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FILAMENT STRUCTURE AND METHOD OF ASSEMBLING THE SAME

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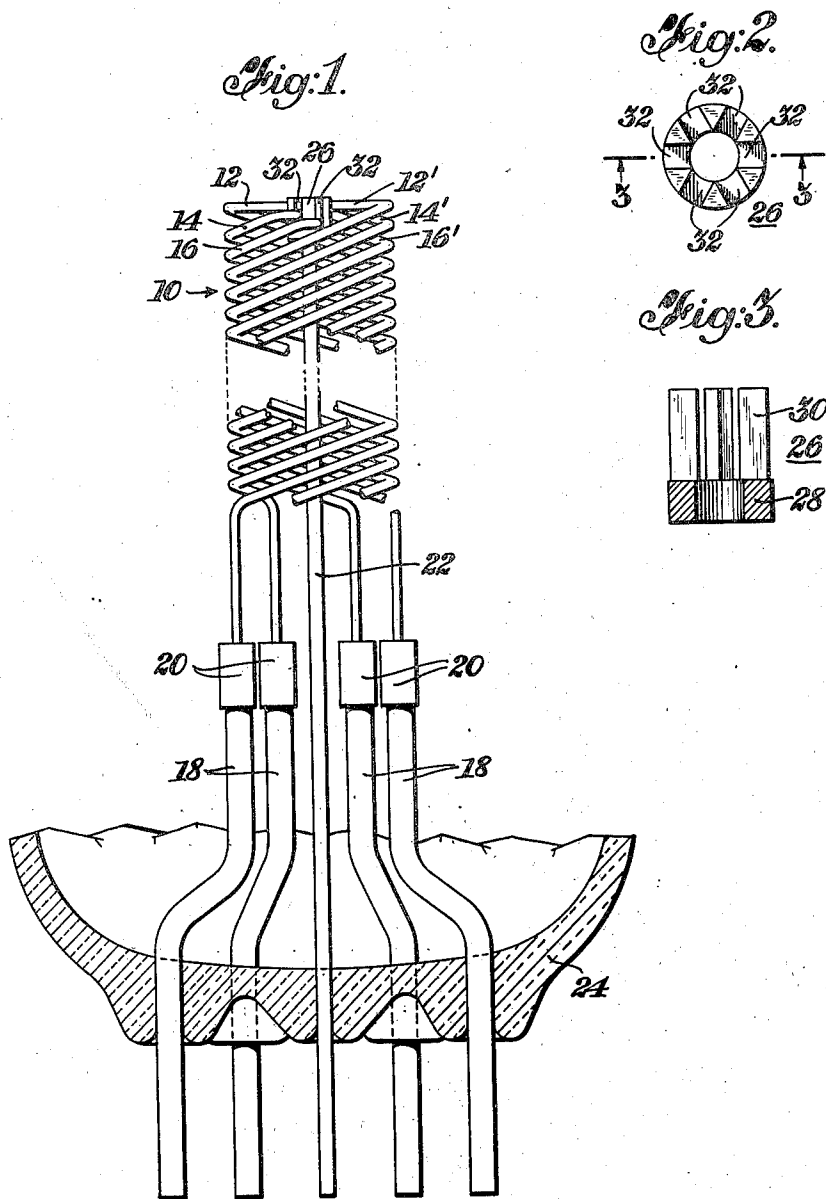
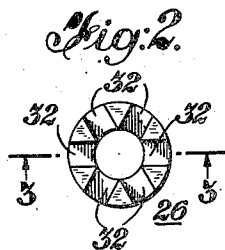
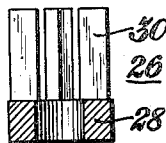


Fig. 3.



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## UNITED STATES PATENT OFFICE

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FILAMENT STRUCTURE AND METHOD OF  
ASSEMBLING THE SAME

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3 Claims. (Cl. 250—27.5)

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This invention relates to improvements in filament structures and method of assembling the same, and more particularly relates to filaments consisting of a plurality of individual bifilar windings.

An object of this invention is to provide an improved method and means for assembling a filament consisting of a plurality of individual bifilar windings.

Another object of this invention is to provide an improved method and means for insuring proper spacing between the individual bifilar windings of a composite filament structure.

Still another object of this invention is to provide an improved device for interconnecting and spacing the individual bifilar windings of a composite filament structure.

Other objects and advantages of the present invention will appear from the following description of a preferred structural embodiment thereof, illustrated in the accompanying drawing in which:

Fig. 1 is a vertical cross-sectional view of a vacuum tube, broken away to illustrate the filament structure of the present invention;

Fig. 2 is an enlarged top view of a novel filament connector used in assembling the filament structure of Fig. 1;

Fig. 3 is a vertical cross-sectional view of the filament connector, taken along the line 3—3 of Fig. 2.

The composite filament structure 10 of Fig. 1 is shown as consisting of three bifilar windings, the first of which is indicated at 12, 12', the second at 14, 14', and the third at 16, 16'. The open ends of the bifilar windings are attached to suitable filament leads 18 by means such as metal bands 20. The filament structure includes a centrally positioned lead rod 22; this lead rod together with the individual filament leads 18 extending through the glass envelope of the vacuum tube, partly indicated at 24.

It will be realized that when a filament structure is made up of a plurality of bifilar windings, a construction which is known per se and the advantages of which are also known to the art, it is extremely important that the bifilar windings be properly spaced so as to maintain equal spaces between the turns. Heretofore, various methods and means have been proposed for mounting and properly spacing the individual bifilar windings of a composite filament, but such previously proposed arrangements have been both difficult in assembly, and have proved inaccurate in spacing. In accordance with the present invention, I provide a simple arrangement whereby the accurate

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assembly of such bifilar windings is relatively easy to accomplish. On the upper end of the central lead rod 22 is mounted a castellated connector 26 illustrated in more detail upon a larger scale in Figs. 2 and 3. The lower portion 28 of the connector 26 is formed as a ring mounted and connected in any suitable manner to the end of the lead rod 22. The upper portion 30 of the connector 26 is formed with a plurality of equally angularly spaced transverse slots 32 into which the closed ends of the individual bifilar windings are inserted. Since the filament structure illustrated by way of example shows three sets of bifilar windings, the connector will, in this case, be provided with three sets of transverse slots, one slot for each connected end of a bifilar winding. The use of such a connector automatically properly spaces the bifilar windings relatively to one another in an easy but yet accurate manner.

In assembling the filament structure according to the present invention it is preferred to first attach, as by welding, the connector 26 to the end of the lead rod 22. The connected ends of the bifilar windings are then inserted in the individual slots at the top of the connector. With this arrangement it is possible to line up the individual spirals very well and keep an equal space between them, since the filaments are able to slide in the slots and take their correct positions. The open ends 30 of the filaments are then welded to their respective filament leads and finally the top portion of the connector is melted by arc welding or a similar process so that each of the filament spirals is finally welded with the filament connector, and forms a rigid electrical connection with the central lead rod 22.

While the invention has been illustrated in connection with a composite filament having three bifilar windings, it is obviously applicable to filaments consisting of any number of bifilar windings, when the question of accurate spacing between the windings is important. Furthermore, while the invention is particularly adapted for use in the filament structure of vacuum tubes, it is equally applicable to filament structures used in any type of tube, where the use of a composite filament consisting of a plurality of bifilar windings is appropriate.

Accordingly, while I have described above the principles of my invention in connection with a certain specific example, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of my invention as set forth in the objects and the accompanying claims.

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I claim:

1. Filament structure for vacuum tubes and the like, comprising a centrally positioned supporting lead rod, a plurality of bifilar windings positioned about said rod, and means for attaching the closed ends of said bifilar filaments to said rod, comprising a castellated connector attached to the end of the rod, the upper end of said connector being formed with a plurality of equally angularly spaced through slots, one slot for the closed end of each bifilar filament, and means for respectively mounting the closed end of each bifilar filament in one of said slots, whereby said collar serves to angularly space said bifilar filaments with respect to one another.

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2. The combination according to claim 1, in which said last means comprises the melted end of said slotted connector.

3. The method of assembling a plurality of bifilar filaments, which comprises the steps of attaching a castellated filament connector to the end of a central supporting lead rod, spacing the filaments by respectively inserting their closed ends in angularly disposed slots of the castellated filament connector, welding the lower ends of the filaments to individual filament leads, and then melting the slotted end of said connector to weld the closed ends of the bifilar filaments in their respective slots.

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