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(54) **Circular heater lamp.**

(57) The invention relates to a circular heater lamp including a curved bulb the curved main body portion of which houses a cylindrical filament. Each end of the filament is connected to a respective plug member housed in a respective end portion of the bulb, each end portion having a radius of curvature which differs to that of the curved main body portion. Each of the plug members is formed with a male or female conical wound section 4 which engages the inside or outside of the filament.

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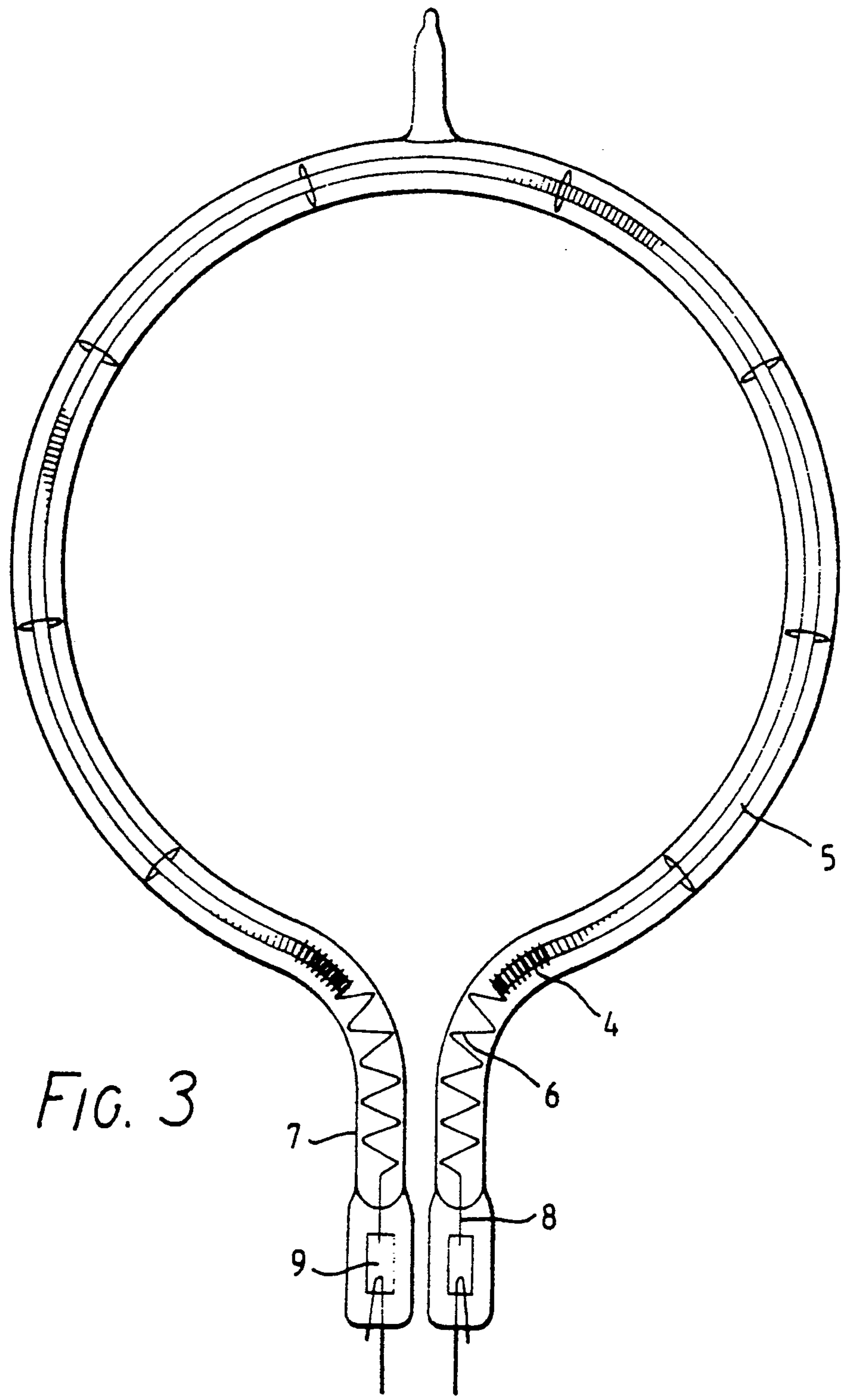


FIG. 3

CIRCULAR HEATER LAMP

This invention relates to circular heater lamps, more particularly, but not exclusively, to the filament plug design.

The emergence of circular shaped tungsten halogen lamps for use in cooker and heating applications has given rise to processing difficulties associated with the filament plugging details.

These problems occur because during assembly of the lamp it becomes necessary to navigate at least one of the filament plug terminations well into the circular portion of the bulb to the extent where the opposite unplugged filament end can emerge sufficiently to achieve engagement and welding of the complementary plugged detail.

Standard linear tungsten halogen lamps are without problems in this respect and can utilize a straight rigid plug design.

Circular lamp shapes as shown in Figure 1 have to date utilized a heavy solid tungsten plug appropriately curved to match the bulb radius of say 69mm. However, a plug with a matching radius cannot conform to the bulb's curved exit portions of 17mm radius and hence inevitably the plug finally positions the filament off centre. Further, it is difficult to effect a permanent join between the solid tungsten plug 1 and the filament 2, as these components are both high refractory metals and cannot be welded with certainty.

A further plugging method for circular lamp designs is shown in Figure 2, this design incorporates the tail section into the filament design. This means that where the filament helix terminates, shown as point 3, the filament wire continues in a straight characteristic, which is co-axial to the filament and becomes the filament tail. This is then welded onto the molybdenum foil to effect continuity. This arrangement, however, does not necessarily hold the filament on centre, with reference to the envelope. Also, the described filament tail is structurally weak and prone to transit breakage.

A further method of plugging to overcome these problems is to construct a flexible coil close to the filament diameter dimensions, which is enmeshed onto the filament end and incorporates a straight tail at the exit point for welding to the molybdenum foil. It has been found that such an arrangement although manageable in processing terms is undesirable, as the flexible tail incandesces and produces unwanted light in the pinch seal area. Also, the pinch seal temperature, which has a maximum limit of 350°C, can be adversely affected by this lit tail characteristic. Further, the filament is not necessarily held on axis by this type of plug and hence the produced light pattern is not truly circular, as the tails tend to form a tangential effect.

The invention strives to provide a circular heater lamp which overcomes the disadvantages of the above prior art designs.

Accordingly, the present invention provides a circular heater lamp including a curved bulb the main body portion of which houses a filament connected at each of its ends to a respective plug member housed in a respective curved end portion of said bulb, characterized in that each of said plug members comprises a wire having a substantially conical wound section engaging the end of the filament.

In one embodiment said filament is cylindrical in cross-section and said conical wound section is male engaging the inside of said filament.

In another embodiment said filament is cylindrical in cross-section and said conical wound section is female engaging the outside of said filament.

In a preferred embodiment each of said plug members has a portion of its wire wound in the form of a helix of a diameter to fit inside said end portion of said bulb with appropriate clearance from the inside wall thereof, one end of said helix being integral with said conical wound section.

Advantageously said helix terminates in a straight wire formed axially within said end portion of said bulb. One end of the straight wire is welded to molybdenum foil.

In order that the invention may more readily be understood, a description is now given, by way of example only, reference being made to the accompanying drawings in which :

Figure 1 shows a circular lamp shape with a solid plug as in the prior art.

Figure 2 shows a one piece filament/plug as in the prior art.

Figure 3 shows the proposed plug design in accordance with one embodiment of the invention.

Figure 3 shows a plug with a conical wound section 4 at the point of filament engagement, where the cone shape may be male or female and engages either inside the filament cylinder 5 or screws over the outside. At the end of the conical section the winding increases substantially to form a helix 6 of diameter to fit inside the bulb 7 with appropriate clearance. The helix may comprise of a few or a multiple of turns according to the lamp design parameters. This helix terminates in a straight wire 8 formed axially and is welded to the molybdenum foil 9. This plug design may be of similar diameter wire to the filament, but preferably would be of heavier calibre gauge wire.

The described plug design embraces the following advantages :-

1. The filament is held on axis and presents a circular format within the bulb.

2. The plug is flexible and can be easily navigated through the circular bulb during the manufacturing

process stage.

3. Because the large helix is open pitched and in intimate contact with the bulb wall, it does not incandesce and the watts losses are minimal.

4. The conical male/female connection to the filament makes a positive connection without welding and the cone shape enables a series of filament diameters to be accommodated.

5. It becomes possible to tension the filament within the circular bulb without pulling the filament off axis.

6. The plug design gives resilience to the filament and hence improves robustness.

Claims

1. A circular heater lamp including a curved bulb the main body portion of which houses a filament connected at each of its ends to a respective plug member housed in a respective curved end portion of said bulb, characterized in that each of said plug members comprises a wire having a substantially conical wound section 4 engaging the end of the filament 5.

2. A circular heater lamp as claimed in Claim 1, characterized in that said filament 5 is cylindrical in cross-section and said conical wound section 4 is male engaging the inside of said filament.

3. A circular heater lamp as claimed in Claim 1, characterized in that said filament 5 is cylindrical in cross-section and said conical wound section 4 is female engaging the outside of said filament.

4. A circular heater lamp as claimed in any one of Claims 1 to 3, characterized in that each of said plug members has a portion of its wire wound in the form of a helix 6 of a diameter to fit inside said end portion of said bulb with appropriate clearance from the inside wall thereof, one end of said helix being integral with said conical wound section 4.

5. A circular heater lamp as claimed in Claim 4, characterized in that said helix 6 terminates in a straight wire 8 formed axially within said end portion of said bulb.

6. A circular heater lamp as claimed in Claim 5, characterized in that one end of said straight wire 8 is welded to molybdenum foil 9.

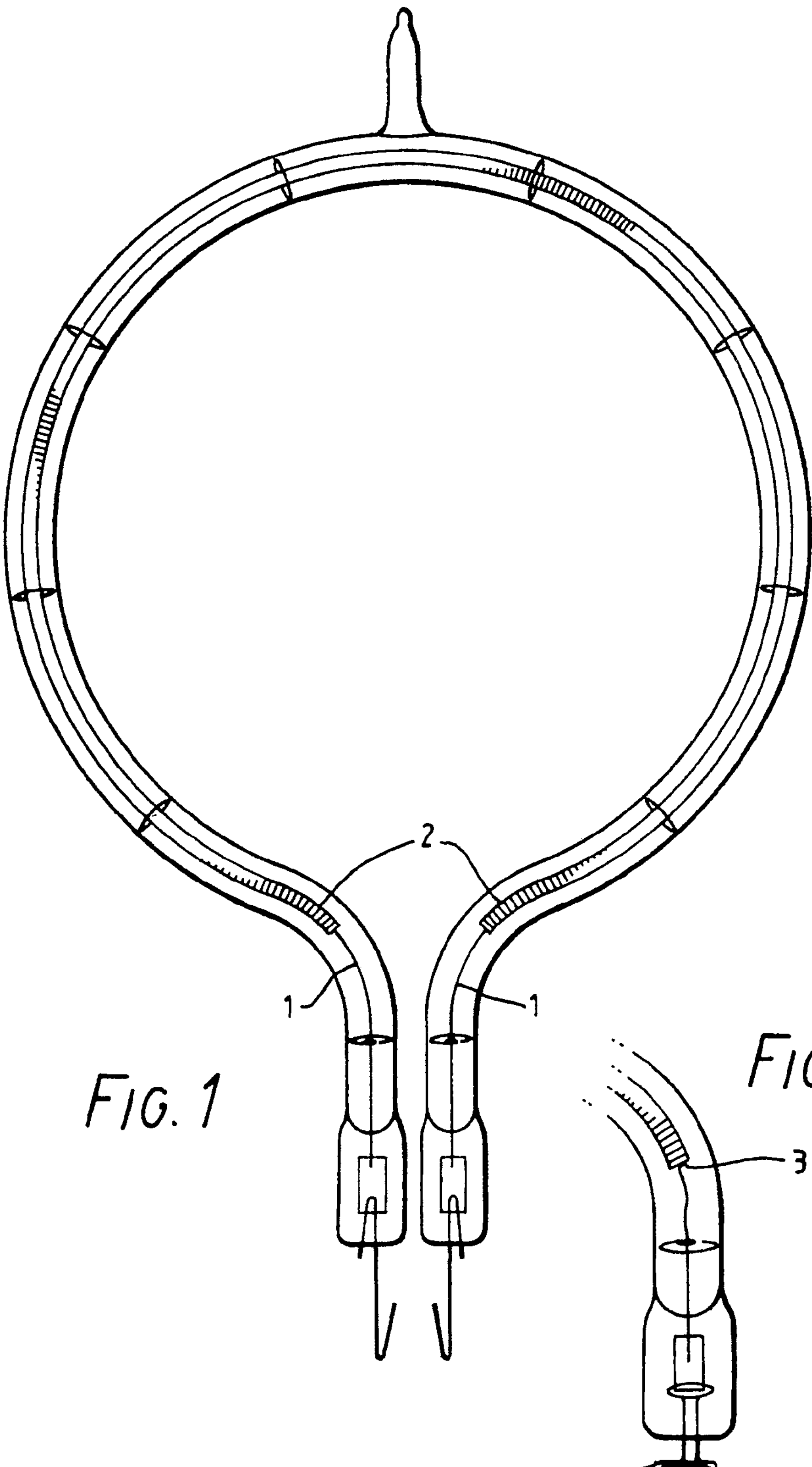
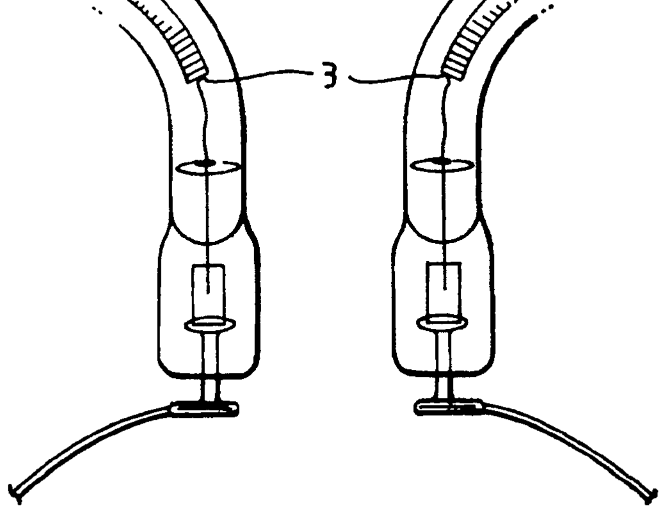


FIG. 1

FIG. 2



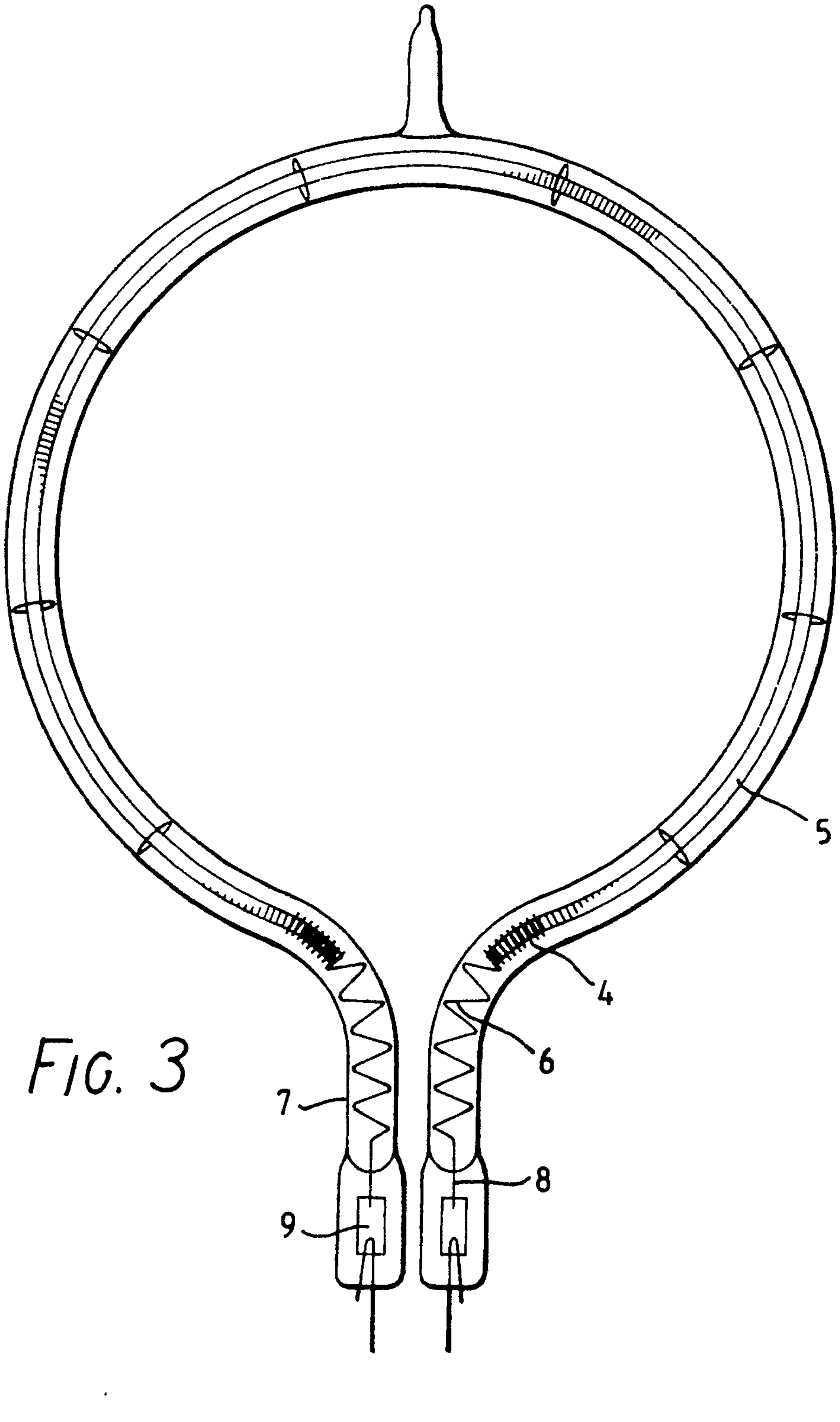


FIG. 3