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AIRPORT MARKER WITH FLEXIBLE SUPPORT

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2 Sheets-Sheet 1

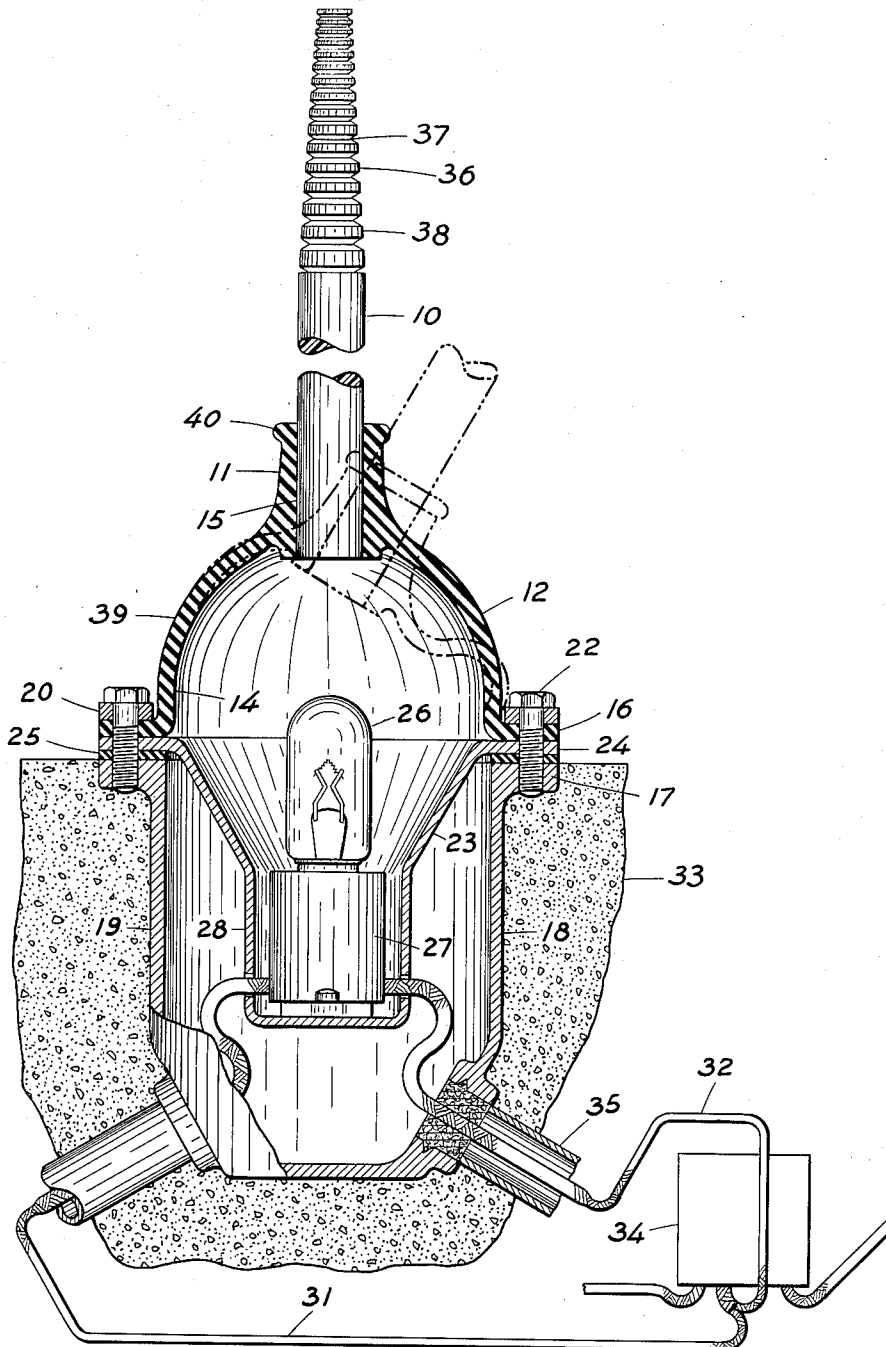


Fig. 1

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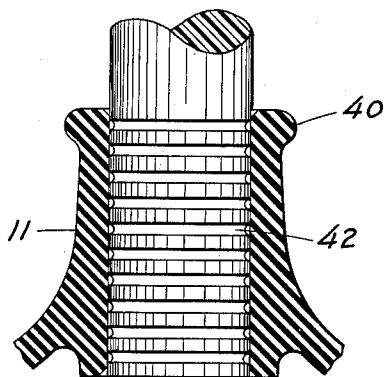


Fig. 4

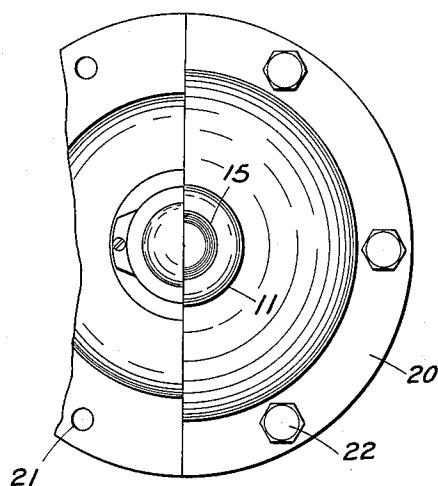


Fig. 2

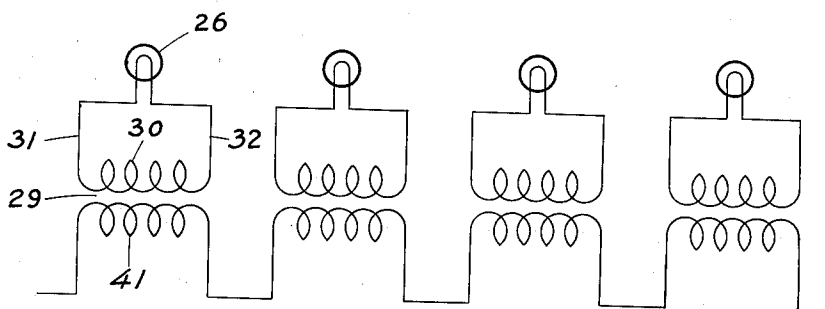


Fig. 3

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AIRPORT MARKER WITH FLEXIBLE SUPPORT

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This invention relates to airport markers, or lights, particularly markers used to indicate the boundaries of taxiways, used in conjunction with runways on airports.

The conventional types of taxiway light used for airports are divided into two general types.

One type of light, or marker, is supported by a cast iron or steel base, which is imbedded in a concrete block, with a column mounted in a cap attached to the base, the column supporting a light and a diffuser, or shade, which is mounted near the top thereof, the column, light and diffuser being above the ground level.

With this type of light construction, the light support columns, and the lights themselves, are frequently broken, or badly damaged, when they are struck by the wheels of airplanes, taxiing in at the end of a landing, or by trucks of various types, tractors and other vehicles, used either in loading the airplane, or in maneuvering it on the ground, while the airplane is being unloaded, loaded, or serviced preparatory to a trip.

This necessitates not only costly replacement, when one or more lights are broken on a taxiway, but also frequently results in damage to both airplanes and various types of supply vehicles, due to inadequate marking after some of the lights or markers are broken, until they are replaced.

In another type of light construction, the same type of base is imbedded in a concrete block, a flange located at the top of the base, projecting a short distance above the top of the concrete, a light bulb mounted in the base projecting above the top of the base, with a cover made of heavy glass, or other relatively transparent or translucent material, attached to the top of the base, the center of the cover being above the bulb.

With this type of construction, even a relatively light snowfall, tends to submerge the glass cover, thus sharply reducing, or obscuring entirely the light from the marker. The same condition may also be caused by an accumulation of mud or dirt, blown across the airport by winds, or deposited on the lights by streams of rain water which carry with them parts of the soil, or other parts of the airport, during and after a rainstorm.

Such lights are also subject to frequent cracking and breakage, when trucks and other vehicles drive over them, during the process of loading and servicing of airplanes.

Despite the greater tendency to damage or injury, the elevated type of light, in which a supporting column is used, is generally preferred to the other types, due to the superior illumination, and the fact that the light remains visible under a wider range of weather and operating conditions.

The primary object of my invention is to provide a marker which will project a considerable distance above the level of the concrete or taxiway, the marker standard being mounted in a flexible support, in such a manner that when it is struck by an airplane wheel, or by the wheels of another type of vehicle, the light standard, and support, therefor, will be deflected from their normal po-

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sition, the standard returning to its normal position after the wheel of the vehicle is removed.

A further object is to provide a marker, the light bulb for which is mounted under the top of the base, so that it will not be injured or broken, even though the projecting standard or support, thereof, is struck by the wheels of the airplane or other vehicle.

A further object is to provide a flexible support for a taxiway marker, a flange formed at the bottom of the support, serving as a gasket or seal, to prevent the flow of moisture into the light sockets and the wires, mounted in the base underground.

Another object is to provide a marker upper structure, which can be used interchangeably with the conventional type of taxiway light base, thus sharply reducing the cost of replacement and installation.

The accompanying drawings, illustrative of one embodiment of my invention, and a modification thereof, together with the description of its construction and the method of operation, and utilization thereof, will serve to clarify further objects and advantages of my invention.

In the drawings:

Fig. 1 represents a vertical section through the assembled airport marker and the mounting base therefor.

Fig. 2 is a partial plan view of the assembled unit, and a partial plan view of the base of the unit, with the flexible support removed.

Fig. 3 represents a schematic wiring diagram of a line of markers, shown in Fig. 1, and the transformers used in conjunction therewith.

Fig. 4 is a vertical section through a modification of the marker standard, shown in Fig. 1, and the neck of the flexible support.

It will be understood that the following description of the construction and operation of the airport marker with flexible support, is intended as explanatory of the invention and not restrictive thereof.

In the drawings, the same reference numerals designate the same parts throughout the various views.

One embodiment of the marker, shown in Figs. 1 and 2, comprises a substantially cylindrical marker standard 10, made of Lucite, or other suitable transparent plastic material, the lower end of the standard being fitted into an opening formed in the neck 11, of a flexible support 12, made of rubber composition or other suitable flexible material.

The flexible support comprises, essentially, a hollow thin-walled substantially hemispherical body 14, with a frusto-conical neck 11, having an opening 15, cut through the center thereof, formed integral with the top of the body.

A substantially circular flange 16, is formed integral with the bottom of the support body 14, the outer diameter of the flange being substantially equal to that of the upper flange 17, of a base 18, on which the support is mounted.

The base 18, which is interchangeable with the conventional type of base used for airport marker lights, comprises a substantially cylindrical, thin-walled shell 19, having a flange 17, formed integral with the upper section thereof.

An annular clamping ring 20, made of flat steel, or other suitable material, is mounted above the flange 16 of the support 12, to press the support flange against the flange 17, of the base, and retain the support in position. The outer diameter of the clamping ring 20, is substantially equal to that of the flange 16, of the support, a circular hole formed through the center of the ring clearing the outer diameter of the body 14 of the support. The ring enables the support and standard to be removed,

as a unit, to replace a light bulb, mounted in the base, as hereinafter described.

A plurality of openings 21 is cut through the clamping ring 20 and the support flange 16, between the inner and outer circumference of the clamping ring, a plurality of bolts or screws 22, threadably attached to the upper flange of the base, fitting through the openings 21, to clamp the clamping ring and the support flange to the base.

A light support bracket 23, having a flange 24, formed integral with the upper end thereof, is mounted in the center of the base 18, the flange 24, of the light support bracket, being located between, and mounted in substantial alignment with the flanges 16 and 17, of the support and the base, respectively.

A thin circular gasket 25, made of sheet rubber, or other suitable gasket material, is interposed between the flange of the light support bracket, and the flange 17 of the base, to seal the flange of the base, and prevent the seepage of moisture into the base.

The ring 20, in clamping the support flange 16 to the flange 17 of the base, similarly presses the flange against the upper flange 24, of the light support bracket, thus providing a seal against the upper surface of the bracket flange. The support flange 16 and the gasket 25, thus effectively seal the flanges leading to the interior of the base and the lamp support bracket, respectively, thereby preventing the seepage of moisture into the unit.

The bolts 22, which clamp the support flange 16 to the flange 17 of the base, pass through a series of openings formed in the flange 24, of the light support bracket, and in the gasket 25, respectively, the bolts compressing the flange 16 of the support and the gasket 25, simultaneously, in clamping the support flange to the base.

A light bulb 26, of cylindrical form, or the conventional substantially spherical type of bulb, is mounted below the standard, the bulb being threadably fitted to a socket 27, mounted in the substantially cylindrical lower section 28, of the light support bracket, the socket being supported by the base of the bracket.

In mounting the units, the current for the lights is fed through a plurality of small individual transformers 29, which are connected in series, to step down the transmission voltage, which would be as high as 2400 volts, to the voltage required for individual light bulbs, which is generally 110 volts.

The individual light bulbs are connected to the secondary circuit 30, of the individual transformer, by a pair of leads 31 and 32, connecting the secondary transformer terminals to the terminals attached to the light socket, as indicated in Fig. 1.

The base 18 is imbedded in a concrete, or other suitable form of block 33, the upper surface of the block being in substantial alignment with the level of the concrete taxiway.

The transformers 29 are generally small units, mounted inside the base 18, or a separate transformer, mounted in a box 34, which is buried in the ground, near the corresponding base, may be provided for each unit.

Where an external transformer is used, conduits 35 are provided at the inlet and outlet end of the base, the opening at the center of each of the conduits being packed with oakum, cotton waste, or other suitable packing material, at the inner end thereof, to seal the opening around each of the lead lines 31 and 32.

In assembling the standard to the opening in the neck of the support, rubber cement, or other suitable adhesive material would be applied between the outer circumference of the standard, and the interior of the neck, to effectively grip the standard and seal the opening, to prevent the seepage of moisture into the support.

The upper end of the standard is tapered 36, as indicated in Fig. 1, a plurality of annular grooves 37, being formed around the outer circumference of the tapered upper section, to concentrate the light, transmitted from the bulb, through the cylindrical section of the standard, thus accentuating the light in the annular bands 38, formed

in the tapered end of the light standard, between the grooves 37, and providing a readily visible light concentration area, having a distinguishing pattern, which is readily visible from the air, or to vehicles on the ground.

The light waves from the bulb 26, are projected upward through the cylindrical standard, and while they are visible over the entire length of the standard, they are primarily concentrated in the annular bands 38, formed in the tapered section, at the upper end of the light standard. The tapered area at the top is therefore readily visible over a considerable distance.

When the projecting portion of the unit, either the support, or the marker standard is struck by the wheel of an airplane, or other vehicle, the flexibility of the support allows it to bend to the position indicated in dot-dash lines, Fig. 1, or to any greater angular position, the body of the support being temporarily distorted, as indicated, by the angular movement of the standard.

After the pressure is relieved, the standard and the support member revert to their normal position, shown in Fig. 1.

The wall 39, of the body of the support, is either of uniform thickness throughout, or it may be tapered, the upper portion of the wall, approaching the neck, being considerably thinner than the lower portion, near the bottom flange to strengthen the area adjacent the flange, and increase the flexibility of the upper portion, thus providing greater angular deflection of the standard and the support body.

As indicated in Figs. 1 and 4, a bead 40, is formed integral with the upper end of the neck 11, of the support, to strengthen the neck at the open end thereof.

In the wiring diagram, shown in Fig. 3, the current is fed from the source, to the primary transformer coils 41, which are connected in series.

The secondary coils 30, of each transformer, are connected to the individual light bulbs 26, by the leads 31 and 32 as hereinafter described.

Fig. 4 shows a modification of the bottom of the standard, shown in Fig. 1. A plurality of spaced grooves 42, of semi-circular or other suitable cross-section, is cut through the outer circumference of the standard. The cement, or other adhesive material, used to bind the standard to the neck of the support, is thus concentrated in the grooves formed in the standard, thus increasing the bond between the standard and the neck of the support and firmly gripping the standard within the support.

In place of the transformers, hereinbefore specified, the current could be supplied by a 110 volt, or a 220 volt line, directly to the socket, and the lamp bulb, fitted thereto.

By using the conventional type of base and mounting, and substituting a clamping ring 20, a flexible support 12, and a gasket 25, for the conventional type of cap, used in the conventional flush, or elevated type of airport marker light, the above described unit can be substituted in place of the conventional fixed types of marker lights, thus providing a flexible unit which will withstand considerable striking and jarring, thereby sharply reducing the breakage in lights of this type, particularly in the elevated type of light.

A light bulb 26 and a socket 27, as indicated in Fig. 1, would be substituted in place of the conventional light bulb and socket, or the transparent plastic marker standard could be mounted above, and in substantial alignment with the conventional type of light bulb, the installation and operation of the unit being substantially as hereinbefore described.

The height of the marker standard could be varied considerably, depending upon the requirements of a particular installation.

The diameter of the body of the marker standard would depend to some extent upon its height, and would be varied, depending upon the height of the standard, and the strength and light intensity required.

The length and included angle of the tapered section

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36, formed at the top of the standard may be varied considerably, depending upon the size of the light concentration area required.

The size and contour of the grooves 37, formed in the tapered section, and the spacing thereof, may be varied considerably, thus increasing or decreasing the width of the bands formed between the grooves.

The interior of the neck 11 of the support, into which the standard is fitted, may be smooth, or a plurality of grooves or depressions may be formed therein, to concentrate the bonding area in which the cement, or other adhesive material, is concentrated, in order to increase the bond between the standard and the support.

The height and contour of the body 14, of the support member, may be altered considerably, the height being increased to increase the flexibility of the support, and the range of the angular movement of upper portion of the unit.

While designated herein as an airport marker light, the light standard 10, the flexible support 12, the light bulb 26, and the socket, therefor, may be mounted on an elevated, decorative, or other type of base, in place of the underground base, hereinbefore described, the unit being suitable for operation as a lighting unit for advertising, or other purposes, for which a unit of this essential type is generally suitable.

In this type of installation, the form, contour and flange of the flexible support may be altered to fit the base used, and suit the requirements of a particular installation, or purpose.

In installations of this type, the current would be supplied directly to the light bulb, by a 110 volt line, the transformers for stepping down the transmission voltage being eliminated.

It will be apparent to those skilled in the art that my present invention is not limited to the specific details described above and shown in the drawings, and that various modifications are possible in carrying out the features of the invention without departing from the spirit and scope of the appended claims.

What I claim is:

1. An airport marker comprising a substantially cylindrical standard, made of a transparent plastic material, the upper end of said standard being of frusto-conical form, said frusto-conical upper end having a plurality of grooves around the outer circumference thereof, to provide a plurality of separated bands, a flexible support mounted in axial alignment with said standard, one end of said support having a substantially cylindrical neck formed integral therewith, said neck having a circular opening formed therethrough to receive the standard, means attaching said standard to the wall surrounding said opening, a flange formed integral with the opposite end of said flexible support, a base having a central opening through the upper end thereof, mounted in substantial axial alignment with the support, means clamping said support flange to the base, means sealing the base opening, and a light source mounted within said base in axial alignment with the standard, said light source projecting light rays through the standard to the frusto-conical upper end thereof.

2. An airport marker comprising a substantially cylindrical standard, made of a transparent plastic material, a flexible support mounted in axial alignment with said standard, one end of said support having a substantially cylindrical neck formed integral therewith, said neck having a circular opening formed therethrough to receive the standard, means attaching said standard to the wall surrounding said opening, the exposed end of said standard being of substantially frusto-conical form, said frusto-conical end having a plurality of grooves cut through the outer circumference thereof to provide a plurality of distinguishing bands, a flange formed integral with the opposite end of said flexible support, the body of said flexible support, between the neck and the flange,

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being of arcuate contour, the diameter of the flexible support body being progressively reduced from the flange to the neck, a base mounted in axial alignment with the support, an annular ring, surrounding the body adjacent the flange, fitted to said flange, a light support bracket mounted within said base, means demountably clamping the ring, support flange and bracket to the base, the support flange sealing the opening in the bracket and the base, a light bulb and socket fitted to said bracket in substantial axial alignment with the standard, said bulb projecting light rays through the standard, the frusto-conical end of said standard concentrating said light rays.

3. A lighting unit comprising a hollow base having a mounting flange formed thereon, a flexible support having an integral circular compressible flange formed at one end thereof, said flexible support having a substantially cylindrical neck formed at the opposite end thereof, the upper end of said neck having a bead integral therewith, a body of arcuate contour connecting the flange and neck and formed integral therewith, said neck having a circular opening formed therethrough, a substantially cylindrical standard, made of a transparent plastic material, fitted to said neck opening, in substantial axial alignment with the support, means attaching said standard to the wall surrounding said opening, an annular ring, surrounding the body adjacent the flange, fitted to said flange, a light support bracket mounted within said base, said bracket having a flange formed integral therewith, a plurality of bolts fitted through said ring and flanges, demountably clamping the ring, support flange and bracket flange to the base, the support flange sealing the opening in the bracket, means sealing the opening in the base, a socket mounted in said light support bracket, and a light bulb, threadably fitted to said socket in substantial axial alignment with the standard, said bulb projecting light rays through the standard.

4. A lighting unit comprising a hollow base having a flange formed thereon, a flexible support having a flange formed at one end thereof, said flexible support having an integral circular compressible substantially cylindrical neck formed at the opposite end thereof, the upper end of said neck having a bead integral therewith, a body of arcuate contour connecting the flange and neck, and formed integral therewith, the diameter of the flexible support body being progressively reduced from the flange to the neck, said neck having a circular opening formed therethrough, a substantially cylindrical standard, made of a transparent plastic material, fitted to said neck opening, in substantial axial alignment with the support, means attaching said standard to the wall surrounding said opening, the exposed end of said standard being of substantially frusto-conical form, said frusto-conical end having a plurality of grooves cut through the outer circumference thereof to provide a plurality of distinguishing bands, an annular ring, surrounding the body, adjacent the flange, fitted to said flange, a light support bracket mounted within said base, said bracket having a flange formed integral therewith, a plurality of bolts threadably fitted to the base flange, demountably clamping the ring, support flange and the bracket flange to the base, the support flange sealing the interior of the bracket and the base, a socket supported by said bracket, and a light bulb threadably fitted to said socket, in substantial axial alignment with the standard, said bulb projecting light rays through the standard, the bands formed in the frusto-conical end of said standard concentrating the light rays from said bulb.

5. A marker unit comprising a hollow base having a mounting flange of substantially circular contour, a flexible support having a compressible circular flange formed integral with one end thereof, removably attached to the flange of the base, said support having a substantially cylindrical neck formed at the opposite end thereof, a body of arcuate contour connecting the

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flange and the neck, and formed integral therewith, said neck having a circular opening formed therethrough, a substantially cylindrical standard, made of a transparent plastic material, fitted to said neck opening in substantial axial alignment with the support, an annular ring, surrounding the body adjacent the flange, fitted to said flange, a light support bracket fitted to said base, said bracket having a flange formed integral therewith, a plurality of connecting elements fitted through said ring and the flanges, demountably clamping the ring, support flange and the bracket flange to the base, the support flange sealing the opening in the bracket, means sealing the opening in the base, a socket mounted in the light support bracket, a light bulb threadably fitted to the socket, in substantial axial alignment with the standard, said light bulb projecting light rays through the standard to the opposite extremity thereof.

6. An airport marker comprising a substantially cylindrical standard, made of a transparent plastic material, a flexible support mounted in axial alignment with said standard, one end of said flexible support having a substantially cylindrical neck formed integral therewith, the upper end of said neck having a bead integral therewith, said neck having a circular opening formed therethrough, to receive the standard, the portion of said standard, fitted to the neck opening, having a plurality of grooves formed around the circumference thereof, an adhesive material, applied to said grooves and around the opening, attaching the standard to the wall of the neck, the exposed end of said standard being of substantially frusto-conical form, said frusto-conical end having a plurality of grooves cut through the outer circumference thereof, to provide a plurality of distinguishing bands, a flange formed integral with the opposite end of said flexible support, the body of said support, connecting the neck and the flange, being of arcuate contour, the diameter of the flexible support body being progressively reduced from the flange to the neck, a base mounted in axial alignment with the support, an annular ring, surrounding the body, adjacent the flange, fitted to said support flange, a light support bracket fitted to said base, said bracket having a flange formed integral therewith, a gasket interposed between the bracket and base flanges, means demountably clamping the ring, support flange and bracket flange to the base, the support flange sealing the opening in the bracket, the gasket sealing the opening in the base, a light bulb and socket fitted to said bracket in substantial axial alignment with the standard, said bulb projecting light rays through the standard, the frusto-conical end of said standard concentrating the light rays.

7. A marker unit comprising a hollow base having a mounting flange of substantially circular contour formed integral therewith, a flexible support having a compressible circular flange formed integral with one end thereof, said flexible support having a substantially cylindrical neck formed at the opposite end thereof, the upper end of said neck having a bead integral therewith, a body of arcuate contour, connecting the flange and neck, and formed integral therewith, the diameter of the flexible support body being progressively reduced from the flange to the neck, said neck having a circular

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opening formed therethrough, a substantially cylindrical standard, made of transparent plastic material, fitted to said neck opening, in substantial axial alignment with the support, means attaching said standard to the wall surrounding said neck opening, an annular ring, surrounding the body adjacent the flange, fitted to said flange, a light support bracket fitted to said base, said bracket having a flange formed integral therewith, a plurality of bolts, threadably fitted to said base flange, demountably clamping the ring, support flange and bracket flange to the base, a gasket interposed between the bracket and base flanges, the support flange sealing the opening in the bracket, the gasket sealing the opening in said base, a socket mounted in the light support bracket, and a light bulb threadably fitted to the socket, in substantial axial alignment with the standard, said bulb projecting light rays through the standard.

8. A lighting unit comprising a hollow base having a mounting flange of substantially circular contour formed thereon, a flexible support having a compressible circular flange formed integral with one end thereof, said support having a substantially cylindrical neck formed at the opposite end thereof, a body of arcuate contour connecting the flange and neck, and formed integral therewith, said neck having a circular opening formed therethrough, a substantially cylindrical standard, made of a transparent plastic material, fitted to said neck opening, in substantial axial alignment with the support, an adhesive material deposited on the standard and the wall surrounding the neck opening, attaching said standard to the wall of the neck, the exposed end of said standard being of substantially frusto-conical form, said frusto-conical end having a plurality of grooves cut through the outer circumference thereof to provide a plurality of distinguishing bands, an annular ring, surrounding the body, adjacent the flange, fitted to said flange, a light support bracket, a portion of the bracket being mounted within said base, said bracket having a flange formed integral therewith, a plurality of bolts threadably fitted to the base flange, demountably clamping the ring, support flange and bracket flange to the base, a gasket interposed between the bracket and base flanges, the support flange sealing the opening in the bracket, the gasket sealing the opening in the base, a socket supported by said bracket, and a light bulb threadably fitted to said socket, in substantial axial alignment with the standard, said bulb projecting light rays through the standard, the bands formed in the frusto-conical end of the standard concentrating the light rays.

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