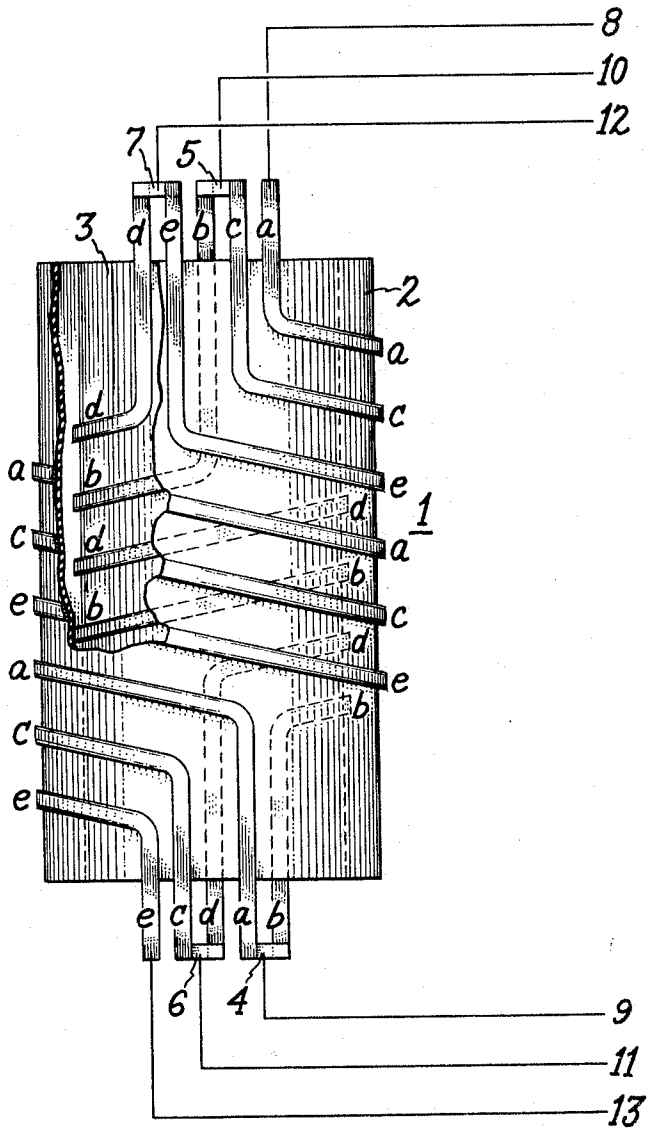
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TRANSFORMER TAP WINDING

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TRANSFORMER TAP WINDING

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1 Claim. (Cl. 336—181)

This invention relates to transformer tap windings and more particularly to improvements in high current interwound windings of that type.

For changing the voltage or another electrical quantity of a transformer, it is common practice to provide at least one of its windings with a plurality of taps to which circuit connections can selectively be made so as in effect to cut out of circuit or introduce into the circuit various sections of the tap winding between electrically adjacent pairs of taps. Ordinarily these sections have the same number of turns and it is common practice to interwind the sections so as to make other electrical quantities or characteristics of the transformer, such as reactance, substantially independent of the number of sections of the tap winding which are in or out of circuit and so that the tap connections can be made at the ends of the winding and not at intermediate points in the winding.

In some interwound tap windings heretofore known, all winding sections have all been in one layer which has required separate connections between successive sections extending from the top to the bottom of the winding. The currents in these separate top to bottom connections provide additive magneto motive forces which in the case of heavy currents can cause excessive losses in adjacent transformer tank plate unless protected by a conducting shield and also produce excessive electromagnetic forces during short circuits. Where interwound tap sections have been wound with adjacent sections in different concentric winding layers, all taps have been taken from only a single end of the winding.

In accordance with the present invention, there is provided a novel double layer interwound tap winding with the layers wound in opposite directions and with top to top and bottom to bottom connections between successive sections so as to eliminate the previously described objectionable features of a single layer interwound tap winding.

An object of the invention is to provide a new and improved transformer tap winding.

A further object of the invention is to produce a heavy current transformer tap winding having interconnections between sections which do not produce additive magneto motive forces.

A further object of the invention is to provide an interwound transformer tap winding for heavy currents in which the interconnections between sections are made without axial jumpers and in which taps are provided in equal or substantially equal number at each end of the windings.

The 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 claim.

Referring now to the single figure of the accompanying drawing, which is a partly broken away side elevation view of a simplified embodiment of the invention, there is shown therein a double layer interwound tap winding **1** having an interwound three section outer layer **2**, and a concentric coaxial oppositely interwound two section inner layer **3**. All five sections are shown by way of example as having about two turns. The sections of the outer layer **2** consist of separate interwound conductors *a*, *c*, and *e*, respectively, while the sections of the inner layer **3** consist of separate oppositely interwound conductors *b* and *d*, respectively. By "oppositely interwound" it is meant that they are interwound and wound in the opposite direction to the sections of the outer layer.

The sections are serially connected by top to top and bottom to bottom connections. Thus there is a connection **4** between the bottom end of the first section comprising the conductor *a* of the outer layer and the bottom end of the first section comprising the conductor *b* of the inner layer. There is a second connection **5** between the top end of the first section of the inner layer comprising the conductor *b* and the top end of the second section of the outer layer comprising the conductor *c*. There is another connection **6** between the bottom end of the second section of the outer layer comprising the conductor *c* and the bottom end of the second section of the inner layer comprising the conductor *d*, and there is a fourth connection **7** between the top end of the second section of the inner layer comprising the conductor *d* and the top end of the third section of the outer layer comprising the conductor *e*. The terminal ends of sections *a* and *e* are disposed at opposite ends of the winding **1**. Thus all of the five winding sections are serially connected with additive polarity and six taps or tap leads may be brought out from the winding. These comprise, for example, an end tap **8** connected to the top terminal end of the first section of the outer layer comprising the conductor *a*, an intermediate tap **9** connected to the connection **4**, an intermediate tap **10** connected to the connection **5**, an intermediate tap **11** connected to the connection **6**, an intermediate tap **12** connected to the connection **7** and an end tap **13** connected to the bottom terminal end of the third section of the outer layer comprising the conductor *e*.

While the winding **1** has been shown and described for the sake of simplicity as a separate and distinct winding, it will, of course, be understood that it may in turn be a tap winding section of a larger winding having many more turns in which case the additional turns would preferably be wound in one or more additional layers preferably concentric and coaxial with the layers **2** and **3**.

While there has been shown and described a particular embodiment of the invention, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention, and therefore it is intended by the appended claim to cover all such changes and modifications as fall within the true spirit and scope of the invention.

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

A double layer tap winding for electromagnetic induction apparatus comprising concentric coaxial inner and outer layers of oppositely interwound multi-turn winding sections, said sections being of substantially equal length, a plurality of external terminals at each axially opposite end of said winding, adjacent ends of winding sections in different layers being connected through said terminals to connect all said winding sections in series circuit relation between a single pair of coil end terminals, one said winding layer having one more section than the other layer whereby equal numbers of said external terminals including a single coil end terminal are located at each axial end of said winding, and a separate tap lead connected to each of said external terminals thereby to provide an equal number of tap leads at each axial end of said winding with a tap-to-tap voltage therebetween equal to the winding section voltage.

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