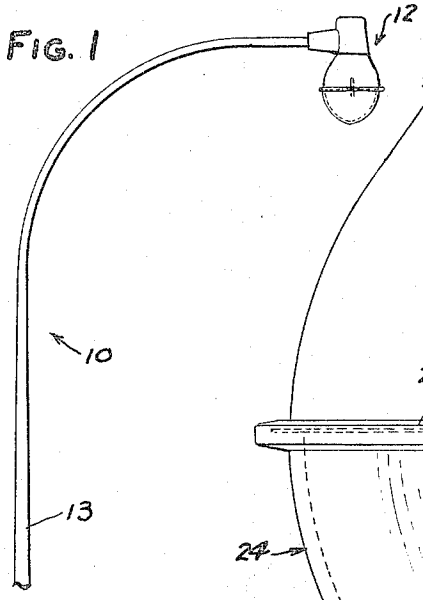
Nov. 8, 1966 J. T. BARNES 3,284,625

OUTDOOR LIGHTING EQUIPMENT

Filed May 8, 1964

FIG. 1



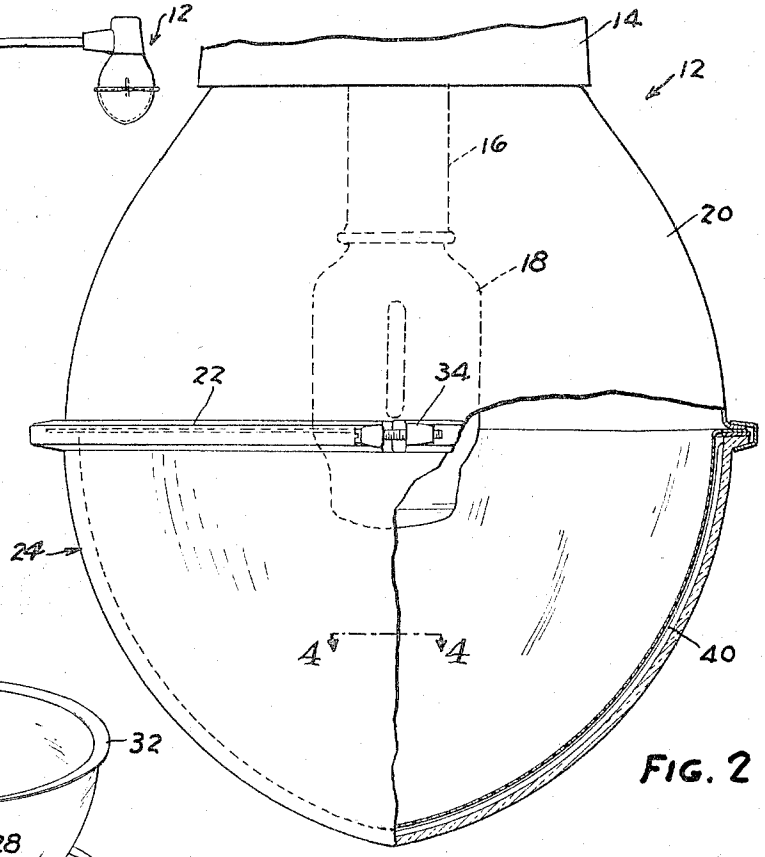


FIG. 2

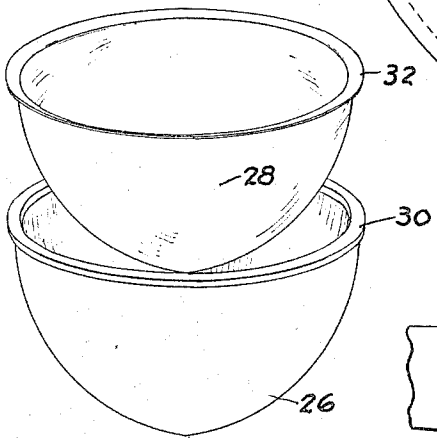


FIG. 3

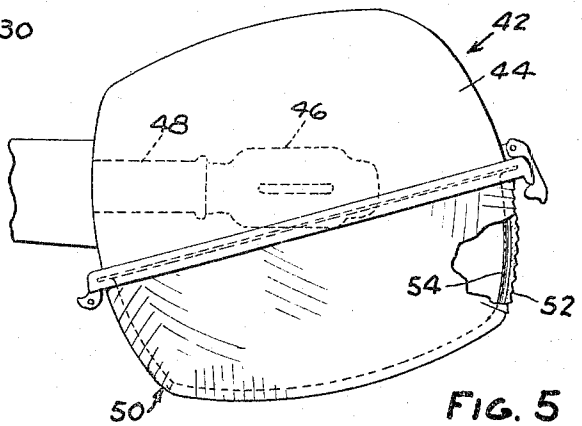


FIG. 5

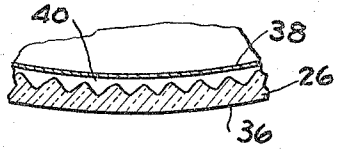


FIG. 4

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OUTDOOR LIGHTING EQUIPMENT

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5 Claims. (Cl. 240—25)

This invention relates generally to equipment for illuminating private or public outdoor areas, streets, and highways. In such equipment, the assembly which comprises the lightbulb or lamp, its accessory equipment, and the glassware is referred to as a luminaire. The invention particularly relates to improvements in the glassware of a luminaire. The glassware referred to is for the purpose of diffusing light from the light source or refracting it into desired light patterns.

Conventionally, this glassware, as the name implies, has been made of glass and is relatively easily cracked or shattered. In urban areas, it is not unusual for public utitlities to spend tens of thousands of dollars each month to replace glassware damaged or destroyed by vandalism. Heretofore, glassware has been made of certain plastic materials. This has not proved satisfactory primarily because the materials used become yellow in time under the effects of ultraviolet radiation received from the light source. This disadvantage is aggravated where the light source is a mercury vapor lamp.

It is possible to slow down this yellowing effect by adding ultraviolet stabilizers to the plastic material but this weakens the plastic material and only delays the time when the glassware must be replaced because of yellowing.

The object of this invention is to provide a simple, relatively inexpensive improved structure which largely eliminates the problems and disadvantages mentioned above.

In general, the invention contemplates making the globe or refractor from a plastic material of sufficient thickness so that it will withstand the abuse of thrown rocks, sling shots, B-B guns, and the like. Within the globe or refractor is an insert made of a thin film of plastic material. This insert conforms to the interior configuration of the globe or refractor and transmits light thereto in undiffused and unrefracted condition. The insert in opaque to ultraviolet radiation which would yellow the globe or refractor. When the insert itself becomes yellowed, it can be removed, disposed of, and a new one substituted in its place. In the accompanying drawings:

FIG. 1 is a partly diagrammatic side elevation of outdoor lighting equipment utilizing the present invention.

FIG. 2 is an enlarged partly diagrammatic generally elevational view of a luminaire incorporating the present invention, portions being shown in section and in phantom to illustrate structural details.

FIG. 3 is an exploded generally perspective view of two components of glassware according to this invention.

FIG. 4 is a fragmentary partly diagrammaatic sectional view on an enlarged scale taken on line 4—4 of FIG. 2.

FIG. 5 is a view similar to FIG. 2 but showing a different type of luminaire incorporating the present invention.

Shown in the drawings is an outdoor lighting fixture **10** comprising a luminaire **12** mounted on a pole **13**. Except for the glassware, luminaire **12** is of conventional construction, having a housing **14** which supports a socket **16** and accessory equipment (not shown) for a lamp **18** which, in the illustrated equipment, is a mercury vapor lamp. The luminaire also includes a reflector **20** at the base of which is a conventional wedge band **22** which supports a globe **24** according to this invention.

Globe **24** comprises an outer element **26** and an inner liner element **28**. Outer element **26** is made of a tough, translucent plastic material such as an acrylic, butyrate, or polycarbonate plastic material. An example of a suitable commercially available acrylic plastic is Plexiglas, a product of Rohm and Haas, of Philadelphia, Pa. An example of a suitable commercially available butyrate plastic material is Tenite II, a product of Eastman Chemical Products, Inc., of Kingsport, Tenn. Examples of suitable commercially available polycarbonate plastic materials are Lexan, which is a product of Chemical Materials Department, General Electric Co., Pittsfield, Mass.; and Merlon, which is a product of Mobay Chemical Company, of Pittsburgh, Pa. Examples of suitable materials for liner element **28** are the acrylic and polycarbonate materials referred to above.

There may be other plastic materials which are suitable for elements **26** and **28**. The principal requirements for the material of outer element **26** are that the material be translucent, tough enough to withstand abuse of thrown rocks, sling shots, B-B guns, and the like when formed into hollow globes or refractors, and resistant to deterioration upon continued exposure to the elements. In general, the polycarbonate materials referred to above meet these requirements more effectively than other plastic materials to date tested by applicant.

The requirements for the material forming liner element **28** are that it be translucent, opaque in relatively thin films to ultraviolet light, and resistant to harmful effects of the heat within globe **24**, which may reach about 240° F. Polycarbonate materials have in general met these requirements more effectively than other materials to date tested by applicant. However, where the luminaire is to be subjected to extremely cold conditions, an acrylic liner may be preferable. In most applications, it is contemplated that the material of liner **28** will be clear and substantially free of diffusing or refracting irregularities. However, the liner material may be tinted or provided with optical properties as required in specific applications.

When elements **26** and **28** are nested, liner **28** fits closely but loosely within outer element **26** and flanges **30** and **32** at their respective upper edges are interengaged. To mount the assembled elements, their superposed flanges are engaged within wedge band **22** as shown in FIG. 2 and the wedge band is then tightened by means of a threaded clamp **34**. In the globe illustrated, element **26** has an outer side **36** which is smooth and an inner side **38** provided with small diffusing prisms as shown in FIG. 4. Liner **28** is disposed between outer element **26** and lamp **18**.

In a commercially satisfactory unit, outer element **26** is formed out of a polycarbonate plastic material and has a wall thickness of about .080". The outer element is formed by injection molding. Liner **28** is also formed of a polycarbonate plastic material. Its wall has a minimum thickness of about .001" but may be considerably thicker depending on whether the cost of the plastic is a material factor in manufacture. A commercially satisfactory liner **28** is made by vacuum molding a film of polycarbonate material which is about .008" thick to begin with, the resulting liner having a thickness ranging down to .002" or .003".

Where liner **28** is made of an acrylic plastic material, its wall thickness in general must be somewhat thicker than that of a liner made of polycarbonate plastic material since the acrylic plastic is not as tough in thin films as the polycarbonate plastic and is somewhat more difficult to handle. In a commercially satisfactory unit, an acrylic liner has a wall thickness of about .010" to .012".

In use, liner **28** has sufficient thickness to be opaque to ultraviolet radiation from lamp **18** which would yellow

the wall of outer globe element **26**. In time, liner **28** itself becomes yellowed, but when this happens wedge band **22** is merely removed, the old liner disposed of, and a new one added in its place. Original outer element **26** continues in use. The cost of a liner **28** is but a very small fraction of the cost of outer globe member **26**.

The close but loose fit of liner **28** within the outer globe element provides a thin insulating air space **40** shown in exaggerated form in FIGS. 2 and 4. This space is thin enough to permit adequate heat dissipation to prevent the interior of the luminaire from becoming overheated but is also adequate to protect outer element **26** from the heat of lamp **18**. Since liner **28** is very thin and relatively flexible, it may contact the inner light diffusing prisms of outer element **26** at some locations. However, these regions of contact are very limited and the insulating air space is adequate for the purposes described.

Since liner **28** over the major portion of its area is out of actual contact with the interior of outer element **26**, it is relatively invisible from the outside. In actual use, it has been found that it takes at least fifty percent longer for the liner to become objectionably yellowed than it would take for an unlined element **26** to become visibly yellowed to an objectionable extent. This means that the acceptable life of a liner is at least fifty percent longer than would be the acceptable life of an unlined element **26**. Where a film material used to make liner **28** is provided with an additive to stabilize it against the effects of ultraviolet light, the effective life of the liner can be even further increased.

Originally, it was expected that the use of liner **28** would result in a light transmission loss of about 6 percent. In actual use, this has not happened. The actual light transmission loss is only about one percent utilizing either the acrylic or polycarbonate liner. This effect is not thoroughly understood, but it is believed that the "wasted light" is ultimately reflected out of the luminaire by reflector **20**.

Liner **28** is substantially imperforate and provides a shield or dust pan which protects interior **38** of outer element **26** from accumulations of dust, dirt, and other foreign matter. This either eliminates or greatly reduces the necessity of periodically washing the interior of outer element **26**.

Shown in FIG. 5 is a horizontal burning luminaire having a reflector **44** which houses a bulb **46** and its socket **48**. The glassware **50** is constructed similarly to globe **24** except for having appropriate configuration and optical characteristics for a horizontal burning luminaire. Glassware **50** has an outer element **52** corresponding to outer element **26** and a liner **54** corresponding to liner **28**, these elements cooperating in the manner described above.

I claim:

1. For a luminaire having a light source and light-transmitting means held by support means in light-transmitting relation to the light source, improved light-transmitting means comprising,

a bowl-shaped, form-retaining element made of a tough, weather-resistant, translucent plastic material, said element having an inner side and an outer side,

a bowl-shaped film made of a heat-resistant, translucent plastic material, said film having a thickness of at least about 1 mil and being substantially opaque to ultraviolet radiation,

said film being separate from said element and being removably insertable within said element,

said element and film being dimensioned and configured to be mounted in light-transmitting relation to the light source of a luminaire with which they are adapted to be used with said inner side disposed toward the light source and said film positioned between said inner side and light source,

said film being dimensioned and configured to fit closely but loosely within said element,

and said improved means including positioning means effective when the same is so mounted on a luminaire to position said film within said element so that a thin insulating air space is provided between said film and said inner side of said element.

2. The improved light-transmitting means defined in claim **1** wherein the portions of the film disposed between the light source and said inner side are substantially imperforate so that said film provides a removable shield which protects said inner side from accumulations of dust and the like.

3. The improved means defined in claim **1** wherein each of said element and film has an open side adjacent which is a peripheral flange, the flange of said film engaging the flange of said element when said film is inserted in said element, the interengaged flanges providing said positioning means.

4. The improved means defined in claim **1** wherein said film has a thickness in the range from about .001" to about .012".

5. The improved means defined in claim **1** wherein each of said element and film has an open side adjacent which is a peripheral flange, the flange of said film being engaged against the flange of said element when said film is inserted within said element, said interengaged flanges providing said positioning means,

said film having a thickness in the range from about .001" to about .012",

the portions of the film disposed between the light source of a luminaire and said inner side being substantially imperforate so that said film provides a removable shield which protects said inner side from accumulations of dust and the like.

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