June 27, 1939. P. O. CARTUN ET AL 2,164,288

ELECTRIC INCANDESCENT LAMP

Filed June 25, 1938

Fig. 1.

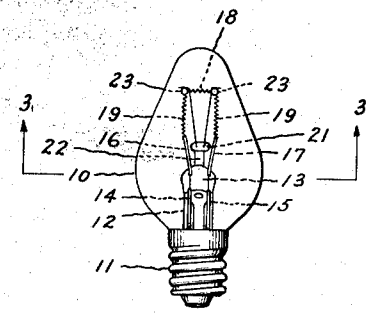


Fig. 2.

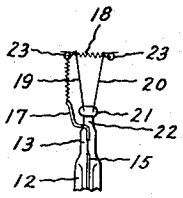


Fig. 3.

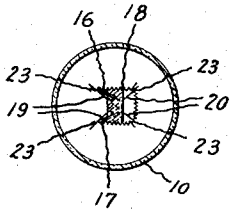


Fig. 4.

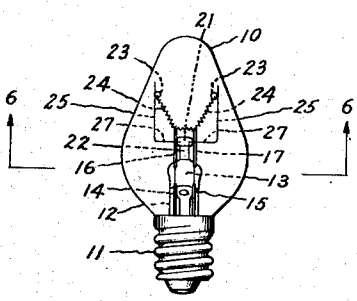


Fig. 5.

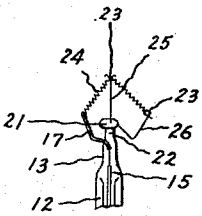
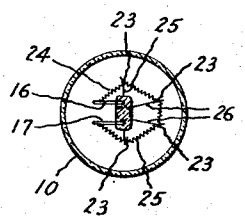


Fig. 6.



Inventors:
Paul O. Cartun,
Will D. Pew,
by Harry E. Dunham
Their Attorney.

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2,164,288

UNITED STATES PATENT OFFICE

2,164,288

ELECTRIC INCANDESCENT LAMP

Paul O. Cartun, Cleveland Heights, and Will D. Pew, East Cleveland, Ohio, assignors to General Electric Company, a corporation of New York

Application June 25, 1938, Serial No. 215,802

3 Claims. (Cl. 176—39)

Our invention relates to electric incandescent lamps in general, and more particularly to improvements in the mounting and arrangement of the filaments therein.

In low-wattage electric incandescent lamps employing a coiled filament design such as that described and claimed in United States Patent No. 1,723,920, issued August 6, 1929, to P. O. Cartun and assigned to the assignee of the present invention, the angles between adjacent sections of the filament are often very acute. This is especially true where the enclosing bulb is relatively small so as to constitute a space limitation on the configuration of the filament. Because of these acute angles, the adjacent filament sections frequently become twisted and interlock, particularly adjacent the rear support, when the lamp is subjected to sudden shock or vibration, with the result that the filament either burns out immediately or else its life is considerably foreshortened.

One object of our invention is to provide an electric incandescent lamp with an improved filament arrangement whereby twisting and interlocking of the adjacent sections of the filament, and hence premature burnout thereof, is entirely prevented.

Another object of our invention is to provide an electric incandescent lamp with an improved filament arrangement in which the angle between adjacent sections of the filament is made sufficiently large, approximately ninety degrees or thereabouts, to prevent interlocking of said sections, while maintaining the configuration of the filament within allowable space limitations.

Further objects and advantages of our invention will appear from the following detailed description of species thereof and from the accompanying drawing, in which:

Fig. 1 is a front elevation of an electric incandescent lamp comprising our invention; Fig. 2 is a fragmentary side elevation of the filament mount thereof; Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1; and Figs. 4, 5 and 6 are views similar to Figs. 1, 2 and 3 of a modification of our invention.

Referred to the drawing, the lamp there shown comprises a bulb 10 having a base 11 secured to the neck portion thereof, such as by suitable cement, and a stem 12 disposed within said bulb and sealed thereto. The stem is formed with a pressed portion 13 in which portions of a pair of lead wires 14, 15 are sealed. The inner portions 16, 17 of the lead wires 14 and 15 respectively, are bent or slightly offset, as shown in Fig. 2, in a direction transversely of the stem press 13. The inner leads 16, 17 are connected to opposite ends of a filament 18 of the closely coiled type, preferably tungsten. The said filament 18 is additionally supported within the bulb by means of a plurality of support wires comprising a front pair 19, 19, and a rear pair 20, 20. The said support wires 19 and 20 are embedded at one end in a glass button 21 formed on a comparatively short rod 22 of glass or other insulating material united to the stem press 13 and extending longitudinally therefrom. The opposite or filament-engaging ends of the support wires 19, 20 are provided with loops 23 through which the filament passes. The filament is thus free to slide in the loops when the lamp is subjected to shock or when the filament expands or contracts under the influence of temperature changes therein.

As is evident from the drawing, the filament support loops 23 are so disposed as to define the four corners of a square or rectangle the plane of which extends approximately at right angles to the longitudinal axis of the lamp. In addition, the loops on the front pair of support wires 19, 19 are so located as to lie in that plane which passes through the ends of said leading-in wires 16, 17 and extends longitudinally of the lamp. As a result of this particular disposition of the filament support loops 23, the sections of the filament supported between the ends of the inner leads 16, 17 and the loops on the front pair of support wires 19, 19 extend approximately parallel to each other and also to the longitudinal axis of the lamp, while the remaining portions of the filament extending back from the support wires 19, 19 and passing through the loops in the rear pair of support wires 20, 20 form three sides of a square or rectangle the plane of which extends transversely of the longitudinal axis of the lamp. With such an arrangement of the filament 18, the angles at the bends therein, i. e., at the various support wires 19, 20, are substantially 90° or thereabouts. Such a considerable angle therefore eliminates the tendency of the adjacent filament sections to interlock when the lamp is subjected to shock. Thus, the danger of short circuiting of the filament with resulting premature burnout thereof is effectively prevented.

Referring now to the modification shown in Figs. 4 to 6, the lamp there shown is substantially the same as that shown in Figs. 1 to 3 except for the particular arrangement of the filament 24 and its support wires. Extending from the button 21 on the stem 12 are a pair of front

or side support wires 25 and a pair of rear support wires 26. The side support wires 25, 25 extend substantially longitudinally of the lamp and are located in a plane extending approximately parallel to the plane of the stem press 13 and through the longitudinal axis of the lamp. As shown in Fig. 4, these support wires 25, 25 are formed with laterally bent portions 27 so as to space the filament support loops 23, formed at the ends of said support wires, a greater distance apart than the ends of the inner leads 16, 17. As is evident from Figs. 5 and 6, the rear pair of support wires 26, 26 extend substantially transversely of the lamp in a direction opposite to that of the offset or bend in the inner leads 16, 17. The loops 23 at the ends of the rear support wires 26, 26 are spaced apart approximately the same distance as the ends of inner leads 16, 17. Also, these same loops are so located with respect to the loops on the side support wires 25, 25 and the ends of the inner lead wires 16, 17, as to form therewith approximately three corners of an imaginary square or rectangle, as viewed from the side of the lamp (Fig. 5). As a result of this particular arrangement of the support loops 23, the bends in the filament 24 at the side support wires 25 amount to substantially 90° or thereabouts so that the possibility of the adjacent filament sections becoming interlocked, when the lamp is subjected to sudden shock, is practically eliminated. Similarly, the bends in the filament 24 at the rear support wires 26 amount to at least 90° or thereabouts, so that interlocking of the adjacent sections of the filament at such rear supports is also prevented.

It is obvious from the above description that by the use of two back support wires instead of only one, as formerly employed, the bend angle between adjacent sections of the filament at such rear supports is accordingly widened or increased to the point where interlocking of such sections is effectively prevented under practically all conditions of lamp shock or vibration. Likewise, the particular disposition of the rear support loops with respect to the front support loops and the ends of the inner leads also serves to space the adjacent filament sections at the front supports at an angle sufficient to eliminate interlocking thereof adjacent said front supports. It will be noted that with the particular filament arrangements shown, the widening of the angles between adjacent filament sections has been accomplished while maintaining the configuration of the filament within minimum space limitations, thus permitting insertion and disposition of the filament within a relatively small bulb, such as that illustrated in the drawing.

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

1. In an electric incandescent lamp, the combination of a stem having a seal portion and an insulating rod extending therefrom substantially axially of said lamp, leading-in wires having ends spaced transversely from the end of said rod and from each other, a front pair and a rear pair of filament support wires extending from the end of said rod and provided with filament engaging portions at their ends, and a filament supported solely upon the said ends of said leading-in wires and on the said portions of said support wires, the said filament engaging portions of said rear pair of support wires being so located with respect to the filament engaging portions of said front pair of support wires that adjacent sections of said filament at each of said rear support wires make an angle with each other of at least approximately ninety degrees.

2. In an electric incandescent lamp, the combination of a stem having a seal portion and an insulating rod extending therefrom substantially axially of said lamp, leading-in wires having ends spaced transversely from the end of said rod and from each other, a front pair and a rear pair of filament support wires extending substantially longitudinally of said lamp from the end of said rod and provided with filament engaging portions so disposed as to define a rectangle the plane of which extends substantially transversely of said lamp, the filament engaging portions of said front pair of support wires and the ends of said leading-in wires being located approximately in a common plane extending substantially longitudinally of said lamp, and a filament supported solely upon the ends of said leading-in wires and by the said filament engaging portions of said support wires, said filament extending from said ends of said leading-in wires to the filament engaging portions of said front pair of support wires and thence back to the filament engaging portions of said rear pair of support wires.

3. In an electric incandescent lamp, the combination of a stem having a seal portion and an insulating rod extending therefrom substantially axially of said lamp, leading-in wires having ends spaced transversely from the end of said rod and from each other, a pair of front support wires extending substantially longitudinally of said lamp from the end of said rod and provided with filament engaging portions spaced apart at least the same distance as the said ends of said leading-in wires, a pair of rear support wires extending substantially transversely of said lamp from the end of said rod and also provided with filament engaging portions spaced apart a distance no greater than the distance between the filament engaging portions of said front pair of support wires, and a filament supported solely upon the ends of said leading-in wires and by the said filament engaging portions of said support wires and extending from the said ends of said leading-in wires to the filament engaging portions of said front pair of support wires and thence back to the filament engaging portions of said rear pair of support wires, the filament engaging portions of said rear pair of support wires being so located with respect to the filament engaging portions of said front pair of support wires and with respect to the ends of said leading-in wires that adjacent sections of said filament at each of said front support wires make an angle with each other of approximately ninety degrees.

PAUL O. CARTUN.
WILL D. PEW.