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1,970,406

WIRE COIL

Filed March 13, 1934

Fig. 1.

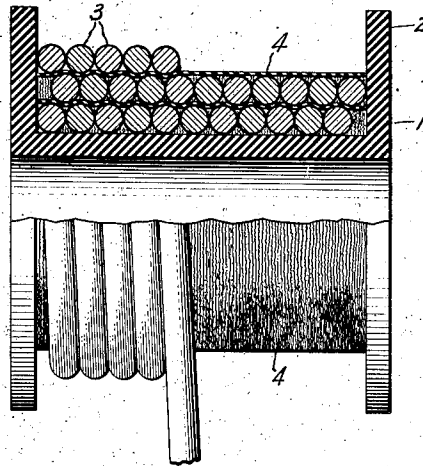
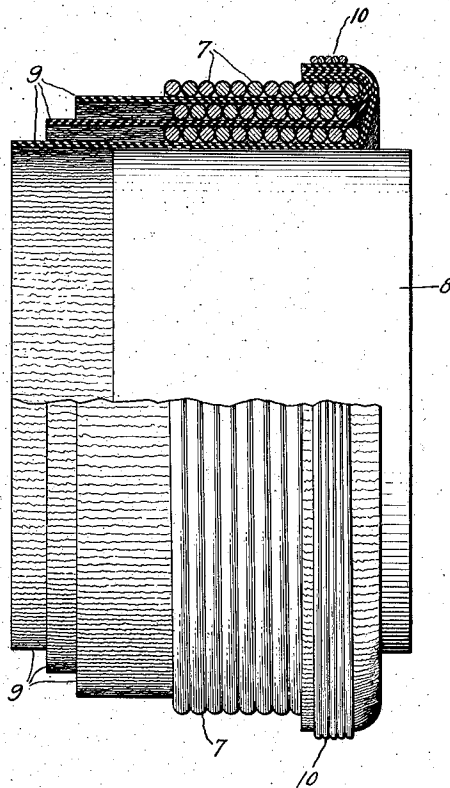


Fig. 2.



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UNITED STATES PATENT OFFICE

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WIRE COIL

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6 Claims. (Cl. 175-21)

My invention relates to wire coils such as are used in electrical apparatus and it relates particularly to coils which comprise a plurality of layers of turns between which layers additional insulation is required over that of the wire itself.

Certain forms of spool wound coils heretofore constructed have had the adjacent layers of the turns separated by thin sheets of insulating material such as paper. If the sheets are cut to fit between the flanges of the spool it is found that as the wire is wound upon the insulation layer thus formed the pressure of the wire deforms it and causes one or both ends thereof to shrink or be drawn away to an objectionable extent from the adjacent flange of the spool. In accordance with one aspect of my invention I employ crepe paper as the insulating material between adjacent layers of such a coil and arrange the paper with the corrugations thereof extending circumferentially of the coil. Being so arranged the paper is able to stretch axially of the coil as the wire is being wound thereon to form the coil, the amount of stretch being sufficient to prevent the paper layer from being drawn away from either flange of the spool.

My invention also relates to coils which are not spool wound but which are wound, for example, on a form from which they are subsequently removed and given an exterior covering of insulation. If the layers of such a coil are separated with insulation of a non-elastic character, such as paper, and one attempts to turn the projecting portions of the insulation back over the ends of the coil to form a protecting and insulating cover for the coil, it is necessary first to make numerous slits in the projecting portions of the insulation. Cutting the insulation in this way, however, materially weakens its dielectric strength so that where the coil is subjected to relatively high potential differences any lessening of its dielectric strength is a serious consideration. In accordance with another aspect of my invention I employ a corrugated sheet of insulating material, such as crepe paper, between the layers of the coil with the corrugations extending axially of the coil. Because of the fact that the material as so arranged readily yields circumferentially of the coil the projecting portions of the material may be turned outwardly and over the end portions of the coil without being slitted at any point. The turned back portions of the insulation may then be bound down by a tie string, each layer of the coil or the end portions at least thereof being

thereby completely enveloped in an unbroken cell of insulation.

My invention will be better understood from the following description taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

Referring to the drawing, Fig. 1 is an enlarged view partly in cross section of a spool wound coil embodying my invention, and Fig. 2 is a cross sectional view of a portion of a form wound coil also embodying my invention.

In Fig. 1, which represents a spool wound coil, I have shown the coil in the process of being wound rather than as a finished coil, for the purpose of more clearly disclosing my invention. The spool 1 may be constructed of any suitable material, preferably insulating material, and may have side flanges 2 which are integral with the cylindrical connecting portion as shown or separate therefrom. The wire 3 comprising the coil is wound on the spool in layers in the usual manner and over each layer of turns there is placed a layer of crepe paper 4 with the corrugations of the paper extending circumferentially of the coil. The paper is cut so as to completely fill the space between the two flanges of the spool and preferably is of such length that each piece extends completely around the coil. As the next layer of turns is wound on, the crepe paper surrounding the previous layer is slightly depressed between the turns of the former layer, as shown by the drawing. Since the crepe paper has its corrugations extending circumferentially of the coil the paper readily yields axially of the coil so that when the layer of turns is completed the paper has not been withdrawn from either flange as would be the case with ordinary non-elastic paper but rather extends completely to both side flanges of the spool. It will be seen from the drawing that the last layer of crepe paper shown forms a smooth cylindrical surface until the wire is wound thereon, causing it to be slightly deformed by the pressure of the applied wire but that such deformation does not have the result of drawing the paper away from either flange of the spool.

Referring now to Fig. 2, which represents a form wound coil, I have shown the coil comprising the turns 7 wound in layers on the form 8 and between each two layers of turns and between the form and the first layer are layers of corrugated insulation 9, such as crepe paper, the corrugations in this case extending axially of the coil. In winding the coil the insulation is allowed to extend for some distance

beyond the ends of the coil, as represented at the left-hand end of the coil in Fig. 2. After the winding of the coil has been completed the projecting portions of the insulation are turned back over the adjacent ends of the coil, as represented at the right-hand end of the coil in Fig. 2. These turn-back portions may then be suitably bound down by a tie string as shown at 10. Since the insulation is corrugated in an axial direction it stretches readily circumferentially of the coil, which facilitates its being turned back over the end portion of the coil without breaking the insulation or requiring any slitting thereof, which would be the case if the insulation were of a non-yielding character. If desired the projecting portions of the insulation at the two ends of the coil may be of such length that after being turned back over the coil they will meet, thus forming a complete envelope for the coil. Such a coil having no breaks in the insulation enveloping the individual layers of the coil as well as the complete coil, is well adapted for use where the coil is to be subjected to relatively large differences of potential, since the coil, or at least the coil ends, are enclosed in a complete cell of insulation.

What I claim as new and desire to secure by Letters Patent in the United States is:

1. A coil of wire comprising a plurality of turns of the wire arranged in a plurality of layers and a layer of insulating material between adjacent layers of the turns, said material comprising crepe paper.

2. A spool wound coil of wire comprising a plurality of turns of the wire arranged in a plurality of layers and a layer of crepe paper between adjacent layers of the turns, the cor-

rugations of the paper extending circumferentially of the coil.

3. A spool having side flanges, a coil of wire wound on the spool comprising a plurality of turns arranged in a plurality of layers and a layer of crepe paper between each two adjacent layers of the wire, said paper having its corrugations extending circumferentially of the coil whereby the paper by yielding axially of the coil is not drawn away from either side flange of the spool.

4. A coil of wire comprising a plurality of turns of the wire arranged in a plurality of layers and a layer of insulating material between adjacent layers of the turns, said material having corrugations therein extending axially of the coil and having a portion turned back over the end of the coil.

5. A coil of wire comprising a plurality of turns of the wire arranged in a plurality of layers and layers of crepe paper between adjacent layers of the turns, the corrugations of the paper extending axially of the coil and corresponding portions of the paper layers being turned back and overlying an end portion of the coil.

6. A coil of wire comprising a plurality of turns of the wire arranged in a plurality of layers and layers of crepe paper between adjacent layers of the turns, the paper having portions extending beyond the ends of the coil and having its corrugations extending axially of the coil, said portions of the paper being turned back over the corresponding ends of the coil.

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