Feb. 28, 1956 L. E. DILTS 2,736,344

METHOD OF STRETCHING A FILAMENT

Filed Nov. 6, 1951

Fig. 1.

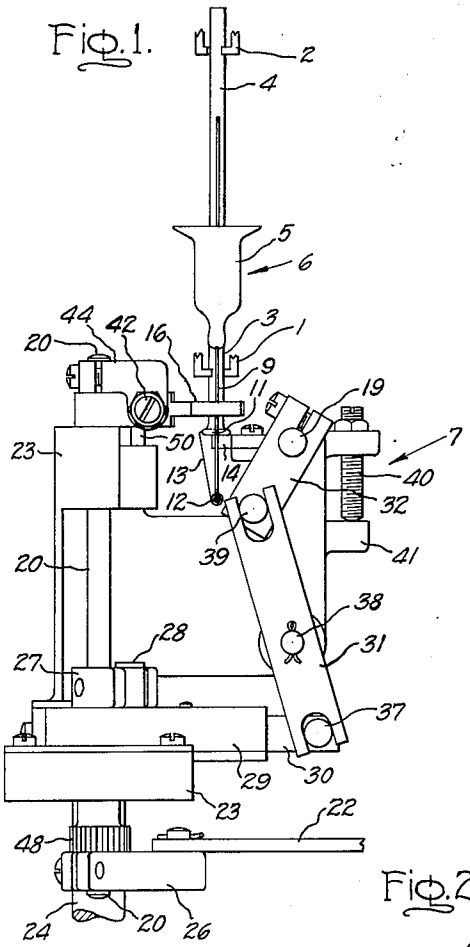


Fig. 5.

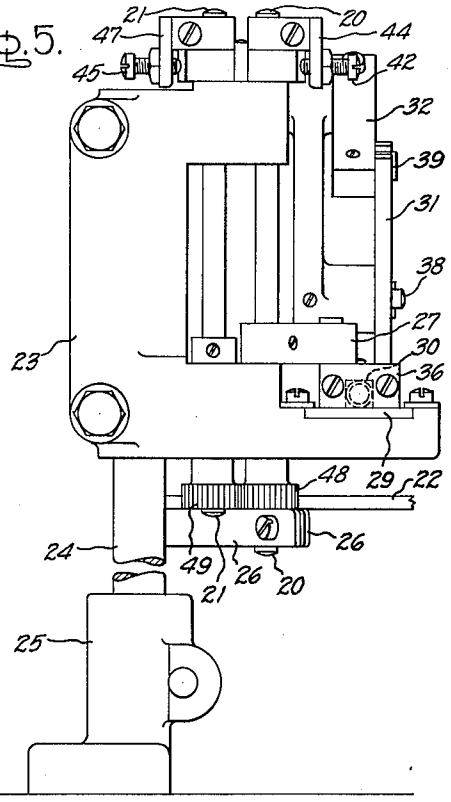


Fig. 2.

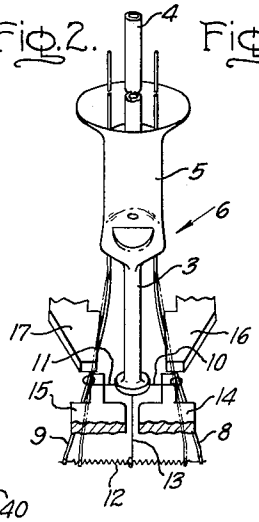


Fig. 3.

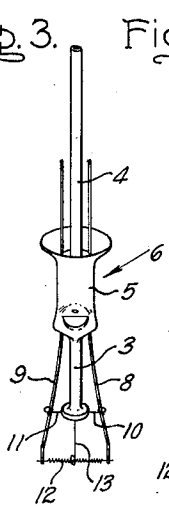


Fig. 6.

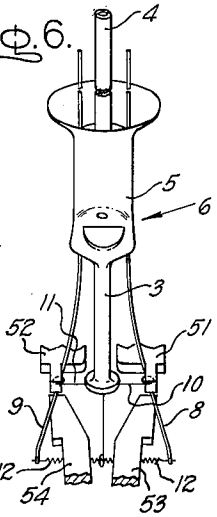
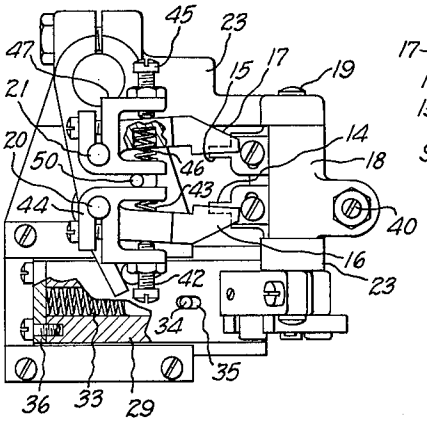


Fig. 4.



Inventor:
Lee E. Dilts,
by Vernet C. Kauffman
His Attorney.

United States Patent Office

2,736,344

Patented Feb. 28, 1956

2,736,344

METHOD OF STRETCHING A FILAMENT

Lee E. Dilts, South Euclid, Ohio, assignor to General Electric Company, a corporation of New York

Application November 6, 1951, Serial No. 255,112

3 Claims. (Cl. 140—71.6)

My invention relates to a method and apparatus for establishing a definite pitch in the coiled filament of an incandescent lamp mount or the like, and more particularly to a method and apparatus for stretching the filament by manipulating or repositioning the lead-in wires, to which the filament is connected, to provide a uniform pitch, or number of turns per unit length, of the coil.

An object of my invention is to provide a novel method and apparatus for establishing a definite and uniform pitch of the turns of a coiled filament, especially a coiled-coil filament, of a completed mount, as for instance an incandescent lamp mount of the type made by the apparatus disclosed in Flaws Patent 2,085,578 dated June 29, 1937, and assigned to the same assignee as the present invention. The method is of advantage in compensating for differences in the manufacture of mounts resulting in variations in tension and, accordingly, in spacing of the turns of the coiled filament thereof. These differences, for the most part, are caused by variation in the spacing of the lead-in wires to which the filaments are attached, and are brought about by a non-uniform spacing of those portions of the lead-in wires embedded in the vitreous stem of said mount and by non-uniform ties in tie wires extending from an arbor of the stem to intermediate portions of the lead-in wires. According to the invention the portions of the lead-in wires extending beyond the vitreous stem of the mount are repositioned or deformed in a manner to cause the extending or "free" end portions of said leading-in wires, to which are connected a coiled filament, to be spread apart so that said filament is retained in a stretched condition and the turns thereof are spaced at definite distances.

Another object of my invention is to provide a method and apparatus for effectively increasing the spacing between the ends of lead-in wires of a mount, which method and apparatus are applicable to the repositioning of lead-in wires which are connected at intermediate points to a fixed stem arbor by tie wires. The method provides for the bending of the lead-in wires to effect the repositioning thereof in a manner to cause relatively little displacement of said lead-in wires at their points of connection to the tie wires and to widen the acute angle between said lead-in wires to spread the ends thereof. The method is also suited to the establishment of a desired tension and coil spacing in a filament of a mount when a single lead-in wire at one end of the filament is repositioned in the manner described.

Further features and advantages of my invention will appear from the following detailed description of species thereof and from the accompanying drawing.

In the drawing, Fig. 1 is a side elevation of a device midway in the operation of repositioning the lead-in wires of a mount to place a filament connected between said lead-in wires under predetermined tension and the coils of said filament at a definite spacing; Fig. 2 is a perspective view at substantially right angles to Fig. 1 showing the bending and stop fingers of the lead-in wire repositioning device at their limit of movement with respect to

a mount and showing the original position of said lead-in wires in dot-dash lines; Fig. 3 is a perspective view, on a smaller scale, of the mount after separation of the repositioning device therefrom; Figs. 4 and 5 are plan and back views of the lead-in wire repositioning device; and Fig. 6 is a perspective view corresponding to Fig. 2 of a mount and modified means for repositioning the lead-in wire thereof.

As best seen in Figs. 2 and 3, the mount 6 comprises a glass stem 5 in which are sealed and anchored a pair of lead-in wires 8 and 9 which project longitudinally therefrom on opposite sides of the axis of the stem 5. A coiled-coil filament 12 is connected across the free ends of lead-in wires 8 and 9, and tie wires 10, 11 extend laterally outward from an arbor 3 on stem 5 and have their ends looped loosely around intermediate portions of the respective lead-in wires 8 and 9. The filament 12 is additionally supported by a support wire 13 extending longitudinally from the stem arbor 3. The stem 5 also carries the conventional exhaust tube 4.

The stretching operation preferably takes place at a station taken by the mount 6 directly after it has been manufactured and can, as shown in the drawing, be performed most conveniently at a station along the course of movement of the mount conveyor disclosed in the mount making apparatus of Flaws Patent 2,085,578 and directly after passing from operative relation to said apparatus. The conveyor, as herein represented by the spaced pairs of jaws 1 and 2, engages the stem arbor 3 and the exhaust tube 4 respectively, and advances said mount 6 to a device 7 which bends and repositions the lead-in wires 8 and 9 to stretch the filament 12 in accordance with the invention.

The conveyor advances the mount 6 to a position directly over the device 7 at a time when the stop fingers 14 and 15 in a retracted position on one side of the horizontal path of movement of the mount 6, and the bending fingers 16 and 17 are located in a wide open position on the opposite side of said path. The operation of the device 7 causes the stop fingers 14 and 15 to be swung up to the operative position, at which they are shown, by rotation of the hub 18 and the shaft 19; and the bending fingers or jaws 16 and 17 are pivoted in a horizontal plane into engagement with the outer sides of said lead-in wires 8 and 9 by rotation of the vertical shafts 20 and 21. Both operative movements of the device 7 result from the timed operation of a portion of the main driving means (not shown) of the mount making apparatus, which portion preferably corresponds to portions actuating other devices thereof at other stations along the conveyor, and which, at the described moment in the arrangement of the mount 6 before said device 7, causes an advance of the operating bar 22 to the left in Fig. 1. Inasmuch as the main supporting body 23 of the device 7 is a stationary member mounted upon the upper end of the support column 24 fastened by bracket 25 to the frame of the mount making apparatus, the motion of the operating bar 22 swings the arm 26 on the lower end of the shaft 20 to turn said shaft 20.

The stop fingers 14 and 15 are the first elements of the device 7 to be brought into operative relation to the mount 6 and, accordingly, are actuated by the first rotative movements of the shaft 20. During this interval, the shaft 20, to which is attached a second arm 27 engaging a roller on pin 28 in the top surface of the slide 29, effects a longitudinal movement of said slide 29 in ways in the body 23 of the device 7, and also effects rotation of lever 31 by virtue of a corresponding motion of the push bar 30 extending from the end of the slide 29. The lever 31, in turn, rotates the arm 32 and shaft 19 thereby initiating the swing of stop fingers 14 and 15 into operative relation to the mount 6. The rotation of the shaft

20 occurs at a time when the push bar 30, which bears against a helical spring 33, extends out beyond the slide 29 to the limit set by the engagement of pin 34 in the top of said push bar 30 with the end of a slot 35 in said slide 29; and said rotation of shaft 20 does not disturb the position of the push bar 30 in the slide 29 or cause further compression of the spring 33 which is located behind said push bar 30 in an opening in slide 29 and is retained therein by the end plate 36 on said slide 29. The motion is transmitted from the push bar 30 and a pin 37 extending therefrom to the lever 31 which is pivoted on a pin 38 extending from the body 23 of the device 7, and from said lever 31 to a pin 39 projecting from the arm 32. Bearings provided by the body 23 on opposite sides of the hub 18 supporting the stop fingers 14 and 15 establish the center of rotation of the shaft 19, the hub 18 and said stop fingers 14 and 15. Said fingers 14 and 15 reach their limit of motion when the stop screw 40 in a lug on the hub 18 seats against a projecting ear 41 on said body 23. This movement of the stop fingers 14 and 15 swings them up between the lead-in wires 8 and 9 to a position adjacent and under the tie wires 10 and 11 and, in most instances, causes the outside edges of said fingers 14 and 15 to bear against the lead-in wires 8 and 9 inasmuch as said outside edges of the fingers are spaced slightly farther apart than the proximate sides of the loops in the ends of the tie wires 10 and 11.

The described rotation of the shaft 20 also causes the bending fingers 16 and 17, on the opposite side of the mount 6 from stop fingers 14 and 15, to close part way to the position shown in the drawing, and is continued until said bending fingers 16 and 17 have squeezed said lead-in wires 8 and 8 closer together as shown in Fig. 2. The rotation of shaft 20 is transferred to the bending finger 16, which is pivoted upon an upper end portion of the shaft, through a yoke 44 which is clamped to said shaft 20. Said finger 16 is clamped between an adjustable screw 42 in one ear of said yoke 44 and a spring 43 held in a well in finger 16 and engaging the other ear of yoke 44. The rotation is transferred to bending finger 17, which is correspondingly pivoted upon the upper end portion of a shaft 21, through a corresponding yoke 47, adjusting screw 45 and helical spring 46. Shafts 20 and 21 are journalled in the body 23 of the device 7 and are rotated together through intermeshing of the spur gears 48 and 49 on the lower end portion of both shafts 20 and 21.

The function of the bending fingers 16 and 17 is to squeeze those portions of the lead-in wires 8 and 9 located between the stem tube 5 and the tie wires 10 and 11 to thereby bend the wires 8 and 9 about the fixed fingers 14 and 15 so that the free ends of said lead-in wires are spread apart with concomitant stretching of the filament 12. This function of the device 7 corrects any variation in the form of the mount 6 caused by variations in the spacing of the lead-in wires 8 and 9 within the stem tube 5 and such variations in said lead-in wires 8 and 9 and the tire wires 10 and 11 as may have been placed therein or may not have been corrected during the prior mount making operations.

The bending fingers 16 and 17, as shown in Fig. 2, bend the lead-in wires 8 and 9 to a greater extent than is to be maintained in the final mount 6 (Fig. 3) since some allowance must be provided for the spring back in said lead-in wires 8 and 9 and for the contraction force of the coiled-coil filament 12. The bends made in the lead-in wires 8 and 9 do not cause said wires 8 and 9 to move beyond the freedom allowed by the loops in the tie wires 10 and 11 and therefore do not result in any direct pressure being applied to said loops, as would be the case if the same operation were performed without the use of the stop fingers 14 and 15. Symmetry in the bending of the lead-in wires 8 and 9 is attained by causing the shafts 20 and 21 to

rotate until the adjacent or proximate ears of the yokes 44 and 47 thereon both bear against the post 50 extending from the top of the body 23 of the device 7, so that all slack in the mating of the spur gears 48 and 49 is absorbed, and by adjusting the screws 42 and 45 to effect the same motion in both of the bending fingers 16 and 17 at such times.

During the final part of the rotation of the shaft 20 which effects this closing movement of the bending fingers 16 and 17, the motion of the slide 29 compresses the spring 33 behind the push bar 30 and causes the stop pin 34 in the latter to shift in the slot 35 in said slide 29. The reverse rotation of the shaft 20 occurring when the device 7 is again disengaged from the mount 6 causes the bending fingers 16 and 17 to move away from said mount 6 and then, as the pin 34 seats against the end of the slot 35 causes the stop fingers 14 and 15 to swing down and away from the lead-in wires 8 and 9. On completion of these operations, all parts of the apparatus are out of contact with the mount 6, and the lead-in wires 8 and 9 and the filament 12 have sprung back part way toward their original positions; however, the deformation of said lead-in wires 8 and 9 causes them to bear against the inner, or proximate, sides the loops of the tie wires 10 and 11 and causes the filament 12 to be retained under moderate tension. In the manufacture of a mount for a 60-watt incandescent lamp, for example, it is customary to have the filament stretched 1.5 mm. after the lead-in wire respositioning operation is complete.

In a modification, illustrated in Fig. 6, the lead-in wires 8 and 9 are engaged at points above the tie wires 10 and 11 by relatively fixed fingers 51 and 52 at the outside of said lead-in wires. The lead-in wires 8 and 9 are engaged at points below the tie wires by relatively movable bending fingers or jaws 53 and 54 located between the lead-in wires 8 and 9. After movement of the pairs of fingers 51, 52 and 53, 54 to the positions shown in Fig. 6, the fingers 53, 54 are spread or moved apart to thereby spread the end portions of the lead-in wires 8 and 9 and stretch the filament 12 a predetermined amount.

In both methods disclosed, the stop finger 14—15 and 51—52 protect the loops of the tie wires 10 and 11 from the pressure of the bending fingers 16—17 and 53—54 respectively and result in the lead-in wires 8 and 9 being repositioned so that the filament 12 is maintained in a stretched condition designed to assist in causing the coils thereof to be properly spaced.

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

1. A method of stretching the coiled filament of an incandescent lamp mount having a pair of lead-in wires anchored in and extending longitudinally from a stem, tie wires extending laterally from the stem and having their ends looped loosely about intermediate portions of the lead-in wires and the coiled filament connected between the ends of the lead-in wires, which method comprises holding the mount by its stem, bracing the lead-in wires against spreading at points adjacent to the tie wires and between the tie wires and said stem while applying pressure to said lead-in wires at points on the opposite side of said tie wires and in directions to spread apart the free ends of said lead-in wires without distorting the loops in said tie wires and stretch said filament sufficiently so that upon releasing the pressure the intermediate portions of the lead-in wires bear against adjacent edges of the looped ends of the tie wires and the filament is retained in a predetermined stretched condition.

2. The method of forming an incandescent lamp mount having lead-in wires anchored in and extending longitudinally from a stem and having tie wires extending laterally from said stem toward intermediate portions of the lead-in wires which method comprises preliminarily connecting a coiled filament between and across the free ends of said lead-in wires and forming the ends of said

tie wires into loops loosely encircling the said intermediate portions of the lead-in wires, and then stretching the filament, while holding the mount by its stem, by engaging each of the lead-in wires at points adjacent to and on opposite sides of the tie wire and applying pressure thereto in directions to cause the portions of the lead-in wires between their points of emergence from the stem and the tie wires to be bent closer together and the extremeties of said lead-in wires to be spread apart so as to effect a spreading apart of the free ends of the lead-in wires and concomitant stretching of the filament sufficient so that upon removal of the pressure the lead-in wires are held by contraction of the filament against the inner sides of the loops in said tie wires.

3. The method of forming an incandescent lamp mount having lead-in wires anchored in and extending longitudinally from a stem and having tie wires extending laterally from said stem toward intermediate portions of the lead-in wires which method comprises preliminarily connecting a coiled filament between and across the free ends of said lead-in wires and forming the ends of said tie wires into loops loosely encircling the said intermediate portions of the lead-in wires, and then stretching the filament, while holding the mount by its stem, by bracing the lead-in wires against movement toward each other at points adjacent to the tie wires and between the tie wires and the said free ends of the lead-in wires while applying pressure to said lead-in wires at points on the opposite sides of said tie wires and in directions to squeeze the lead-in wires toward each other to cause the said free ends of the lead-in wires to be spread apart without distorting the loops in the tie wires and to cause the filament to be stretched sufficiently so that upon removal of the pressure the lead-in wires are held by contraction of the filament against the inner sides of the loops in said tie wires.

References Cited in the file of this patent

UNITED STATES PATENTS

1,733,881	Illingworth	Oct. 29, 1929
2,085,578	Flaws	June 29, 1937
2,145,911	Anderson	Feb. 7, 1939
2,575,771	Russell	Nov. 20, 1951