Sept. 28, 1965 W. J. DECKER 3,209,192

DECORATIVE ELECTRIC LAMP WITH SPECULAR COATING

Filed Dec. 29, 1960

FIG. 1.

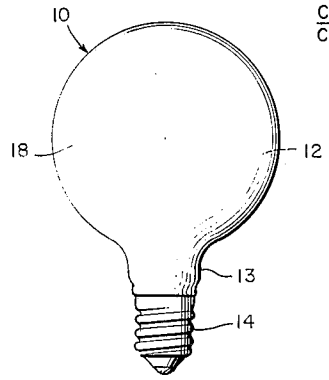


FIG. 2.

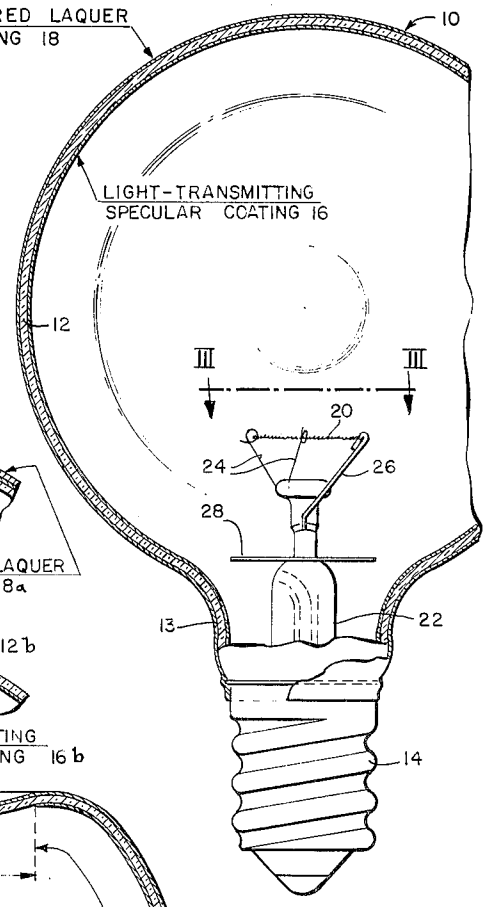


FIG. 4.

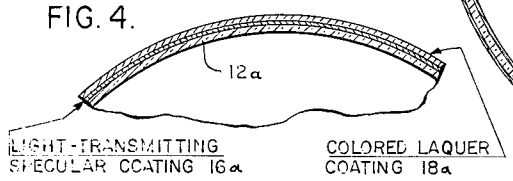


FIG. 5.

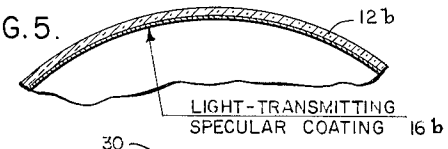


FIG. 6.

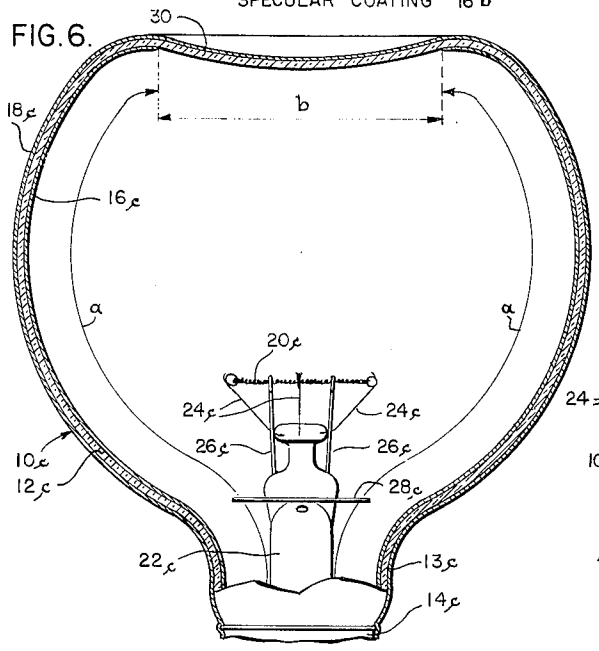
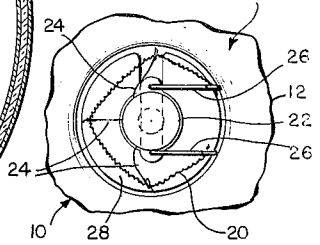


FIG. 3.



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DECORATIVE ELECTRIC LAMP WITH SPECULAR COATING

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8 Claims. (Cl. 313—116)

This invention relates to electric lamps and, more particularly, to a novel incandescent lamp for decorating Christmas trees and the like.

As is well known, the primary purpose of Christmas tree lights is to produce an appealing decorative effect at a reasonable cost. To this end various types of decorative lamps have been developed and marketed. Some are relatively simple and merely have bulbs shaped and colored to simulate different Christmas characters or scenes, while other are rather elaborate and include means for using the heat generated by the lamp to revolve colored shades or the like, or to generate bubbles in tubes containing colored fluid. More recently, lamps which flash on-and-off to create a "twinkling" effect, and others covered with translucent plastic particles which produce a frosted or snowball apearance have been developed and successfully marketed.

It is the general object of this invention to provide a decorative lamp which is distinctively different from the prior art lamps and produces a pleasing decorative effect in both a lighted and unlighted condition.

A more specific object is the provision of an incandescent decorative lamp of simple and inexpensive construction that will create totally different decorative effects when energized and deenergized and is thereby more versatile than the prior art lamps.

The foregoing objects, and others which will become obvious as the description proceeds, are achieved in accordance with this invention by coating a part or the entire surface of the lamp envelope with a specular coating that reflects incident light originating outside the lamp but transmits the light generated by the filament. Thus, when the lamp is unlighted, the coated portions reflect light and the lamp functions as a silvered Christmas tree ornament; and, when the lamp is energized, it becomes luminous and produces a subdued lighting effect that is both pleasant and distinctive. When the lamp is provided with a second coating of colored lighting-transmitting material, such as a suitable plastic, a specular colored effect is obtained when the lamps are out, which changes to a colored glowing effect when the lamps are lighted.

A better understanding of the invention will be obtained by referring to the accompanying drawing, wherein:

FIG. 1 is a side elevational view of a decorative lamp embodying this invention;

FIG. 2 is a fragmentary side sectional view on an enlarged scale of the lamp shown in FIG. 1;

FIG. 3 is a plan view of the filament mount and basal end of the lamp along the line III—III of FIG. 2, in the direction of the arrows;

FIG. 4 is a fragmentary cross-sectional view of the bulb of an alternative lamp embodiment according to the invention;

FIG. 5 is a similar view of another embodiment; and

FIG. 6 is a fragmentary side sectional view of still another embodiment.

While the present invention may be advantageously employed in various types of decorative lamps, it is particularly adapted for use in Christmas tree lamps and accordingly has been so illustrated and will be so described.

With particular reference now to the drawing, in FIG.

1 there is illustrated a Christmas tree lamp **10** having a generally spherical glass envelope **12** terminated at one end by a constricted neck portion **13** to which is attached the usual base member **14**. As shown in FIG. 2, the envelope contains a light source such as a filament **20** that is coaxially supported within the lamp by means of a re-entrant type stem **22** sealed to the neck of the envelope. The filament is held in the desired configuration by means of support wires **24** that are embedded in the stem, and the ends of the filament are electrically connected to the base **14** by means of lead-in wires **26** in the usual manner. The lamp **10** may be either of the vacuum or gas-filled type, depending upon the wattage rating. The lamp here illustrated has a rating of approximately 6½ watts and is, accordingly, of the vacuum type. The envelope **12** has an outside diameter of approximately 1¾" and is referred to in the art as a G–14 bulb.

The desired distinctive and variable decorative appearance of the lamp **10** is achieved in accordance with this invention by providing a coating **16** of suitable metal, such as silver or aluminum, on at least a portion of the envelope **12**, which coating is of such thickness that it reflects incident light originating outside the lamp but is permeable to and transmits the light generated by the filament **20**. In the particular embodiment shown in FIG. 2, the entire inner surface of the envelope **12** is provided with such a coating, the latter by virtue of its peculiar properties being identified in this and the other figures as a "light-transmitting specular coating." In order to enhance the decorative appearance of the lamp, a second coating **18** of suitable colored material, a cured layer of colored thermosetting plastic such as cellulose acetate lacquer for example, is provided on the outer surface of the envelope **12**.

The thickness of the light-transmitting specular coating **16** and the colored lacquer coating **18** must be properly controlled otherwise insufficient or excessive light will be transmitted through the envelope from the filament and the desired subdued glowing effect will not be obtained when the lamp is energized. While the coating thicknesses will vary, of course, depending upon the wattage and intensity of the filament when energized, with the 6½ watt G–14 lamp **10** here illustrated very satisfactory results have been obtained with a specular coating **16** of silver having a thickness (calculated) of approximately 0.110 micron. On this basis, a thickness range (calculated) of approximately 0.9 to 0.130 micron would probably be permissible. The thickness of the lacquer coating **18** in this particular instance was approximately 2 mils, with a permissible tolerance of 0.5 mil for the specific concentration of coloring material used.

In addition to enhancing the decorative appearance of the lamp **10**, the lacquer coating **18** also serves to strengthen the envelope **12** and prevent it from breaking should the lamp be accidently dropped or struck.

Since silver and aluminum both reflect infrared, the use of these or similar metals as the specular coating **16** naturally causes the infrared radiations produced by the filament **20** to be internally reflected thus increasing the operating temperature of both the envelope **12** and base **14**. In order to prevent excessive base temperatures, it has been found desirable in such cases to support a shield **28** of infrared reflecting material, such as aluminum, between the filament **20** and neck portion of the envelope **12**, which shield can be slotted and slipped over the stem press in transverse relationship with the lamp axis as shown in FIGS. 2, 3 and 6.

Alternatively, the light-transmitting specular coating can be fabricated from a material that is reflective as regards exterior light but permeable to both infrared

and visible radiations emanating from the filament **20**. Specific examples of suitable materials are germanium, silicon, antimony sulphide and selenium sulphide. Thus, by properly controlling the coating thickness and selecting a suitable material, a specular coating can be provided which will reflect incident light from outside the lamp and transmit both visible and infrared radiations generated inside the lamp by the filament.

Various other modifications are possible. For example, an envelope **12***a* could be employed wherein the light-transmitting specular coating **16***a* is on the outside surface of the envelope and is, in turn, covered by the colored lacquer coating **18***a*, as shown in FIG. 4.

Or, as shown in FIG. 5, the exterior colored coating may be omitted entirely to provide an envelope **12***b* having only a light-transmitting specular coating **16***b* on its interior surface.

As shown in FIG. 6, the heating effect on the base **14** produced by the specular coating **16** (if infrared reflecting) can also be reduced by providing a lamp **10***c* having an envelope **12***c* the spherical end segment whereof opposite the neck portion **13***c* is dished to form a depression **30** that is concave inwardly. In this manner a concave rather than a spherical convex surface is provided opposite the basal end of the lamp which will disperse the incident infrared radiations from the filament **20** instead of reflecting them into the neck portion. The operating base temperature can be further decreased by restricting the specular coating **16** to the neck and side surfaces "*a*" of the envelope and leaving the surface "*b*" of the depressed end segment **30** clear, as indicated in FIG. 6. The colored exterior coating **18***c* is preferably applied over the entire outside surface of the envelope **12***c*, as shown, to avoid complicating the manufacture of the lamp. While a shield **28** is shown in this particular embodiment, the decrease in the base temperature effected by the aforesaid modification in the bulb configuration and coating pattern may permit such shield to be omitted thereby further simplifying the construction of the lamp.

It will be appreciated that any of the above-described lamps may be constructed to periodically flash on-and-off in the well-known manner when energized, thereby to provide a string of dual-purpose lights that continuously change from attractive silvered ornaments to glowing balls of light.

It has been found that the overall brightness of the lamp when energized varies according to the position of the filament along the lamp axis, the brightness decreasing as the filament approaches the geometrical center of the envelope. Optimum brightness is achieved when the filament is offset from the bulb center by approximately ¼ of the bulb diameter toward the neck portion of the envelope, as shown in FIGS. 2 and 3, and this location is preferred. When thus disposed, some of the light from the filament will be internally reflected by the proximate curved parts of the envelope and then transmitted through the envelope thereby producing a scintillating or sparkling effect when the lamp is lighted, which adds to its ornamental appearance.

As will be recognized from the foregoing, the objects of the invention have been achieved by providing a versatile decorative lamp of simple inexpensive construction which has a totally different and attractive ornamental appearance when energized and deenergized and thus provides two distinctively different decors.

While several embodiments have been illustrated and described in detail, it will be understood that various modifications in both the configuration and organization of parts can be made without departing from the scope of this invention.

I claim:

1. A decorative electric lamp comprising an envelope of light-transmitting material, a light source sealed within said envelope, and a specular thin infrared-transmitting coating on at least a portion of said envelope, said coating being of such thickness that it reflects incident light originating outside said lamp but is permeable to light generated by said light source.

2. A decorative electric lamp as set forth in claim **1** wherein said specular coating is on the inner surface of said envelope and is substantially coextensive therewith.

3. A decorative electric lamp as set forth in claim **1** wherein; the portion of said envelope with said specular coating is also coated with a layer of colored light-transmitting material, said specular coating is located between said layer of colored material and said light source, and the thickness of said layer of colored material relative to that of said specular coating is such that said layer of colored material transmits a predetermined amount of the light generated by said light source and transmitted by said specular coating.

4. A decorative electric lamp as set forth in claim **2** wherein the outer surface of said envelope is coated with a light-transmitting layer of colored thermosetting plastic.

5. A decorative electric lamp as set forth in claim **1** wherein said specular coating is on the outer surface of said envelope and is covered with a light-transmitting layer of colored material.

6. A decorative electric lamp as set forth in claim **1** wherein; said envelope is of generally spherical configuration and has a neck portion and said light source comprises a filament.

7. A decorative electric lamp as set forth in claim **3** wherein said layer of colored light-transmitting material comprises an exterior coating of cured thermosetting plastic.

8. A decorative incandescent lamp as set forth in claim **6** wherein said filament is located on the axis of said lamp but offset a predetermined distance from the geometrical center of said enevelope toward the neck portion thereof.

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