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A. GREINER ET AL
CIRCULAR ELECTRIC LAMP

2,453,986

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FIG. 1.

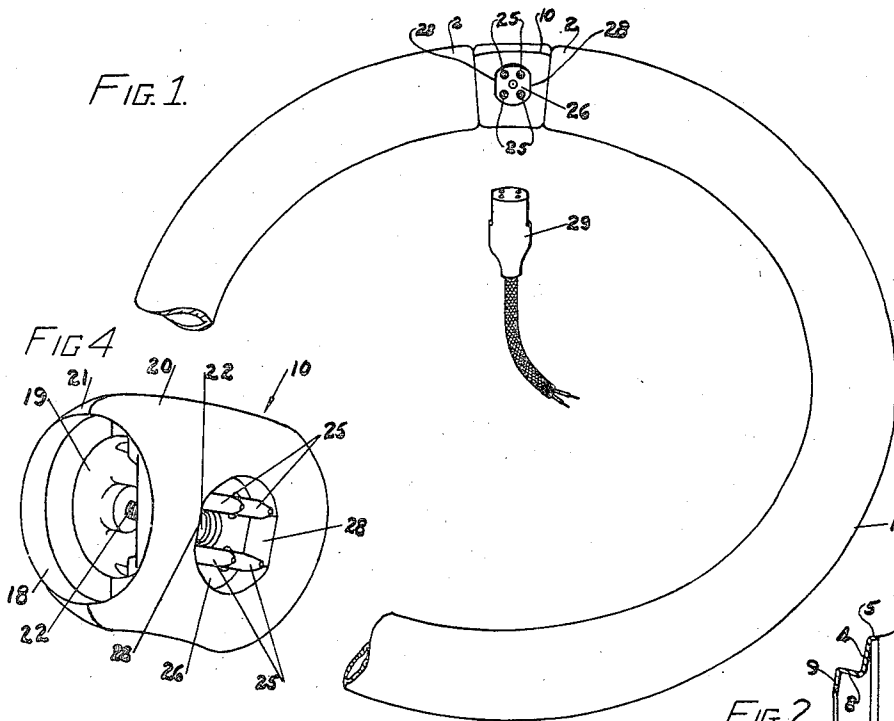


FIG. 4.

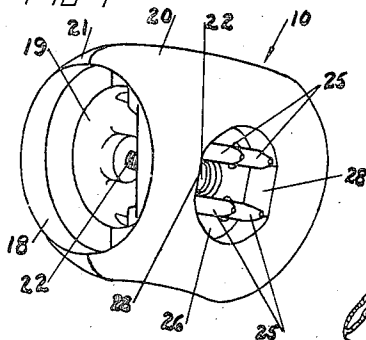


FIG. 2.

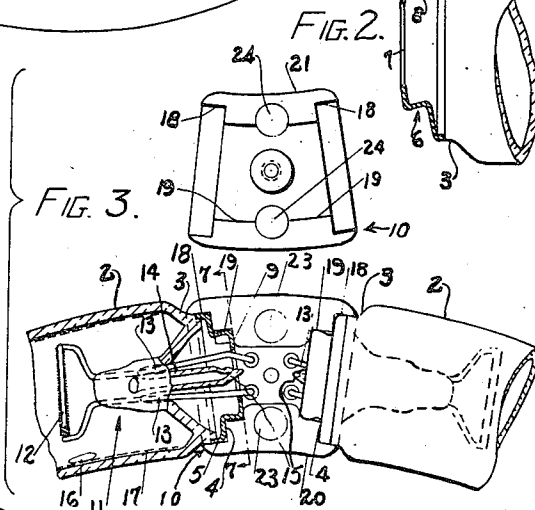


FIG. 3.

FIG. 7.

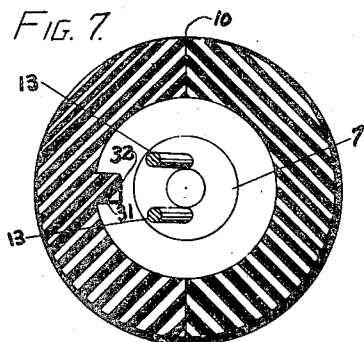


FIG. 6.

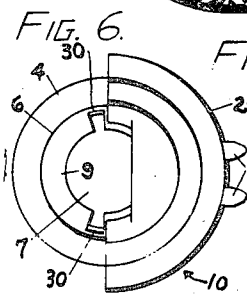
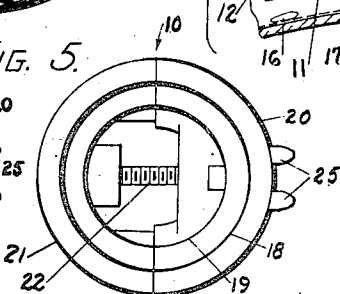


FIG. 5.



INVENTORS:
ALFRED GREINER
AUGUST W SEITZ
By *John H. Anderson*
THEIR ATTORNEY

UNITED STATES PATENT OFFICE

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CIRCULAR ELECTRIC LAMP

Alfred Greiner, Cleveland Heights, and August W. Seitz, Euclid, Ohio, assignors to General Electric Company, a corporation of New York

Application May 7, 1945, Serial No. 592,478

1 Claim. (Cl. 176—122)

1 This invention relates to electric lamps and discharge devices of a type comprising long envelopes formed in a bent and more or less nearly closed configuration, which are commonly made of vitreous materials, usually glass. A tubular envelope bent to a circular outline is a representative and very desirable form. The translation means for converting electrical energy into useful radiation in such lamps may be of incandescent filament type, or many involve an electric discharge, or may be of any other suitable kind. The present invention is especially concerned with the basing of these circular or closed figure lamps. The particular lamp here illustrated and described as an embodiment of the invention is a low pressure positive column fluorescent tube of the general type disclosed in U. S. Patent No. 2,339,166 to Harrison, and the base here illustrated is likewise of the general type shown in that patent. Various novel features and advantages of our invention will appear from the following description of species and forms of embodiment, and from the drawings.

In the drawings, Fig. 1 is a tilted or perspective broken view of a circular lamp tube conveniently embodying the invention, also showing a cooperating connector; Fig. 2 is a side view of one end of the lamp tube on a larger scale, showing an attached part in axial section; Fig. 3 is a fragmentary view of the ends of the lamp envelope associated with part of the base, one end of the envelope being shown in vertical mid-section, and a part of the base being shown detached and reversed in order to reveal its internal conformation; Fig. 4 is a tilted view of the base by itself, and Fig. 5 an end view; Fig. 6 is an end view of part of the base in association with an end disc for a lamp, illustrating a modification; and Fig. 7 shows a section through one end of the base taken as indicated by the line and arrows 1—7 in Fig. 3, and illustrates another modification.

As shown in Fig. 1, the lamp comprises a tubular glass envelope 1 bent to a circular outline and having closed ends 2, 2 directed toward one another, though somewhat spaced apart. As shown in Figs. 2 and 3, the tube ends 2, 2 are reduced in size at 3, 3, as is usual for fluorescent tubes, and to these reduced tube ends 3, 3 are attached end disc members 4, 4, at least as large as these ends 3, 3 and here shown of substantially the same ex-

2 ternal diameter as the ends. Thus the peripheries of the discs 4, 4 present annular shoulders circumferentially exposed beyond the glass tube ends 3, 3. Like the discs shown in U. S. Patents Nos. 2,154,550 to White and Johnson and 2,146,579 to Inman, the discs 4, 4 may be of sheet metal (such as the chrome iron known commercially as "Allegany 55") to which the glass of the abutting tube ends 3, 3 readily seals by fusion. Whether embossed or dished outward as in Fig. 2, or flat as in Fig. 3, the discs 4, 4 may be stiffened with marginal flanges 5, 5, to the inside of which the glass may also be fused. Instead, however, of having an inward projecting boss as in the last-cited patents, each disc 4 has an outward projecting conically enlarged boss 6 which is centrally apertured at 7; or, to state it differently, the disc has an outward-projecting and flaring flange around an aperture 8 with an inturned edge 9 defining the boss aperture 7. The bosses or flanges 6, 6 may be utilized as annular shoulders to engage in and center a common base 10 for the tube ends 3, 3, Fig. 3, as hereinafter more particularly described; moreover, their undercut or overhanging shoulder conformation as described affords a grip by which the ends of an initially straight tube 1 can be held to bend it to the desired circular or closed configuration after it has been softened by heat, all as described in our application Serial No. 574,724, filed January 26, 1945.

As shown in Fig. 3, the electrode mounts 11, 11 of the lamp 1 may be of ordinary stem and flare type, sealed in, preferably, concurrently with the attachment of the discs 4, 4. The electrodes of these mounts 11, 11 may be of any well-known or preferred type, whether for "hot-starting" after a period of cathode preheat, as exemplified in U. S. Patents Nos. 2,294,203 to Peters, 2,330,161 to Townsend and 2,306,925 to Aicher or for "cold-starting" without such preheat, as also disclosed in said Aicher patent. As here illustrated, each mount 11 comprises a thermionic cathode 12 of coiled or coiled-coil tungsten filament type, preferably coated and activated with charges of alkaline earth metal oxide(s), such as a mixture including barium and strontium oxides. The mount 11 may also include the usual unemissive auxiliary anodes. The current connections or leads 13, 13 for the electrode are sealed and extend out through the stem flare 11, which as here shown

closes off the end of the envelope 1. An inner exhaust tube 14 opening through the seal is shown as also extending out through the stem, and as sealed off at 15. The envelope 1 may contain a low-pressure atmosphere of starting gas, such as argon at a pressure of 2 to 6 mm. of mercury, more or less, and also a vaporizable and ionizable working substance such as mercury. A supply of mercury, which may exceed the amount that will vaporize during operation of the lamp, is indicated by a drop 16 inside the envelope 1, and an internal coating of fluorescent material or phosphor 17 on the envelope walls is also indicated.

As shown in Figs. 3, 4, and 5, the lamp base structure 10 common to the tube ends 3, 3 is hollowed (at least at its ends) to engage around and fit the circumferential shoulders afforded by the discs 4, 4 as above described. As shown in Fig. 3, each end of the base 10 has a double shouldered engagement with the corresponding disc 4: at 18 around the disc periphery, and at 19 around the periphery of the boss or flange 6. However, such double engagement is not always necessary, since either shouldered engagement suffices to hold the base 10 in position. The base 10 may be hollowed throughout its axial length to afford an ample internal cavity for passage of the lamp leads 13, 13, which extend out into this cavity through the stem 11 and the disc aperture 7. Accordingly, the base 10 has the character of a sleeve bridging and closing the gap between the discs 4, 4 and the tube ends 3, 3. As shown, the external diameter of the base body 10 corresponds to that of the tube 1 and its ends are defined by planes radial to the circle represented by the lamp tube 1, so that the base completes the lamp circle in appearance as well as structurally.

The base body 10 may be split longitudinally to facilitate putting it on the completed lamp 1. If it is made of flexible or resilient material like rubber, a single split at one side of the hollow body may suffice, though as shown it is divided by two splits extending lengthwise of the tube 1 into separate halves 20, 21, which are secured together by a screw 22 extending through one half and taking into a threaded hole in the other half, Figs. 4 and 5. As shown, these parts 20, 21 are provided with mating dowel sockets and projections 23, 24, Fig. 3, to facilitate assembling them in proper registry. As rigid material for a base thus constructed, plastics like those known commercially as "Bakelite" and "Lucite" are very suitable, the latter being obtainable in a translucent white which makes it a very good match for the unlighted tube 1; indeed, it even "lights up" from the lamp when in operation. If the fit or grip of the base 10 around the shoulder(s) of the discs 4, 4 does not suffice, the base can be secured against turning by means of cement, such as the ordinary thermosetting incandescent lamp basing cement. Or, if preferred, the base 10 can be anti-turningly keyed to one or both discs 4, 4 as by one or more projections on one of these parts fitting into or against one or more notches or shoulders of the other part, as described hereinafter.

As shown in Figs. 1, 4, and 5, the base 10 is provided with contact terminals to which the leads 13, 13 from each lamp end are connected, these terminals consisting of four pins or posts 25 riveted through the wall of the base half 20 lying at the inside of the lamp circle, at the bottom of a socket recess 26 in this part, Figs. 1 and 4. As shown, the socket 26 is of general circu-

lar outline, with flat(s) 28 corresponding to flat(s) on a corresponding supply cord connector 29, for the purpose of orienting the connector contacts (not shown) with respect to the contact terminals 25. Preferably the base 10 is oriented about the axes of the lamp ends 3, 3 to direct or face the contact terminals 25 at an angle of some 30° with respect to the plane of the lamp circle, to facilitate attaching and detaching the connector 29 when the tube 1 is used under the shade of a floor lamp or a table lamp.

There are important advantages in having the base 10 engage and grip exclusively around the metal discs 4, 4, either on the shoulders of their peripheries, or on those afforded by their bosses or flanges 6, 6, instead of on the glass tube ends 3, 3 as in the above-cited Harrison patent. The discs 4, 4 are very strong indeed to resist any stresses coming to them from the base 10; whereas in themselves the tube ends 3, 3 are comparatively weak. As regards external stresses such as may arise from impacts against the base 10, the discs 4, 4 distribute such stresses to the whole of their joint with the tube ends 3, 3; and as regards any tendency of the gripping base halves 20, 21 to deform the discs, this can be so limited by coordinated design of the discs and the base that virtually no deformation of the discs is possible under any gripping stress that can be imposed. Made by die-stamping or other methods, the diameters of the sheet metal discs 4, 4 and of their bosses or flanges 6, 6 can be kept very uniform—far more so than the glass tube ends 3, 3—and thus the possible gripping stresses can be closely controlled. Moreover, the bosses or flanges 6, 6 are not directly united to the glass of the tube ends, so that slight deformation of these parts by the grip of the base 10 or in resistance to any tendency to turn the base need not involve deforming or stressing the glass, except as torsion stress may be exerted on the whole joint between a disc and the tube end.

Fig. 6 illustrates one way of orienting the base 10 relative to the plane of the tube 1 and keying it against rotation. For this purpose, one or both discs 4, 4 may have key lugs 30, 30, each formed by cutting two pairs of slits in the flange 9 outward from the opening 7 and bending up the tongues between each pair of slits. As shown, these lugs 30 are so located that when the disc 4 and its boss 6 are engaged in the internally shouldered end of the base 10, the edges of the lugs engage or fit against the diametral surface of the base half 20, inside the smaller bore of the half 21.

Fig. 7 illustrates another way of orienting and keying the base 10, the difference being that the sheet metal of the boss 6 of a disc 4 is notched out at 31, and the base part 20 is moulded with a projection 32 to engage or fit in this notch 31.

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

An electric lamp comprising a tubular envelope of non-linear configuration containing electric energy translation means and having its ends disposed in spaced opposed relation, sheet metal discs fused to the said ends of the envelope, at least one of said discs having lug means projecting outwardly therefrom, a cylindrical base member extending between and embracing the ends of said envelope around said discs and providing surfaces at its interior directly engaging said lug means to orient the base member in a predetermined position on said envelope, said base member carrying contact means electrically

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connected to the said electric energy translation means in said envelope.

ALFRED GREINER.
AUGUST W. SEITZ.

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6

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