structure.

8. An inductor winding comprising a cylindrical structure of spaced coils, ribbons or tapes wrapped in opposed directions about the coils, wire about the said tapes, flanged rings forced over the ends of the said tapes and wire to clamp the same in place and a binding material filling the interstices of the winding.

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