June 26, 1951 A. O. JÖRGENSEN 2,558,566

METHOD OF WINDING ELECTRIC COILS

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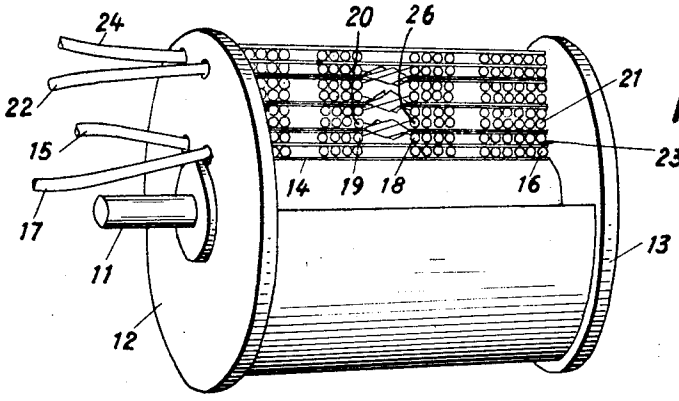


Fig.1

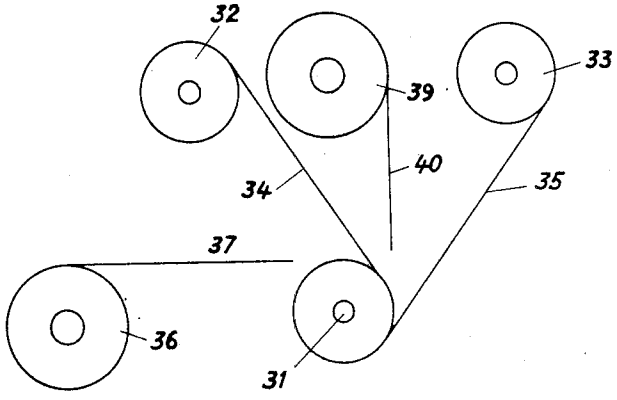


Fig.2

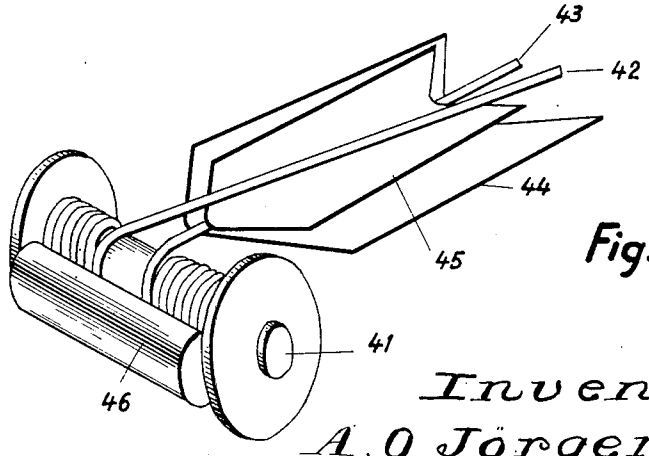


Fig.3

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METHOD OF WINDING ELECTRIC COILS

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4 Claims. (Cl. 242—10)

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The present invention relates to an electromagnetic relay, especially for telephone plants. The invention refers more exactly to relays with two separate windings in the same coil on the core. Such relays are i. e. used in central battery systems for feeding of microphones over subscribers' lines. The object of the invention is among others to arrange the windings electrically and electromagnetically symmetrical in relation to each other, and to reduce the relatively great capacity existing in the embodiments produced until now. According to the invention, this is achieved by layers pertaining to different windings being arranged to cross each other in the middle of the coil.

The invention will be described more closely with reference to the accompanying drawing. Fig. 1 shows the winding in a coil on a core. Figs. 2 and 3 illustrate the manner in which the winding is applied.

The core 11 shown in Fig. 1 supports two flanges 12, 13 of insulating material. An inner insulation 14 is applied round the core itself. The winding process implies application of two windings. The first layer of one of the windings begins with wire 15. After said layer having ended with the last turn 16, an insulating coating 23 is applied round the layer. Another winding is thereafter started from the wire 17 and wound towards the middle of the coil, that is to the right, simultaneously with the first winding being wound to the left in its second layer. When the two windings approach the middle of the coil at the turns 18 and 19, resp., a paper, the breadth of which is equal to the breadth of the coil, is introduced under the two wires, and another paper is inserted between said wires. The wires are thereafter made to cross each other so that turn 18 continues with a turn 20 and turn 19 with a turn 26. There is thus at each point a paper insulation between the wires. After said crossing the winding operations are continued in the same direction as at the beginning of the second layer. The first layer of the second winding thus ends with a turn 21. The two windings are thereafter made to turn in the usual way at the next layer. When the windings approach the middle of the coil new papers are inserted and a new crossing takes place. Since the terminals of the windings should lie at the same end of the coil, the first winding ends before the second, for instance with wire 22. Simultaneously, the other winding turns at flange 13. An insulating coating is thereafter applied over the wound part, the

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outer layer of the second winding then ending at wire 24.

In the described winding process two well mixed windings have been obtained, having an equal number of turns and layers. The winding capacity has become relatively low, since the layer of each winding borders upon the other winding only on one side.

The winding process itself appears more closely in Figs. 2 and 3. In Fig. 2, a core 31 is wound from two wire-supplies 32 and 33. The first winding according to the description made in connection with Fig. 1 is for instance applied from the supply 32 with wire 34 and the other winding is applied from the supply 33 with wire 35. The winding machine is arranged to feed from a supply 36 a band of paper 37 under the two wires at their crossing point, said band filling the whole length of the coil, and from a supply 39 another band of paper 40 between the two wires. The last mentioned band 40 can be narrower than the first mentioned 37. An automatic feeding and cutting of the paper can in a known manner be achieved by means of steering devices not shown in the drawing.

The crossing between two wires 42 and 43 is illustrated in Fig. 3. The larger paper is applied under the two wires, the narrower 45 between them. The papers are automatically cut so as to be somewhat wedge-shaped, as appears in the drawing. The parts of the paper which lie nearest to the flanges are thus prevented from being thrown outwards by the centrifugal force during the winding operation. The winding is supported by rolls 46, which are resiliently pressed against the winding surface.

According to the described embodiment, the terminals of the windings are arranged at one of the flanges, that is on the same side. If the two windings start at different flanges, crossings will naturally take place also at the lower and the upper layer of the winding.

I claim:

1. The process of making a coil for an electromagnetic relay which consists in winding a half of a layer in one direction along the axis of the coil, winding the second half of the same layer in the opposite direction along the axis of the coil with a space between the two halves of the layer, continuing the winding of the first half of the layer in the same direction along the axis of the coil as a half of a second layer wound over the second half of the first layer, and continuing the second half of the first layer beyond the space

between the halves of the first layer in the same direction along the axis of the coil as the second half of the second layer wound over the first half of the first layer.

2. The process of making a coil for an electromagnetic relay which consists in winding one layer in two halves simultaneously from opposite ends toward the mid-section of the coil with a space between the halves at the mid-section, and winding a second layer in two halves simultaneously on either side of said space from continuations of the halves of the first layer wound in the same continued direction along the axis of the coil.

3. The process of making a coil for an electromagnetic relay which consists in winding one layer in two halves simultaneously from opposite ends toward the mid-section of the coil with a space between the halves at the mid-section, winding a second layer in two halves simultaneously on either side of said space from continuations of the halves of the first layer wound in the same direction along the axis of the coil whereby the wires from the first half of the first layer to the second half of the second layer and from the second half of the first layer to the first half of the second layer cross in said space, inserting a layer of insulating paper under the two winding wires, and inserting a second layer of insulating paper between said wires at said crossing within the space between the halves of the winding.

4. The process of making a coil for an electromagnetic relay which consists in winding one layer in two halves simultaneously from opposite ends toward the mid-section of the coil with a space between the halves at the mid-section, winding a second layer in two halves simultaneously on either side of said space from continuations of the halves of the first layer wound in the same direction along the axis of the coil, whereby the wires from the first half of the first layer to the second half of the second layer and from the second half of the first layer to the first half of the second layer cross in said space, inserting a layer of insulating paper having the same breadth as the coil and a wedge shaped point under the two winding wires and inserting a second layer of insulating paper between said wires having a lesser breadth at said crossing between the halves of the winding.

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