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COIL AND METHOD OF WINDING AND PROCESSING SAME

Filed March 25, 1957

FIG. 1

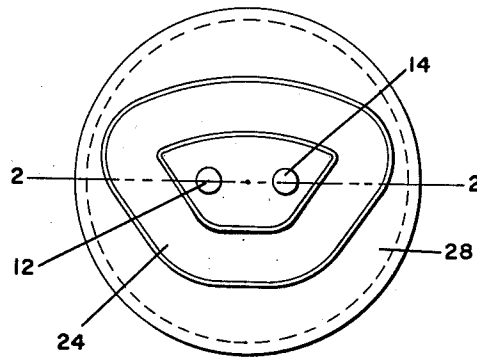


FIG. 2

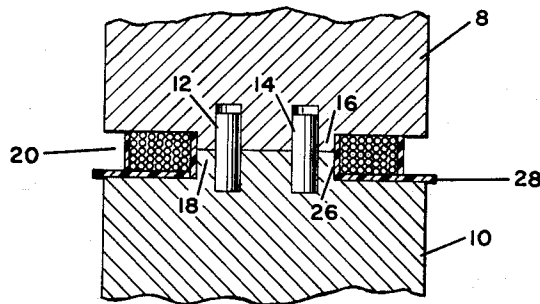
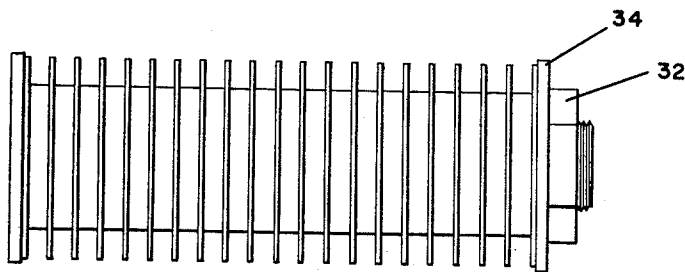


FIG. 3



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3,063,136 COIL AND METHOD OF WINDING AND PROCESSING SAME

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This invention relates to a coil and to the method for winding and processing the same.

In the manufacture of electric watches or other electrical instruments which might use a very small coil the difficulty of winding such a coil and processing it to where it can be handled without destroying its function is considerably increased because of the fineness of wire used.

In a coil such as that disclosed in the invention, the diameter of the wire is approximately .0006" or about one-sixth the thickness of a human hair. Because of this extreme smallness, the winding of the coil creates problems which are entirely different from those experienced in the handling of coils made from wire of larger diameter.

It is the object of the present invention to provide a method of winding these coils whereby they may be handled without destroying the insulation or without breaking the wire of the coil.

It is a still further object of the present invention to provide means for protecting the coil during the winding operation and for facilitating the handling of the coil.

The present invention is illustrated in the accompanying drawing in which:

FIGURE 1 is an end view showing the coil mounted on one-half of the winding spindle.

FIGURE 2 is a longitudinal cross section through the winding spindle.

FIGURE 3 is a top plan view of the press supporting a plurality of coils.

Referring particularly to FIGURES 1 and 2, a winding spindle formed of two separate parts 8 and 10 is connected together with a pair of press fitted pins 12 and 14. The halves of the spindle 8 and 10 are mounted for rotation in a coil winding machine (not shown). This machine may be any one of a number of different types of coil winding machines in present day use.

The ends of the spindle halves 8 and 10 are formed with wedge shaped projections 16 and 18 which conform to the shape of the coil desired and upon which the wire of the coil is wound. By abutting the projections 16 and 18 the annular groove 20 is formed by the spindles 8 and 10 for receiving the windings so as to form the coil 24.

A ring or sleeve 26 which is formed preferably of a non-adhesive plastic, such as "Teflon," and conforming in shape to the projections 16 and 18, is slipped over one of the projections before they are brought together. The other projection slips into the ring 26 to form a core for the coil 24. A washer 28 formed of a similar plastic material is carried on one end of the spindle and serves as an abutment for one end of the coil.

In the making of the coil 24, the spindles 8 and 10 are inserted in a winding machine (not shown), the plastic washer 28 and ring 26 are positioned in place and a predetermined number of turns of wire are wrapped on the ring 26 in the annular groove 20. During the winding process the wire is coated with a resin adhesive in a conventional method.

After the completion of the winding operation, the spindles 8 and 10 are drawn apart from each other and the ring 26 and washer 28 with the coil windings thereon are removed for finishing purposes.

A plurality of coils are then mounted on a bolt (see FIG. 3) having a cross-sectional area similar to the projections

16 and 18 so that each coil is separated from each adjacent coil by the washer 28 and ring 26. A nut 32 together with a washer 34 is screwed on one end of the bolt to bring the coils under pressure. The coils are then subjected to a baking temperature of approximately 350° F. which cures the resin adhesive so that the coils may be now handled without danger of unwinding thereby destroying their thickness or rendering them inoperative.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by the United States Letters Patent is:

1. A method of fabricating coils comprising: providing a rigid annular ring; providing a washer whose inner surface abuts an axial end of said ring to form a flange extending radially outwardly from said ring; providing a surface abutting the other axial end of said ring and in a plane substantially parallel to said flange; winding a wire about said ring and between said flange and said surface to form a coil; coating said wire with an adhesive material during the winding operation; said washer being formed of a material which will not adhere to said wire by means of said adhesive material; removing said surface from said other axial end of the ring; placing a plurality of coils prepared as above stated on a common support element passing centrally through each coil; the washer of each coil being remote from the washer of each adjacent coil; placing said plurality of coils under axial pressure; the rigidity of each ring preventing the axial compression of the wire coil wound about it to an axial thickness less than the length of said ring; and baking said plurality of coils sufficiently to set said adhesive.

2. The method recited in claim 1 wherein: said ring is mounted on a two-piece support during the winding operation; one piece of said two-piece support having a portion against which said washer lies and a projection extending into the central portion of said ring; the other piece of said two-piece support providing the surface abutting the other axial end of said ring; and removing said coil from said two-piece support after the winding operation by means of said washer after said other piece of said two-piece support has been drawn away from said ring.

3. The method recited in claim 2 additionally comprising: providing means for maintaining the two pieces of said two-piece support in alignment during the winding operation.

4. A method of fabricating coils comprising: providing a two-piece support; the first of said pieces having a washer-supporting surface and a projection located centrally of said washer-supporting surface; the second of said pieces having a surface matable with said projection and a second surface surrounding said matable surface; placing a washer about said projection and against said washer-supporting surface; placing a ring about said projection so that the inner periphery of said washer abuts an axial end of said ring and said washer presents a flange surface extending radially outward from said axial end of said ring; moving the second of said pieces towards the first of said pieces so that the matable surface on the former abuts and mates with the projection on the latter and the second surface on the former lies parallel with said flange surface and removed therefrom; winding a wire about said ring and between said flange and said second surface; coating said wire with an adhesive material

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during the winding operation; said washer being formed of a material which will not adhere to said wire by means of said adhesive material; removing said second piece from said first piece and removing said coil from said first piece by means of said washer; placing a plurality of coils prepared as above stated on a common support element passing centrally through each coil; the washer of each coil being remote from the washer of each adjacent coil but in abutting relationship to the ring of said adjacent coil and baking said plurality of coils sufficiently to set said adhesive.

5. The method defined in claim 4 wherein said matable surface of said second piece projects outwardly from said second surface and wherein said projecting matable surface extends into said ring during the winding operation.

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