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ELECTRIC INFRARED EMITTER

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FIG. 1.

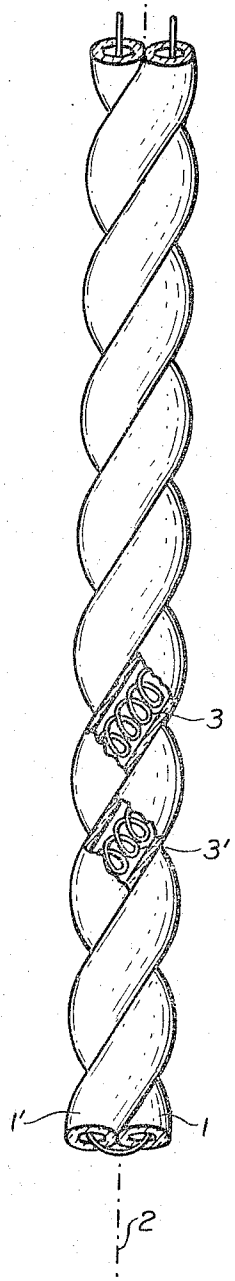
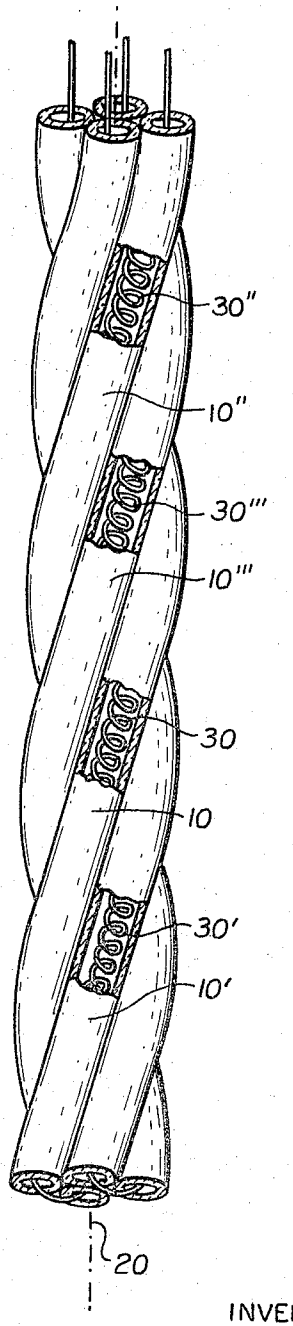


FIG. 2.



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ELECTRIC INFRARED EMITTER

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5 Claims. (Cl. 219—553)

The present invention relates to electric infrared emitters of the type which comprises emitter or radiating tubes of quartz glass, quartz ware, or a glass of a high melting point and electric heating coils enclosed within these tubes.

Infrared emitters of the above-mentioned type are frequently employed, for example, for room heating and drying purposes. In most of these infrared emitters the heating coils lie loosely within the radiating tubes and their position in these tubes is not fixed by any filling material or other securing means. These emitters are employed individually or in the form of two or more of them adjacent to each other, for example, in the form of pairs, the heating coils of which are electrically connected to each other at one end so that the heating coil of one radiating tube serves as the outgoing conductor and the other heating coil as the return conductor of the electric current. All of these infrared emitters are preferably operated in a substantially horizontal position since due to the loose condition of the heating coils within the radiating tubes, the weight of these coils, and the high temperature of operation, there is a considerable danger that the heating coils will sag downwardly and the individual turns of a coil will engage with each other and the coil will therefore burn through within a short time.

It is an object of the present invention to provide an infrared emitter which overcomes this serious disadvantage of the conventional infrared emitters as described above and which comprises at least two closely adjacent radiating elements, each of which consists of a tube of quartz glass, quartz ware, or a glass of a high melting point and of a heating coil within each of these tubes. According to the invention this object is attained in a very simple manner by twisting the radiating tubes together like a rope about a common axis.

Another feature of the invention consists in fusing the twisted radiating tubes together at least at certain points along their lines or surfaces of engagement and preferably along their entire length.

The present invention also permits the radiating tubes of an infrared emitter to be made of different materials. Thus, for example, one radiating tube of an emitter with two tubes may consist of quartz glass, while the other radiating tube may consist of quartz ware. The three different materials, quartz glass, quartz ware, and glass of a high melting point may, of course, also be employed in any other combination with each other.

The features and advantages of the present invention will become further apparent from the following description of two preferred embodiments thereof which are illustrated in the accompanying drawings, in which:

FIGURE 1 shows a perspective view of an infrared emitter with two radiating elements; while

FIGURE 2 shows a perspective view of an infrared emitter with four radiating elements.

The infrared emitter according to the invention as illustrated in FIGURE 1 comprises two radiating elements consisting of a pair of individual tubes **1** and **1'** of quartz glass, quartz ware, or a glass of a high melting point, and of an electric heating coil **3** or **3'** in each of these tubes. These heating coils are electrically connected to

each other at one end and one coil thus serves as the outgoing conductor and the other as the return conductor of the electric current by means of which both coils are heated. According to the invention, the two tubes **1** and **1'** are twisted together about a common axis **2** like the strands of a rope, and for increasing the solidity of the unit, they are fused together along their entire length, as may be seen particularly at their upper and lower ends. In this particular embodiment, the two tubes consist of the same material, for example, quartz ware.

The infrared emitter as illustrated in FIGURE 2 comprises four radiating elements consisting of two pairs of tubes **10**, **10'** and **10''**, **10'''** which are twisted together about a common axis **20** and contain the heating coils **30**, **30'**, **30''**, and **30'''**, respectively. The two heating coils of each pair are again connected at one end and serve as outgoing and return conductors. In this particular embodiment of the invention, one pair of tubes **10** and **10'** consists of quartz ware, while the other pair **10''** and **10'''** consists of quartz glass.

The infrared emitters according to this invention have the considerable advantage that they may be mounted in any desired position. Due to the continuously changing direction of the twisted radiating tubes, the heating coils are always supported on the inner walls of these tubes even when the emitter unit is mounted in a perpendicular position. There is therefore never any danger that the heating coils might sag and that their individual turns might engage with each other.

As can be seen from FIGS. 1 and 2, the individual resistance elements heating coils **3**, **3'**, **30**, **30'**, **30''** and **30'''**, each have helical coil outside diameters which are approximately equal to the inside diameters of their respectively associated hollow tubes **1**, **1'**, **10**, **10'**, **10''**, and **10'''**, so as to minimize shifting of said heating elements relative to their enclosing tubes with changes in attitude thereof. Consequently, the twisting of the aforesaid tubes in combination with the lateral constraint afforded by their inside diameters substantially precludes any movement of the individual coils tending to short circuit their individual turns when the emitter is positioned vertically or in any attitude where the tube twist axis is inclined to the horizontal.

Although my invention has been illustrated and described with reference to the preferred embodiments thereof, I wish to have it understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. An electric infrared radiant heat emitter which comprises a plurality of elongated hollow tubes twisted together about a common longitudinal axis, said tubes being each made of a material selected from the group consisting of glass, quartz glass, and quartz ware, and a helically coiled electrical resistance heating element disposed within each of said hollow tubes for support thereby and for connection to a source of electricity for energization thereby to generate and emit infrared radiant heat, said heating element having a helical coil outside diameter approximately equal to the inside diameter of its associated tube to minimize shifting of said heating element relative to the tube upon changes in attitude thereof.

2. The electric infrared radiant heat emitter according to claim **1** wherein said tubes are fused together along at least one point of engagement along their common longitudinal axis.

3. The electric infrared radiant heat emitter according to claim **1** wherein said tubes are fused together along

the length of their mutual engagement about said axis.

4. The electric infrared radiant heat emitter according to claim 1 wherein said tubes are made of different materials selected from said group of materials.

5. The electric infrared radiant heat emitter according to claim 1 wherein at least two of said resistance heating elements are electrically connected in series.

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