April 11, 1939. E. E. FRANZ 2,154,070

ELECTRICAL COIL

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FIG. 1

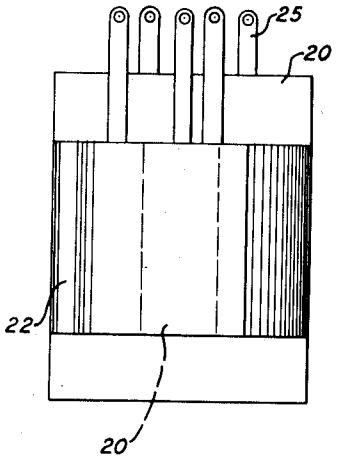


FIG. 2

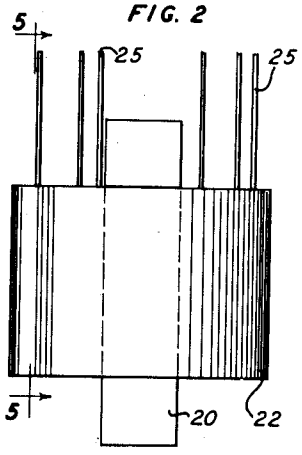


FIG. 3

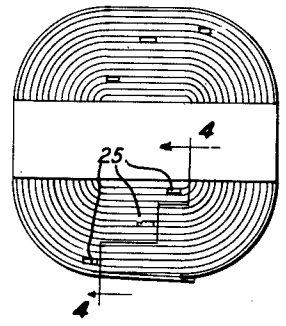


FIG. 4

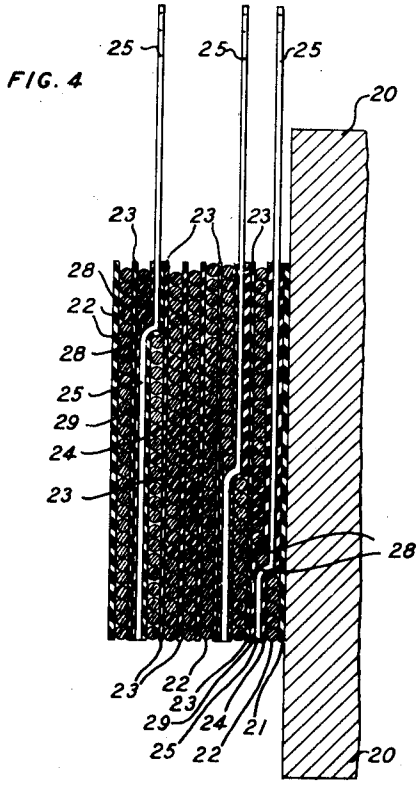


FIG. 5

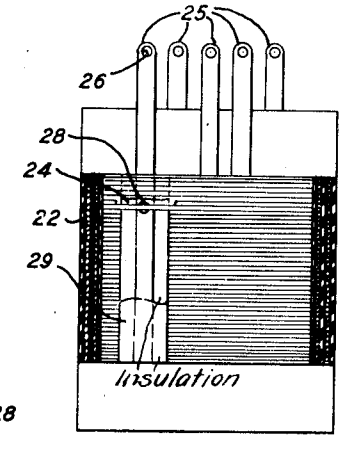
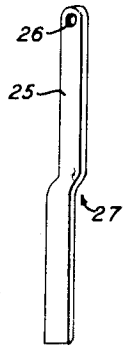


FIG. 6



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FIG. 7

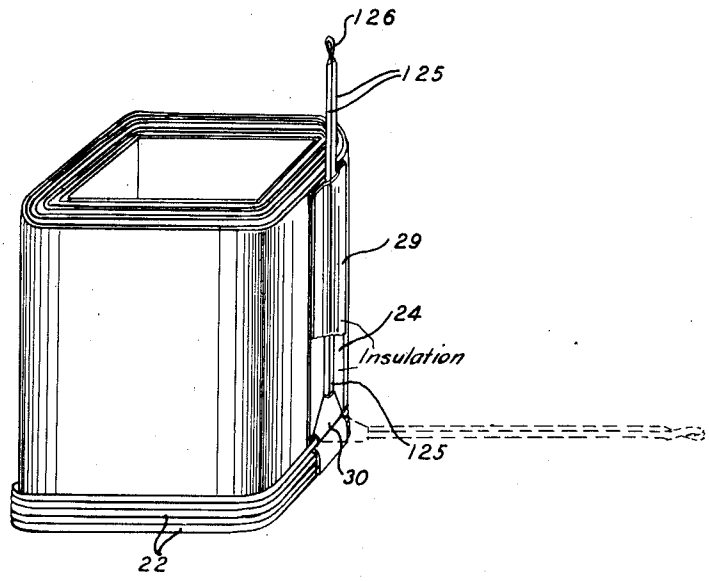
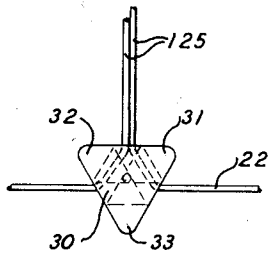


FIG. 8



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UNITED STATES PATENT OFFICE

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ELECTRICAL COIL

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Application July 16, 1936, Serial No. 90,874

3 Claims. (Cl. 175—21)

This invention relates to electrical coils and more particularly to coils in which the winding is tapped at one or more intermediate points whereby a portion only of the winding may be energized if desired.

An object of the present invention is to provide a tapped coil in which the taps brought out to a surface of the coil structure are constructed in a simple and reliable manner and with minimum addition to the bulk of the structure and disturbance of the windings.

In one embodiment of the invention, there is contemplated a coil comprising a plurality of superimposed layers of windings of an insulated electrical conductor in which taps are brought up from one or more intermediate turns of the winding to extend beyond one end of the body of the winding, the taps being either loops of the winding itself or conductive members secured to the winding and extending across the turns thereof, and these taps being simultaneously held in place among the turns of the winding and insulated therefrom by means of laminar members coated with adhesive material.

Other objects and features of the invention will appear from the following detailed description of two embodiments thereof taken in connection with the accompanying drawings in which the same reference numerals are applied to identical parts in the several figures and in which

Fig. 1 is a view in front elevation of a coil constructed in accordance with the invention;

Fig. 2 is an end elevation thereof;

Fig. 3 is a plan view thereof;

Fig. 4 is a broken sectional view on the line 4—4 of Fig. 3;

Fig. 5 is a section on the line 5—5 of Fig 2;

Fig 6 is a perspective of a detached tap member;

Fig 7 is a detached diagrammatic perspective view of the incomplete winding only of a modified form of coil, and

Fig 8 is a detached view of a portion of the winding of Fig. 7 with a clamp in place thereon.

In the embodiment disclosed in Figs. 1 to 6 inclusive, a coil has a magnetic core 20 of any approved material and construction, here shown as an H-shaped mass which may be thought of as silicon steel. Around the cross-bar of the H may be a protective wrapping 21 of any suitable material such as paper or cloth with or without an impregnation of varnish, shellac, or the like; although in some instances this wrapping 21 may be omitted if desired.

Over the wrapped or naked cross-bar is a winding 22 of insulated electrical conductor. The conductor may be thought of as a copper wire with an insulating coating, e. g. enamel, textile threads, felted fibres of paper stock or of asbestos or any other suitable material applied to the wire in any appropriate manner. The conductor is wound on the core in regular superimposed layers of snugly abutted coils and between each two consecutive layers of coils may be a wrapping 23 of material such as that of the wrapping 21; although the wrappings 23 may be omitted in some instances if desired.

The conductor is wound on coil by coil and layer on layer until a point is reached at which a certain desired and predetermined length of conductor or number of turns has been put in place, and at which point it is desired to bring out a tap. Under the last turn and over the surface of the previous turns is placed a strip or flexible lamina 24 of insulating material coated, preferably on both sides, with a suitable adhesive, e. g. a strip of tough paper coated with rubber cement, a piece of electrician's tape, or the like. Upon this adhesive insulating lamina is placed a tap member 25 in the form of a strip of sheet metal perforated at its upper end as at 26 for subsequent connection purposes. A supply of such strips 25 may be prepared beforehand all of identical form and dimensions. Then when one is to be placed in position it is given a single transverse offset 27 at the point along its length where it is to be crossed by the particular turn of the winding to which it is to be attached. This offset may conveniently be done with a pair of pliers either plain or having correspondingly shaped offset jaw surfaces.

The tap member 25 having been placed in position on the adhesive strip 24, the turn of the winding to be connected to the tap is denuded of insulation at the point where it crosses the tap and is then preferably soldered to the tap as indicated at 28. A second adhesive insulating lamina 29 similar to 24 is then pressed over the tap and the coils and the winding is continued until a point is reached where it is desired to have another tap. The above procedure is then repeated.

Tap members thus placed are rigid in themselves and are rigidly held in place by the combined effect of the adhesive laminae 24 and 29 and of the subjacent and superjacent turns of the windings. They are easily maintained in position after being placed and during the subsequent winding; and are not easily displaced after the coil is completed. Being relatively rigid in

themselves, they may be made to occupy relatively accurately predeterminable positions relative to each other and to the outer contours of the finished coil, thus rendering the coil so made susceptible of simple predeterminable mounting in relation to other electrical apparatus to be associated therewith. Also, such taps may be rugged in themselves and so well adapted for subsequent permanent combination with other apparatus by means of soldered connections.

While it is preferable to have the laminae 24 and 29 of or coated with adhesive material, it is in some cases sufficient if they are merely soft enough for the tap and wire to embed themselves therein.

Of the embodiment shown in Figs. 7 and 8 there is disclosed only the detached and incomplete winding, this being thought sufficient to illustrate this form of the invention. Here the winding 22 is made as before by winding an insulated conductor in consecutive superimposed layers of closely abutted coils or turns until a point is reached at which it is desired to have a tap. The wire of the winding is here bent out at right angles to the surface of the coil as indicated in dotted lines in Fig. 7 and carried out to the distance required. It is then doubled back on itself and again bent at right angles to extend along the direction of continued winding. Where the two right angled bends in the wire abut against each other at the base of the loop 125 thus formed, the two parts of the wire are secured together, e. g., by being whipped with one or more turns of non-conductive strand or of wire, or by having some clamping means applied. A preferred form of such means is disclosed in Figs. 7 and 8. This is a blunt pointed, triangular bit 30 of malleable sheet metal, e. g., soft galvanized sheet iron, applied flat against the two wire angles and then having two of its corners 31 and 32 folded over the apices of the angles and its third corner 33 folded down over these two.

An adhesive insulating lamina 24 is pasted over the preceding windings, the loop 125 is brought up into the full line position of Fig. 7, and a second adhesive insulating lamina 29 is pasted over the loop 125. The winding is then continued and other taps may be taken off in the same fashion at other suitable points. At the outer end of each tap 125, the wire may be denuded for a short distance to provide a connecting terminal 126.

It will be evident that the embodiments herein disclosed are illustrative only and may be modified and departed from in many ways without departing from the spirit and scope of the invention as pointed out in and limited only by the appended claims.

What is claimed is:

1. In an electrical coil having means to support a winding and a plurality of turns of conductor strand forming a layer of winding on the winding supporting means, a lamina of insulating material adhesive on both sides and extending over and in contact with a portion only of the turns of the layer, a turn of the layer extending over the lamina in contact therewith, a tap member connected to the last named turn and extending over the lamina in contact therewith, a second lamina of insulating material adhesive on both sides and extending over and in contact with the first lamina and the last named turn and the tap member, and a second portion of the turns of the layer extending over and in contact with the second lamina, the parts being so disposed and proportioned that each of the laminae is over some of the turns of the tapped layer and under some thereof and the tapped turn and the tap member are substantially immovably held between the two laminae and insulated thereby from the remainder of the coil.

2. In an electrical coil having means to support a winding and a plurality of turns of conductor strand forming a layer of winding on the winding supporting means, a lamina of insulating material adhesive on both sides and extending over and in contact with a portion only of the turns of the layer, a turn of the layer extending over the lamina in contact therewith, a tap member connected to the last named turn and extending over the lamina in contact therewith, a second lamina of insulating material adhesive on both sides and extending over and in contact with the first lamina and the last named turn and the tap member, and a second portion of the turns of the layer extending over and in contact with the second lamina, the tap member consisting of a strip of metal having an offset therein to receive the turn connected thereto, the parts being so disposed and proportioned that each of the laminae is over some of the turns of the tapped layer and under some thereof and the tapped turn and the tap member are substantially immovably held between the two laminae and insulated from the rest of the coil thereby.

3. In an electrical coil having means to support a winding and a plurality of turns of conductor strand forming a layer of winding on the winding supporting means, a lamina of insulating material adhesive on both sides and extending over and in contact with a portion only of the turns of the layer, a turn of the layer extending over the lamina in contact therewith, a tap member connected to the last named turn and extending over the lamina in contact therewith, a second lamina of insulating material adhesive on both sides extending over and in contact with the first lamina and the last named turn and the tap member, and a second portion of the turns of the layer extending over and in contact with the second lamina, the tap member comprising a loop of the conductor strand extending from the last named turn and held in form by clamping means at the base thereof, the parts being so disposed and proportioned that each of the laminae is over some of the turns of the tapped layer and under some thereof and the tapped turn and the tap member and the clamping means are substantially immovably held between the two laminae and insulated from the remainder of the coil thereby.

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