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REGULATING TRANSFORMER WITH SUBSTANTIALLY UNIFORMLY DISTRIBUTED WINDINGS ON ITS CORE AND WITH AT LEAST TWO MOVABLE CONTACT MEMBERS

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Fig. 1

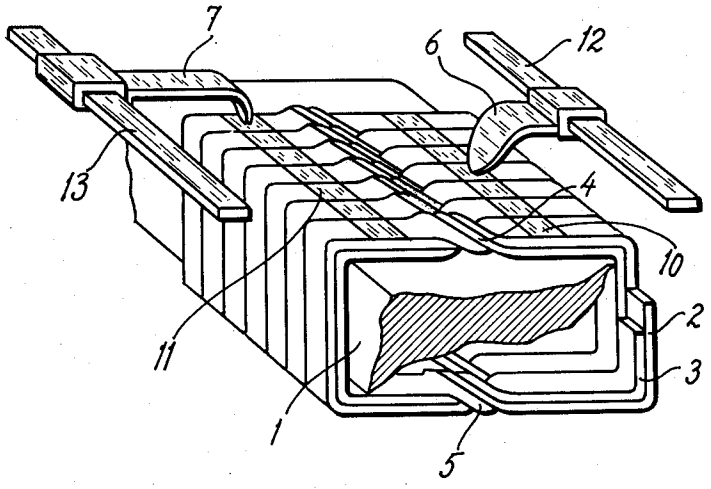
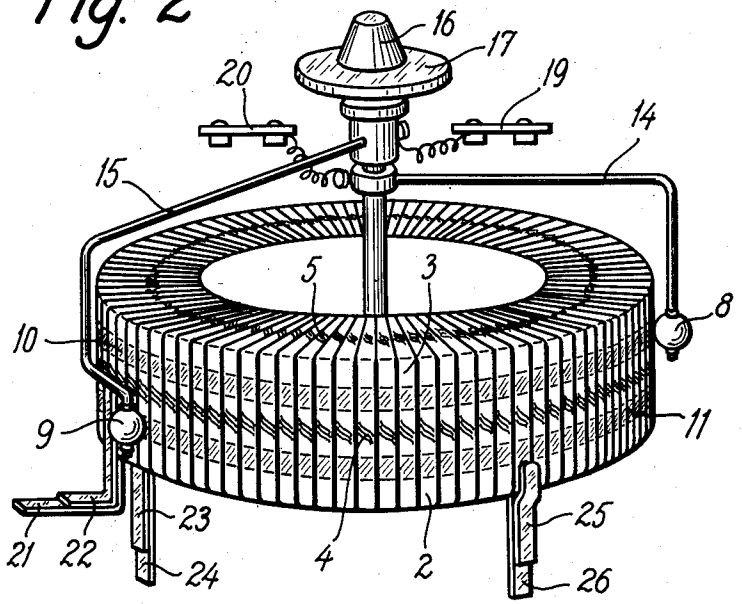


Fig. 2



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REGULATING TRANSFORMER WITH SUBSTANTIALLY UNIFORMLY DISTRIBUTED WINDINGS ON ITS CORE AND WITH AT LEAST TWO MOVABLE CONTACT MEMBERS

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5 Claims. (Cl. 336—149)

The invention relates to a regulating transformer with windings distributed substantially uniformly on its core and with at least two movable contact members which, in order to tap partial voltages from the windings, cooperate with stripped parts of the surface of the windings and in which at least a part of the windings consists of turns of at least two parallel conductors which are preferably of rectangular cross-section.

Regulating transformers of the aforesaid kind are known, but have the drawback that only the conductor in the outermost position is capable of being tapped by movable contact members and the regulable voltage range is therefore limited to such part of the transformer winding as is in the outermost position on the core. If, for example, the transformer is an autotransformer which is used with 220 volts across the total number of windings and each of the two conductors constitutes its separate half of the total winding, only a continuous regulating range of 110 volts will be available, and in accordance with the mode of connection the said range can be selected from 0 to 110 volts or from 110 volts to 220 volts.

In the aforesaid transformers it is, however, necessary or anyway advantageous to have the possibility of regulating within the total voltage range from 0 to 220 volts, but in that case the winding has to be a one-layer winding. This involves, among other things, the drawback that the voltage spread in the secondary winding becomes relatively large as soon as the voltage is tapped over a part only of the regulable voltage range, such part of the winding as in any given moment is cooperating with the contact member located on a part of the iron core of the transformer. Another drawback is that the transformer core and consequently the dimensions of the transformer are increased owing to the one-layer winding if the transformer is to be designed for a predetermined strength of current which determines the cross-section of the conductors.

These drawbacks are eliminated in a regulable transformer in accordance with the present invention in that there are two conductors and at least two points of each of the loops of the windings are turned by 180° in relation to each other so that the conductor which on one side of the turning point is closer to one edge of the transformer core and is a farther position in relation to the other edge of the core on the other side of the turning point and conversely. The stripped parts of the windings are each located on either side of one of the turning points.

As a result, the turns of both windings may be tapped individually by the contact members, and in the case of an autotransformer as referred to above any part of the winding may be tapped, and the regulating range becomes continuous from 0 to 220 volts.

In one embodiment of the transformer in accordance with the invention having an iron core of rectangular cross-section the turning points are each located on the part of the winding lying opposite its adjacent edge of the iron core cross-section.

In another embodiment of the transformer having an annular iron core one of the turning points is according

to the invention located on a part of the winding lying opposite the outer circumference of the annular core, whereby both of the stripped parts of the windings are readily accessible. Alternatively, one of the turning points may according to the invention be located on a part of the winding lying on the inner circumference of the annular core. As a result, the turning point is substantially protected against mechanical damage besides being accommodated in a non-utilised space in consequence of which the outer dimensions of the transformer can be reduced in the axial direction of the annular core. If such saving of space is unnecessary or if the inner diameter of the annular core is so small that it is difficult to provide the turning points on the inner circumference of the core, one of the turning points may according to the invention be located on a part of the winding lying on the end surfaces of the annular core.

The invention will now be further described with reference to the drawing, in which—

FIGURE 1 is a schematic, perspective view of a part of an embodiment of a regulating transformer according to the invention, and

FIGURE 2 is another embodiment of same.

In the drawing an iron core **1** of a regulating transformer is provided with substantially uniformly distributed windings, of which at least a part consists of a plurality of parallel conductors **2**, **3** which are preferably of rectangular cross-section and which at least at two points of each loop of the windings are so turned by 180° about each other that the conductor which on one side of the turning point **4** and **5**, respectively, is closer to one longitudinal edge of the transformer core **1** and is in a farther position in relation to the other longitudinal edge of the core on the other side of the turning point, and conversely. The transformer is in known manner provided with at least two movable contact members, such as metal springs **6**, **7** or carbon rollers **8**, **9** which cooperate with stripped parts **10**, **11** on the surface of the windings, thereby tapping partial voltages from the windings, the individual windings being, by the way, spaced from each other by the insulating layers of the conductors. The stripped parts **10**, **11** of the windings **2**, **3** are located on either side of one of the turning points **4**, **5**. The contact members **6**, **7** may either as shown in FIGURE 1, be slidable in known manner on rails **12**, **13** which are fastened to the frame of the transformer and electrically insulated and are connected to terminals (not shown) for the tapped voltages, or the said contact members **6**, **7** may, as shown in FIGURE 2, in known manner be placed on rotatable arms **14**, **15** which by means of handles, **16**, **17** respectively, can be turned about a mutual shaft **18**. Such shaft is electrically insulated and mounted in the frame of the transformer, the arms **14**, **15** being insulated from each other and furthermore insulated from the shaft **18** which is connected to terminals **19**, **20** respectively. The turning points **4**, **5** may in one embodiment according to the invention be located as shown in FIGURE 1 on either side of the median line of the cross-section of the iron core, and if the iron core is annular as assumed in FIGURE 2 one of the turning points **4** may be located on the outer circumference of the annular core, whereas another of the turning points **5** may be located on such part of the winding as is located opposite the end surfaces of the annular core or opposite the inner circumference of the core.

It will be appreciated that the transformer may in known manner be provided with laminated connections **21**, **22** and **23**, **24** for the ends of the two windings and with permanent taps such as **25**, **26**. The said laminated connections and the taps alike can be interconnected and connected with other electric means, as required. It will

also be appreciated that the transformer over part of its core may be provided with the turned conductors as shown and be provided with an ordinary winding above other parts the conductors of which winding are not turned.

What I claim and desire to secure by Letters Patent is:

1. A regulating transformer with windings distributed substantially uniformly on its core and with at least two movable contact members which tap partial voltages from the windings by cooperating with stripped parts of the surface of the windings and in which at least a part of the windings consists of turns of at least two parallel conductors of preferably rectangular cross-section, characterised in that the two conductors at at least two points of each of the loops of the windings are so turned by 180° in relation to each other that the conductor which is on one side of the turning point is closer to one longitudinal edge of the transformer core and in a farther position in relation to the other longitudinal edge of the core on the other side of the turning point and conversely, the stripped parts of the windings being located on either side of one of the turning points.

2. A transformer as claimed in claim 1 and with an iron core of rectangular cross-section, characterised in that the turning points are each located on a part of the winding lying on opposite sides of the median line of the iron core.

3. A transformer as claimed in claim 1 and with an annular core, characterised in that one of the turning points is located on such part of the winding as is lying opposite the outer circumference of the annular core.

4. A transformer as claimed in claim 3, characterised in that one of the turning points is located on a part of the winding lying on the inner circumference of the annular core.

5. A transformer as claimed in claim 3, characterised in that one of the turning points is located on a part of the winding lying opposite the end surfaces of the annular core.

No references cited.