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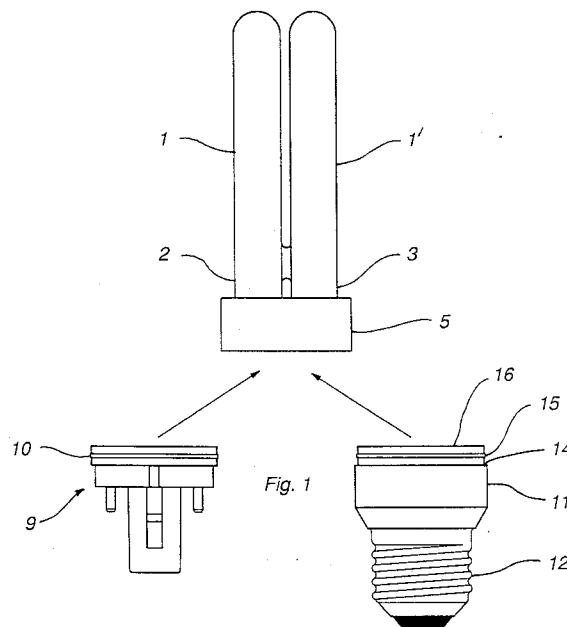
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54 **The upper part of a socket for gas discharge lamps.**

57 With the intention of restricting the storage volume of semi-manufactures in the manufacture of compact fluorescent tubes with external ballast and compact fluorescent lamps with integrated ballast, there is provided a base upper-part (5) which can be joined alternatively to the base (9) of a compact fluorescent tube with external ballast or to a housing (11) configured to enclose ballast and provided with an E27-base and intended for compact fluorescent lamps with integrated ballast. In order to provide a durable connection between the base upper-part (5) with cemented-in discharge tubes (1, 1'), and a respective base lower-part (9; 11), the latter is provided with a circumferentially extending ridges which, when the parts are pressed together, engages a groove (8) formed on the inner surface of a flange (7) that extends circumferentially around the base upper-part (5).



The present invention relates to the upper-part of a lamp socket or base, preferably the base of a gas discharge lamp, and then particularly to a gas discharge lamp of the compact fluorescent lamp kind.

In the case of conventional incandescent bulbs, there is no need for the bulb base to be provided with an upper base-part, since the bulb completely fills the lamp socket. On the other hand, the bases of compact tubes, i.e. the tubes of low-pressure gas discharge lamps, are provided with a two-part base, of which the upper-part serves essentially as a lid or cover. the bottom part of the base encloses a starter which functions to ignite the tube and maintain the lamp in operation and is normally provided with an upwardly facing opening and constructed from an electrically insulating material, and electrical pin connectors which extend downwardly from the base and which function to supply electricity to the lamp.

In the case of compact fluorescent tubes, the joint between the upper and the lower-parts of the base has hitherto lain outside the type of tube holder standard for this type of lamp. In the case of compact fluorescent lamps with integrated ballast and provided with a conventional E27-base to which the housing containing the choke is connected in the same manner as the base of a compact fluorescent tube, the upper-part of the base merely comprises a lid or cover. This lid is normally let into the housing and forms the major part of the end wall of the housing.

Because the housing of a compact fluorescent lamp with integrated ballast must also house a choke, the housing is relatively large and extends way beyond the lamp holder in a lamp fitting. Consequently, an incomplete join between the housing and the upper-part of the lamp base will lie within a region of the lamp fitting in which the fluorescent tube is used and which can be touched physically. The join is also located in that region of the fluorescent tube which is gripped when screwing the tube into or out of the fitting. The use of a base upper-part, which is comparable with an undershot lid or cover, is not without risk when considering the fact that naked current conductors or electric wires pass at some millimeters distance from the join between a base housing and its cover member. These electric conductors may well be live when a person changes a tube which has extinguished.

The object of the present invention is to provide a base upper-part which is totally reliable with respect to electrical safety. Another object is to provide a base upper-part which can be used with the two types of small gas discharge lamps of the kind now used to an increasing extent in home environments, namely compact discharge tubes and fluorescent lamps with integrated ballast. These objects are achieved by the present invention which is characterized by the features set forth in the following Claims.

The use of compact fluorescent tubes requires

separate lamp fittings which incorporate a choke means which controls the current to the lamp. When wishing to improve lighting economy in lamp fittings provided with incandescent bulbs, the incandescent bulb can be replaced with compact fluorescent lamps. Since such fittings are not provided with a choke means, it is necessary for the screw base of the fluorescent lamp to house all the ballast necessary for lamp operation, i.e. in addition to the choke means also a glow filament means and a capacitor capacitor means, which may be incorporated one in the other. These components cannot be accommodated in a standard E27-base, and consequently the base has been extended with a housing such that the combined volume of the base and housing corresponds to the space required by the ballast. The housing preferably has a rectangular cross-section with rounded corners.

For reasons of economy in manufacture, lamps of the kind in question are preferably produced as semi-manufactures, and only a relatively small number are produced complete. The amount of capital tied-up is sufficiently large nevertheless, while both compact fluorescent tubes and fluorescent tube lamps with integrated ballast are produced in designs of different wattages - 7 watts, 11 watts, 15 watts and 20 watts. In this respect, semi-manufacture enables the actual fluorescent tube part of the lamp, these tubes normally being of two-finger or four-finger construction and being totally the same for the two types of lamps mentioned, to be manufactured complete and provided with either a compact fluorescent tube base or an E27-base, according to orders placed at the factory. When fitting the actual fluorescent tube with its respective base, the cathode and switch-equipped tubes which have been coated with fluorescent substances and heat-sealed, are attached to the upper-part of a base in accordance with the invention, with the aid of a thermo-setting, silicone resin cement. When the tube is fitted to the tube holder, this unit is connected to the base of a compact fluorescent tube or to an E27-base with the aforesaid housing mounted in place, wherein two current conductors, or electric wires, are connected in the first instance to the electric pins and, in the second instance, to the metal screw thread and bottom contact respectively. The remaining two electrical conductors are connected across a glow filament and a capacitor, which are connected in parallel. Finally, the upper-part of the base is pressed onto the selected under part, so that the axially directed flange of said upper-part will overshoot the under part. The aforesaid upper base-part and lower base-part are conveniently made of a resilient material, such as a fiberglass reinforced polycarbonate or a polytetramethylene terphthalate (PBT) such that said upper base-part and said lower base-part will snap into engagement with one another this snap.

This snap-on arrangement is achieved through the agency of a groove which extends, preferably continuously, circumferentially around the inner surface of the flange, and a bead or ridge which extends, optionally continuously, around the outside of the under base-part at an adapted height, so as to snap-into the groove when the two base-parts are brought together. Because the vertical extension and the width of the bead or ridge accurately correspond to the depth and width of the groove, a stable and durable join is obtained between the upper and lower-parts of the base. In order to obtain a secure join between the upper and the lower base-parts, it is essential that the bead or ridge will fill the groove to the greatest possible extent. The stability of this join is also assisted by the fact that the upper edge of the lower-part of the base abuts a shoulder on the inner surface of the flange, after snapping said base-parts together. This shoulder is located above the groove. Further, an additional shoulder may be formed on the outer surface of the lower-part of the base at a height or level such that, when fitted, the lower edge of the flange will tightly abut said shoulder. This embodiment enables a "splash-proof" lamp to be manufactured.

In order to enable the upper-part of the base to be used with the base of a compact fluorescent lamp with external ballast and with the screw base of a compact fluorescent lamp with integrated ballast, the axial extension of the flange must be restricted with respect to those standardized lamp holders that are intended for compact fluorescent tubes with external ballast. Consequently, the length of the flange in the longitudinal direction of the lamp is curtailed so that its lower edge will reach the upper edge of the lamp holder. Because there is nothing to restrict the height that the upper-part of the base can be given over the base of a compact fluorescent tube with external ballast, other than the need to be stable against radially directed forces, it has been possible to adapt the upper-part of the base to the base of the compact fluorescent lamp with integrated ballast. The optimization between these two usages has resulted in a flange height, i.e. the extension in the axial direction of the lamp, of almost 2/5 parts of the transverse measurement of the upper socket-part. This provides a space for accommodating the ballast in the compact fluorescent tube base with external ballast, which is slightly larger than necessary. On the other hand, this dimensioning results in an overshoot of the upper base-part on the housing of the compact fluorescent lamp base with integrated ballast, which suffices to provide a highly stable connection. The importance of this will be readily perceived when considering that this type of lamp tube is screwed into its lamp holder, and that the actual discharge tubes constitute the grip used to rotate the tubes.

The invention will now be described in more detail with reference to a preferred embodiment thereof and

also with reference to the accompanying drawings, in which

Figure 1 illustrates a gas discharge tube fitted with a base under-part, and shows to the left the base of a compact luminescent tube with external ballast, and to the right an E27-base provided with a ballast housing; and

Figure 2 is a vertical sectional view of the upper-part of a base.

A coherent discharge chamber of a small gas discharge lamp is enclosed in two or more, series-connected glass tubes 1, 1'. Each of the glass tubes is provided with a respective cathode fixedly mounted distal from the ends 2, 3 of the coherent discharge chamber, as seen in the direction of the discharge path. The ends 2, 3 of the glass tubes extend through holes 6 provided in the upper surface 4 of an upper base-part 5, and are permanently cemented to the inner surface of said upper base-part.

The upper base-part 5 has a rectangular cross-section with pronouncedly rounded corners and is preferably manufactured from PBT, so as to be resilient to a limited extent. As will be seen from Figure 2, the upper base-part 5 includes a flange 7 which extends at right angles from the sides of the upper surface 4 of said base-part, and a groove 8 which extends continuously around the flange 7. The flange 7 includes a lower locking wall 18 which is thinner than the remainder of the flange. The locking wall has a given degree of resilience which enables it to coact with grooved locking means 10; 15 on a lower base-part 9; 11.

When fitting the upper base-part 5, together with the discharge tubes 1, 1' cemented thereto, to the lower-part 9 of the base of a compact fluorescent tube, the electric wires of the cathodes of the discharge tubes 1, 1' are first connected to the ballast mounted in the lower base-part 9 and the flange 7 is then fitted over the outer surfaces of the lower base-part 9. The upper base-part 5 is then pressed down onto the lower base-part 9, so that a bead or ridge 10 extending around the surface of the widest part of said lower base-part snaps into the groove 8 on the inner surface of the flange 7. When the aforesaid base parts are produced to precise measurements, it may be beneficial to heat the upper base-part 5 so as to make said base-part more yieldable and also to expand the base-part slightly. A highly stable join will then be obtained when the base-parts cool.

When a compact fluorescent lamp with integrated ballast is to be produced, a similar procedure is followed. A base upper-part 5 together with discharge tubes 1, 1' attached thereto is passed over a housing 11 fitted to an E27-base 12, subsequent to having connected the lamp cathodes to the ballast mounted in the housing 11. As a shoulder 14 provided on the housing 11 approaches the bottom edge 13 of the upper base-part 5, a bead or ridge 15 snaps into the

groove 8. The upper edge 16 of the housing 11 will therewith also come into contact with a shoulder 17 formed on the inner surface of the flange 7 in the base upper-part 5, therewith enhancing the stability of the thus combined screw base.

Claims

1. A base upper-part made of an electrically insulating material and intended for gas discharge lamps, said socket upper-part comprising an upper surface (4) which is provided with one or more holes (7) for accommodating the gas discharge tubes of the lamp, **characterized** in that a flange (7) which extends circumferentially around the lamp base and in the longitudinal direction of the lamp is formed in one piece with said upper surface (4); and in that the flange has a lower locking wall (18) which is intended to surround and stably-join the base upper-part with either the base (9) of a compact fluorescent tube with external ballast or to the base (11) of a compact fluorescent lamp with integrated ballast.
2. A base upper-part according to Claim 1, **characterized** in that said base upper-part has a rectangular cross-section at right angles to the longitudinal axis of the lamp, with pronouncedly rounded corners and straight intermediate flange walls.
3. A base upper-part according to Claim 1 or 2, **characterized** in that the locking wall (18) has a given resilience so as to be able to coact with locking means on the base of the compact fluorescent tube with external ballast or the base of the compact fluorescent lamp with integrated ballast through the agency of a snap-locking action.
4. A base upper-part according to Claim 3, **characterized** in that the locking wall (18) is provided on its inner surface with a groove (8) for coaction with ridge-shaped locking means (10; 15) on the base of the compact fluorescent tube with external ballast or on the base of the compact fluorescent tube with integrated ballast.
5. A base upper-part according to Claim 4, **characterized** in that the groove (8) extends continuously around the whole of the flange (7).
6. A base upper-part according to any one of the preceding Claims, **characterized** in that the thickness of the locking wall (18) is smaller than the thickness of the remainder of the flange (7).

7. A base upper-part according to any one of the preceding Claims, **characterized** in that the inner surface of the flange (7) is provided with an abutment surface (17) for abutment with an upper edge (16) of a base lower-part (9; 11).
8. A base upper-part according to any one of the preceding Claims, **characterized** in that the flange (7) has an extension in the longitudinal direction of the lamp of up to two-fifths the transverse measurement of the base upper-part.
9. A compact fluorescent lamp with integrated ballast which includes a base upper-part (5) which is made of an electrically insulating material and which has a perforated upper surface (4) for accommodation of gas discharge tubes, and a base lower-part (11) having a conventional screw base (12), **characterized** in that the base upper-part has a flange (7) around the lamp base and which extends in the longitudinally direction of the lamp; in that the flange (7) is formed integrally with the upper surface (4) and has a lower locking wall (18) which is intended to surround and stably join the base upper-part to either the base (9) of a compact fluorescent tube with external ballast, or to the base (11) of a compact fluorescent lamp.
10. A compact fluorescent tube with external ballast, comprising a base upper-part (5) made of an electrically insulating material and having a perforated upper surface (4) for accommodation of gas discharge tubes, and a base lower-part having a standardized compact fluorescent tube base (9) with external ballast, **characterized** in that the base upper-part includes a flange (7) which surrounds the lamp base and extends in the longitudinal direction of the lamp; in that the flange (7) is formed integrally with the upper surface (4) and has a lower locking wall (8) which is intended to surround and stably join the base upper-part with either the base (9) of a compact fluorescent tube with external ballast or to the base (11) of a compact fluorescent lamp with integrated ballast.
11. A compact fluorescent tube with external ballast, comprising a base upper-part (5) made of an electrically insulating material and having a perforated upper surface (4) for accommodation of gas discharge tubes, and a base lower-part having a standardized compact fluorescent tube base (9) with external ballast, **characterized** in that the base upper-part includes a flange (7) which surrounds the lamp base and extends in the longitudinal direction of the lamp; in that the

flange (7) is formed integrally with the upper surface (4) and has a lower locking wall (8) which is intended to surround and stably join the base upper-part with either the base (9) of a compact fluorescent tube with external ballast or to the base (11) of a compact fluorescent lamp with integrated ballast.

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