Aug. 22, 1961 G. J. EDWARDS 2,997,616

MULTIPLE FILAMENT INCANDESCENT LAMP

Filed Nov. 13, 1958

Fig. 1.

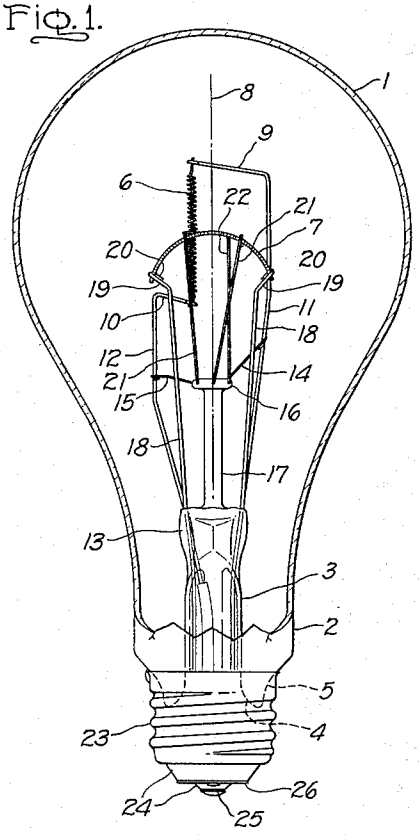


Fig. 2.

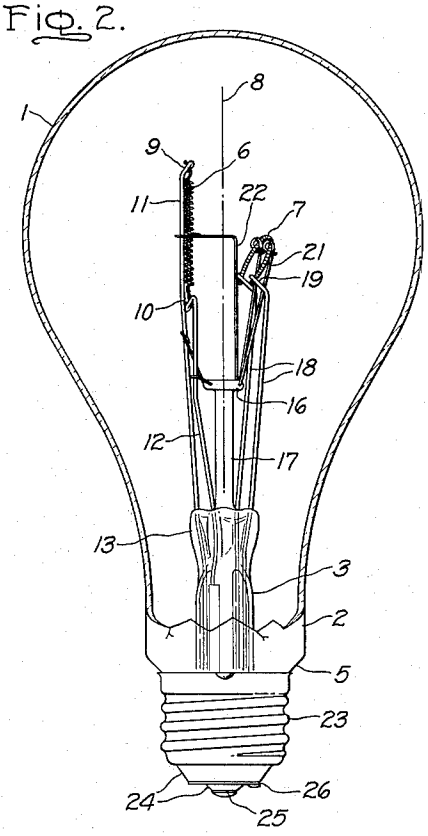
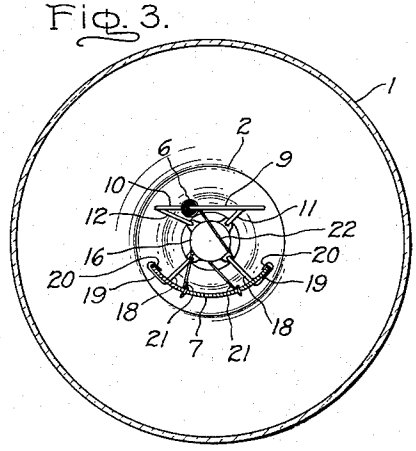


Fig. 3.



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MULTIPLE FILAMENT INCANDESCENT LAMP

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My invention relates generally to electric incandescent lamps, and more particularly to multiple filament lamps adapted to yield several different levels of illumination. Still more particularly, the invention relates to the mount structure including a novel arrangement of filaments and supporting structure therefor.

It is an object of my invention to provide a novel arrangement or combination of a pair of filaments which will provide a high over-all efficiency of illumination together with over-all economy of manufacture. It is a further object to arrange the filaments and the supporting structure therefor into a unit of sufficient compactness to fit through the constricted neck portion of the enclosing glass bulb without giving rise to problems of assembly in high-speed mass production on automatic equipment or of arcing during operation of the lamp.

In accordance with one aspect of my invention, I utilize for the major or higher wattage filament the recently marketed form of a helical coiled-coil disposed with its axis parallel to the longitudinal axis of the lamp bulb so as to be in a vertical position in either the base-down or base-up position of the lamp. For reasons not yet fully understood, the same filament will operate at higher efficiency and for a longer life in the vertical position than when it is horizontally disposed. For the minor or lower wattage filament, I employ a helical single coil formed to an arcuate shape. Although the coiled-coil filament is more costly than a single coil filament, that factor is outweighed by the advantage of higher efficiency of light production when employed as the major filament. However, a second or minor filament of coiled-coil type is difficult to mount vertically in automatic lamp making equipment, so that the less costly single coil is advantageous as a minor filament where efficiency is less important since it is not used alone for reading or other difficult seeing tasks. Moreover, the combination of a vertical coiled-coil filament and an arcuate single coil filament is more efficient over-all than, for example, two horizontally arranged coiled-coil filaments which would be easier to assemble on automatic equipment.

A further feature is the mounting of the arcuate single coil filament in clamping hooks on its lead-in wires in such a manner that the coil leaves the hook at an angle of about 90° from the hook axis in every plane normal to the plane in which the U-shaped hook lies, whereby the coil forms a smooth arc between the lead wire tips with no sharp bends at or near the hooks such as to cause non-uniform spacing of the coil turns with accompanying adverse effect on lamp life. This result is obtained by bending the upper ends of the lead-in wires so as to be inclined at an acute angle to the horizontal and to extend divergently toward the plane including the lead-in wires for the vertical filament, and terminating in hook portions lying in a plane including the said bent upper ends of the lead-in wires, the arcuate filament being clamped at its ends in said hooks and lying in a plane inclined from the horizontal and substantially normal to the said plane including said bent upper ends of the lead-in wires. The resulting structure also has the advantage of compactness in lateral dimensions so as to fit into the constricted bulb neck, while maintaining adequate spacing from the vertical major filament and its supporting structure to avoid arcing.

In accordance with a still further feature, the major vertical filament and its supporting lead-in wires are in

a substantially vertical plane which is preferably displaced from the axis of the lamp in a direction opposite that at which is located the minor filament and its supporting lead-in wires, thereby to provide maximum spacing between the filaments with minimized tendency to arcing and adequate room for access of machine tools for performing the assembly operation while still permitting the mount to fit through the neck of the lamp bulb.

Still further features and advantages of my invention will appear from the following detailed description of a species thereof and from the drawing wherein:

FIG. 1 is an elevation of a lamp structure comprising my invention;

FIG. 2 is an elevation approximately at right angles to FIG. 1; and

FIG. 3 is a plan view of the lamp.

Referring to the drawing, the lamp comprises a gas-filled glass bulb or envelope **1** which may be of conventional pear-shape and having a constricted cylindrical neck portion **2** and an internal mount structure including a re-entrant glass stem tube **3** having a flared lower end **4** (FIG. 1) sealed to the end of the neck portion **2**. It will be understood that during the heating and sealing of the neck **3** to the flare **4**, the lower end portion **5** of the bulb neck is further constricted by the sealing fires to join with the rim of flare **4**.

The mount structure also includes a pair of tungsten wire filaments **6** and **7** located at opposite sides of the bulb axis **8**. The filament **6** is a helical coiled-coil disposed longitudinally of the bulb, and the filament **7** is a helical single coil bent to arcuate shape and lying in a plane at about 45° to the horizontal, the major filament **6** being of higher wattage than the minor filament **7**, for example 100 watts and 50 watts, respectively. The major filament **6** is mounted on and between laterally extending end portions **9** and **10** of a pair of respectively longer and shorter lead-in wires **11** and **12** which lie approximately in a vertical plane parallel to axis **8** and which have portions thereof sealed in two of the corners of a generally square compressed press or seal portion **13** at the upper end of the stem tube **3**. The lead-in wires **11** and **12** are supported or braced by respective anchor wires **14** and **15** looped around the lead-in wires at one end and having their other ends anchored in a button **16** at the upper end of a glass arbor **17** extending upwardly from the stem press **13** along the axis **8**.

The minor filament **7** is mounted on a pair of lead-in wires **18** having portions thereof sealed in the other two corners of the stem press **13** and extending upwardly in a generally vertical plane approximately parallel to the plane including the lead-in wires **11** and **12** and on the opposite side of the axis **8** therefrom. The upper end portions or tips **19** of the lead wires **18** are bent to be inclined upwardly at an acute angle of about 45° to the horizontal and divergently toward the plane including lead wires **11** and **12**, and terminate in U-shaped clamp or hook portions **20** lying in a plane including the said bent end portions or tips **19**. The ends of the filament **7** are clamped in said hook portions **20** so that the filament coil **7** forms a smooth arc between the tips of the lead wires, and the end portions of the filament leave the hooks at an angle of about 90° from the hook axis in every plane normal to the plane including the hooks and the tips **19**.

The minor filament **7** is additionally supported by looped ends of auxiliary support wires **21** having their other ends anchored in the arbor button **16**. Depending upon the rating of the filament **7** and whether it is made of heavier or finer wire, one or two supports **21** may be employed. The major filament **6** is also braced against vibration by an auxiliary support wire **22** which

is anchored in the button 16 and extends vertically upward and thence laterally toward the midpoint of the filament 6 where it terminates in a loop encircling the filament.

It will be observed that the lateral end portion 9 of lead wire 11 is longer than the corresponding end portion 10 of lead wire 12 so that the filament 6 is offset toward the shorter lead wire 12 and away from the longer lead wire 11 to avoid arcing between the filament 6 and the longer lead wire 11. It will also be noted that the support wire 22 for filament 6 is located in the space between the filaments 6 and 7, rather than at the outside of filament 6, to thereby permit a larger spacing between the filaments 6 and 7 and therefore less tendency to arc, while still allowing room for the mount to fit into the bulb neck 2. When the support wire 22 is located at the outside of filament 6 and too close to the filament, arcing occurs between the filament and the support wire, and if the support wire is moved farther away from the filament, then the lateral dimensions of the mount are too great to fit through the bulb neck.

The shape of the tips 19 of lead wires 18 also provides several advantages including the avoidance of sharp bends in the filament adjacent the joints to the lead wire tips, as well as compactness without arcing. Thus, the filament 7 is thereby located in a plane inclined to the horizontal rather than in a horizontal plane so that it fits readily into the bulb neck. If the lead tips 19 were to be bent into a horizontal plane, it would bring the filament 7 too close to the filament 6 and increase the tendency to arc between the filaments unless the lateral dimensions and spacing were increased to an extent such that the mount would not enter the bulb neck. Also, if the lead tips 19 were to be flared out only in the plane of the lead wires 18 (i.e. not bent toward the plane of filament 6 and lead wires 11 and 12), then the lead wires 18 would have to be too close together and too close to the support wires 21 to avoid arcing. Furthermore, placing the major filament 6 in the bulb and mount axis 8, and the minor filament 7 in a horizontal plane and encircling the filament 6, results in violent arcing. It is therefore believed to be apparent that the structure disclosed herein possesses the advantages of high over-all efficiency, economy of manufacture on automatic equipment and necessary compactness together with freedom from arcing.

The lamp may be provided with a conventional base attached to the bulb neck and comprising a screw-threaded metal shell 23 having at its end an insulating web 24 of glass or organic plastic and having affixed thereto an end contact eyelet 25 and an intermediate ring-shaped contact 26. The lead wire 12 and the opposed lead wire 18 (the one at the left in FIG. 1) may be connected to the shell 23, lead wire 11 to the end contact 25, and the other lead wire 18 to the intermediate contact 26, whereby the filaments 6 and 7 may be operated independently or simultaneously in parallel to give three different levels of illumination.

What I claim is new and desire to secure by Letters Patent of the United States is:

1. A multiple filament electric incandescent lamp mount comprising a stem having a vertical axis, a first pair of lead-in wires sealed in and extending upwardly from said stem in spaced relation and approximately in a first vertical plane to one side of said stem axis, said lead-in wires being of different lengths and having their inner ends extending laterally and terminating in vertical alignment one above the other approximately within said vertical plane, a coiled-coil filament extending vertically between and connected at its ends to the terminal portions of said inner ends of the respective lead-in wires, a second pair of lead-in wires sealed in and extending upwardly from said stem in spaced relation and substantially in a second generally vertical plane located to the side of said stem axis opposite that at which is located

the said first plane containing said first pair of lead-in wires, said second pair of lead-in wires having upper end portions bent generally toward said first plane to be inclined upwardly at an acute angle to the horizontal and divergently away from each other and terminating in hook portions lying in a plane including said upper end portions, and a single coiled filament of arcuate form having its ends clamped in said hook portions and lying in a plane substantially normal to the said plane including said upper end portions so that said filament extends from the said hook portion at an angle of about 90° from the axis of said hook portion in planes normal to the said plane in which said hook portions lie whereby the filament forms a smooth arc between said hook portions.

2. A multiple filament electric incandescent lamp mount comprising a stem having a vertical axis and including an arbor extending axially and upwardly therefrom, a first pair of lead-in wires sealed in and extending upwardly from said stem in spaced relation and substantially in a first vertical plane to one side of said stem axis, said lead-in wires being of different lengths and having their inner ends extending laterally and terminating in vertical alignment one above the other approximately within said vertical plane, a coiled-coil filament extending vertically between and connected at its ends to the terminal portions of said inner ends of the respective lead-in wires, a second pair of lead-in wires sealed in and extending upwardly from said stem in spaced relation and substantially in a second generally vertical plane located to the side of said stem axis opposite that at which is located the said first plane containing said first pair of lead-in wires, said second pair of lead-in wires having upper end portions bent generally toward said first plane to be inclined upwardly at an acute angle to the horizontal and divergently away from each other and terminating in hook portions lying in a plane including said upper end portions, so that said filament extends from the said hook portion at an angle of about 90° from the axis of said hook portion in planes normal to the said plane in which said hook portions lie whereby the filament forms a smooth arc between said hook portions and a single coiled filament of arcuate form having its ends clamped in said hook portions and lying in a plane substantially normal to the said plane including said upper end portions, a support wire anchored in the upper end of said arbor and extending upwardly therefrom in the space between said filaments and thence laterally toward and embracing the midpoint of said coiled-coil filament, and at least one other support wire anchored in the upper end of said arbor and extending to and embracing said single coiled filament at a point intermediate its ends.

3. A multiple filament electric incandescent lamp mount comprising a stem having a vertical axis, a first pair of lead-in wires sealed in and extending upwardly from said stem in spaced relation and substantially in a first vertical plane to one side of said stem axis, said lead-in wires being of different lengths and having their inner ends extending laterally and terminating in vertical alignment one above the other approximately within said vertical plane and nearer the shorter of said lead-in wires, a coiled-coil filament extending vertically between and connected at its ends to the terminal portions of said inner ends of the respective lead-in wires, a second pair of lead-in wires sealed in and extending upwardly from said stem in spaced relation and substantially in a generally vertical second plane located to the side of said stem axis opposite that at which is located the said first plane containing said first pair of lead-in wires, said second pair of lead-in wires having upper end portions bent generally toward said first plane to be inclined upwardly at an acute angle to the horizontal and divergently away from each other and terminating in hook portions lying in a plane including said upper

end portions, and a single coiled filament of arcuate form having its ends clamped in said hook portions and lying in a plane substantially normal to the said plane including said upper end portions so that said filament extends from the said hook portion at an angle of about 90° from the axis of said hook portion in planes normal to the said plane in which said hook portions lie whereby the filament forms a smooth arc between said hook portions.

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