United States Patent [19]

Albrecht et al.

[11] **3,876,896**

[45] **Apr. 8, 1975**

[54] **SUBMINIATURE INCANDESCENT BULB WITH LATERAL CONTACT ELEMENTS**

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[22] Filed: **Jan. 30, 1974**

[21] Appl. No.: **437,983**

[30] **Foreign Application Priority Data**

Jan. 31, 1973 Germany 2304510

[52] **U.S. Cl.** ..... **313/315**; 313/318; 339/145 R

[51] **Int. Cl.** **H01k**

[58] **Field of Search** ..... 339/145 R, 99 L; 313/315, 313/318

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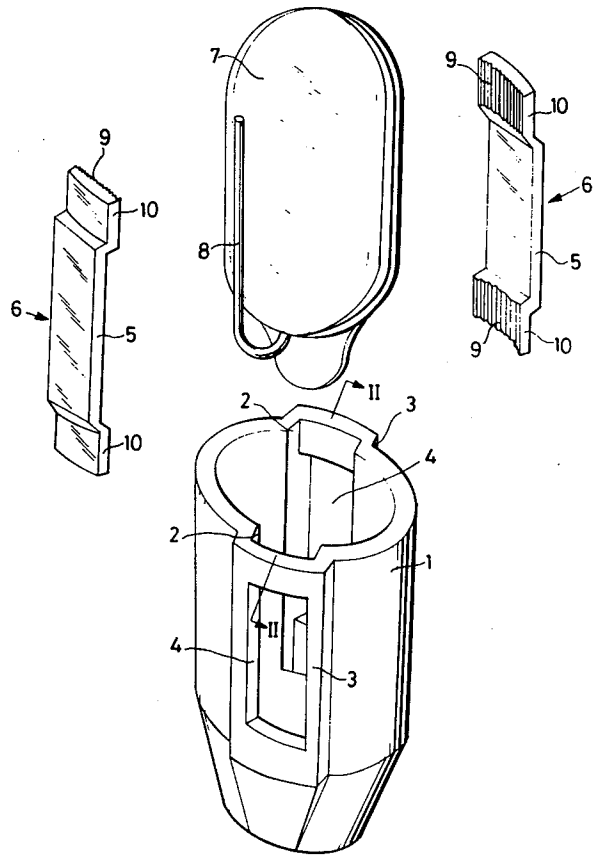
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[57] **ABSTRACT**

A subminiature incandescent bulb in which the overall length of the bulb does not substantially exceed the length of the glass bulb body. U-shaped contact elements protrude through window openings in vertical grooves and these U-shaped contact elements perform the dual function of establishing contacts with the connecting wires of the bulb as well as with the socket, without substantially increasing the length of the bulb.

11 Claims, 4 Drawing Figures



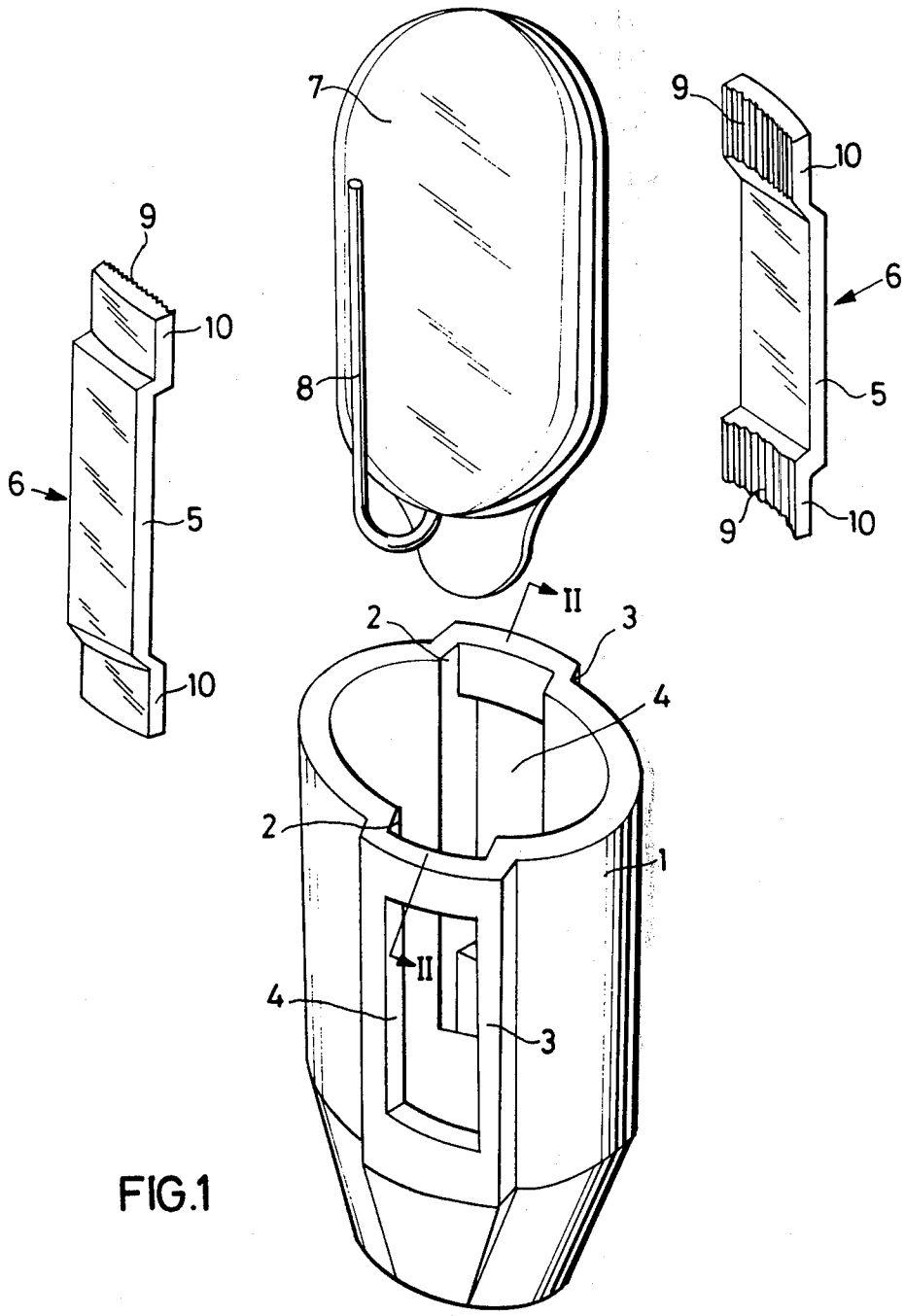


FIG.1

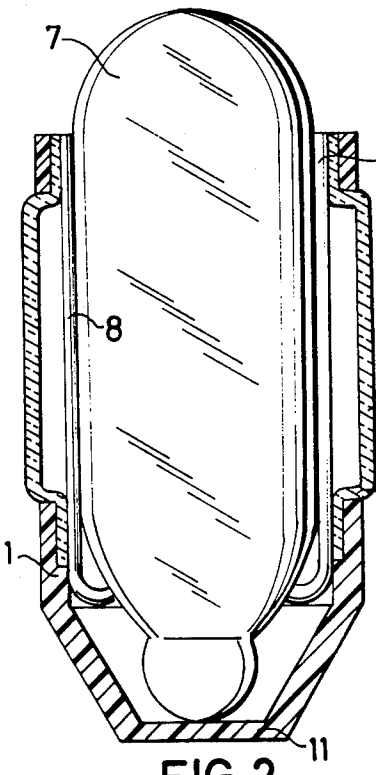


FIG. 2

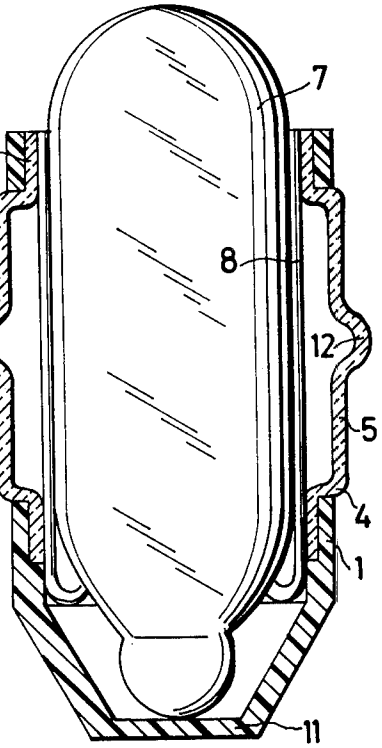


FIG. 4

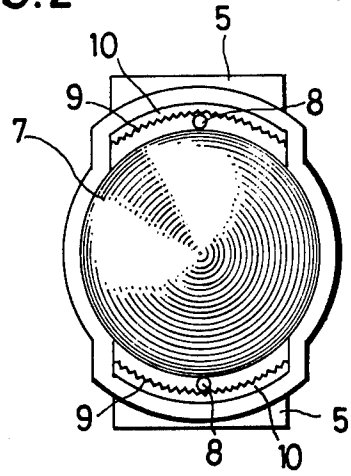


FIG. 3

SUBMINIATURE INCANDESCENT BULB WITH LATERAL CONTACT ELEMENTS

BACKGROUND OF THE INVENTION

The present invention relates to a subminiature incandescent bulb having lateral contact elements forming electric contacts with the current-carrying connecting wires of the bulb and a plastic holder.

Such miniature incandescent bulbs are well known in the art. An example of these is the "telephone lamp" in which two contact elements are laterally glued to the cylindrical bulb body and are commonly held together by a plastic part below the bulb, where the current-carrying contact wires which are fused into the bulb body are soldered to the contact elements.

This known bulb has the disadvantage that, because of the plastic holder provided below the bulb for holding the contact elements, the total length of the subminiature incandescent bulb in its holder is greater than the length of a glass bulb body without a holder.

In the application of subminiature incandescent bulbs as indicating lights, however, it is frequently required that the total length of the subminiature bulb and holder not exceed the length of the glass bulb body without a holder. For these applications, frequently, a certain depth of insertion must not be exceeded, while the diameter remains non-critical.

Accordingly, it is an object of the present invention to provide a subminiature incandescent bulb with lateral contact elements and a plastic holder, the length of which does not exceed the length of the bulb body without the holder.

Another object of the present invention is to provide a subminiature incandescent bulb which is simple in design and which may be economically fabricated.

A further object of the present invention is to provide an incandescent bulb of the foregoing character which is reliable in operation and which has a substantially long operating life.

The objects of the invention are achieved by providing a subminiature incandescent bulb of the type described above which has a holder consisting of a plastic shell containing opposite vertical grooves with window openings. Into these window openings are inserted substantially straight contact elements, each having center sections that have been bent out into a U-shaped configuration. The ends of these contact elements abut on the bent-back connecting wires of the bulb while the bent center sections protrude into the window openings.

Thus, the lower end of the bulb body can lie precisely on a plane with the lower edge of the plastic shell, so that the subminiature incandescent bulb in the holder exhibits precisely the same length as the bulb body itself. As a consequence of the particular design of the contact elements, the solder connection of the connecting wires to the contact elements can be avoided, since a satisfactory electrical contact is obtained by only the clamping action of the contact elements. The center contact sections protruding into the window openings of the vertical grooves abut on the opposite contacts of a corresponding bulb socket when the subminiature incandescent bulb, according to the invention, is inserted into such a socket.

It is advantageous to form the vertical grooves by pushing out the wall of the plastic shell in a U-shaped manner so that the protruding parts can serve as guide fins for the insertion of such a subminiature incandescent bulb into a socket.

In a further embodiment of the invention, the plastic shell can have limit stops which prevent the bulb body from being pushed through the shell. This can be arranged for example so that they grip the lower dome of the bulb body when the fused stud is on a level with the bottom inner surface of the plastic shell.

However, it is much simpler and independent of the length of the fused stud of the bulb body if the limit stop, according to the invention, which limits the insertion of the bulb body consists of a thin-walled bottom of the plastic shell. This causes the overall length of the subminiature incandescent bulb with holder to exceed the length of the bulb body itself by the thickness of the bottom, but this small increase is not substantially important because the bottom serves only as a limit stop and performs no supporting function.

The vertical grooves of the plastic shell extend substantially beyond the length of the cylindrical center section of the bulb body, since in this area the bent-back connecting wires are to be pushed against the bulb body, but the grooves can end at the upper edge of the plastic shell so that the formation of the protrusions of the vertical grooves can be accomplished in a simple manner while injection molding the plastic shell, according to the invention.

In another embodiment of the invention, the two ends of each contact element, which advantageously have vertical serrations for carrying the bent-back wires, are bent perpendicularly to the vertical direction in a manner corresponding to the circumferential curvature of the bulb body. Thus, they can form an obtuse angle of almost 180°, so that they abut in a spring-like manner on the connecting wires, forming a tolerance compensation between the inner diameter of the plastic shell and the slightly varying outer diameter of the bulb body.

It is also within the framework of the invention that the center sections of the contact elements protruding into the window openings be provided with a convex section protruding beyond the outer wall of the plastic shell so that they exert spring action in a radial direction, whereby spring action in the contacts of the socket can be avoided.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

SUMMARY OF THE INVENTION

A subminiature incandescent bulb includes a plastic bulb holder having opposite vertical grooves and window openings. A bulb having connecting wires bent back on the bulb is inserted into the plastic holder. Lateral contact elements in the grooves and window openings form electric contacts with the current-carrying connecting wires of the bulb. Each of the contact elements has a generally U-shaped configuration and has a bent-out center section extending into the window openings, the ends of the bentout center section abutting clampingly against the connecting wires.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view in perspective or the individual parts of the subminiature incandescent bulb according to one embodiment of the invention.

FIG. 2 is a vertical cross-section through the bulb assembled in accordance with FIG. 1.

FIG. 3 is a cross-section through the bulb perpendicular to the vertical direction.

FIG. 4 is a cross-section through a bulb with contact segments of a different construction

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing, the holder for a subminiature incandescent bulb, consists substantially of a cylindrical shell 1 with opposite vertical grooves 2. The grooves 2 protrude outside the cylindrical circumference of shell 1. These protrusions 3 serve as guide fins on insertion into a socket. In the grooves 2, window openings 4 are provided, into which can fit the center sections 5 of contact elements 6. These elements 6 consist of straight pieces which have been bent out into a generally U-shaped configuration and are inserted into the grooves 2.

On subsequent insertion of a bulb body 7 with bent-back connecting wires 8, the connecting wires 8 are pressed against the outer wall of the bulb body by the end sections 10 of the contact elements 6. The contact elements 6 are provided with vertical serrations 9. This results, in addition to formation of a contact, in the clamping of the bulb body 7. Bulb body 7 can furthermore be glued into the plastic shell. The plastic shell 1, which tapers downward conically in accordance with the taper of the bulb body, has a thin bottom 11 which serves as a limit stop for the insertion of the bulb body 7.

The center sections 5 which are inserted into the window openings 4, and the length of which corresponds as accurately as possible to the length of the window openings 4, abut on the side contacts of a socket when the subminiature incandescent bulb, according to the invention, is inserted into a socket.

If, according to the alternate arrangement of FIG. 4, the center sections 5 are provided with a convex section 12, then the contact elements themselves form spring contacts so that spring contacts can be avoided in the socket surrounding the bulb.

The invention is not limited to the embodiments shown. For example, in another embodiment of the insertion limiting stop of the plastic shell 1, instead of the bottom 11, it could be provided that the bulb body 7 does not abut the inner wall of the plastic shell 1 but instead on tolerance-compensating serrations.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristic of the generic or specific aspects of this invention, and therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed is:

1. A subminiature incandescent bulb comprising, in combination, a plastic shell holder having opposite internal vertical grooves and window openings in said grooves, a bulb member inserted into said holder, current-carrying wires connected to said bulb member and bent back on said bulb member, lateral contact elements inserted in said grooves and window openings for forming electric contacts with said current-carrying connecting wires of the bulb, each of said contact elements having a generally U-shaped configuration and having a bent-out center section disposed in said window openings and adapted to form external contacts, the ends of said bent-out center section abutting clampingly against said connecting wires, whereby the latter are clamped between said ends of said bent-out center section and said bulb.

2. The incandescent bulb as defined in claim 1 wherein said plastic shell holder has a thin-walled bottom for abutting against said bulb member.

3. The incandescent bulb as defined in claim 1 wherein said grooves of said holder extend substantially the length of the central portion of said bulb member.

4. The incandescent bulb as defined in claim 1 wherein said grooves of said holder terminate at the upper frontal rim of said holder.

5. The incandescent bulb as defined in claim 1 wherein the ends of each contact element connect with one another through an angle of substantially 180°.

6. The incandescent bulb as defined in claim 1 wherein the ends of each contact element are serrated for guiding said connecting wires.

7. The incandescent bulb as defined in claim 1 wherein said bulb member is cemented into said holder.

8. A subminiature incandescent bulb according to claim 1 wherein said bulb is elongated, said connecting wires extend in one direction generally parallel to the longitudinal axis of said elongated bulb.

9. A subminiature incandescent bulb comprising, in combination, a cylindrically shaped plastic shell holder having opposite vertical grooves and window openings, such cylindrical wall of said holder being pressed outwardly for forming said grooves, a bulb member inserted into said holder, current-carrying connecting wires to said bulb member and bent back on said bulb member, lateral contact elements inserted in said grooves and window openings for forming electric contacts with said current-carrying connecting wires of the bulb, each of said contact elements having a generally U-shaped configuration and having a bent-out center section extending into said window openings, the ends of said bent-out center section abutting clampingly against said connecting wires.

10. A subminiature incandescent bulb comprising, in combination, a plastic shell holder having opposite vertical grooves and window openings, a bulb member inserted into said holder, current-carrying connecting wires to said bulb member and bent back on said bulb member, lateral contact elements inserted in said grooves and window openings for forming electric contacts with said current-carrying connecting wires of the bulb, each of said contact elements having a generally U-shaped configuration and having a bent-out center section extending into said window openings, the ends of said contact elements being bent transversely to the longitudinal direction of said elements to correspond to the general peripheral curvature of said bulb member, the ends of said bent-out center section abutting clampingly against said connecting wires.

11. A subminiature incandescent bulb comprising, in combination, a plastic shell holder having opposite vertical grooves and window openings, a bulb member inserted into said holder, current-carrying connecting wires to said bulb member and bent back on said bulb member, lateral contact elements inserted in said grooves and window openings for forming electric contacts with said current-carrying connecting wires of the bulb, each of said contact elements having a generally U-shaped configuration and having a bent-out center section extending into said window openings, said center section extending into said window openings and protruding beyond the outer wall of said holder, the ends of said bent-out center section abutting clampingly against said connecting wires.

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