April 5, 1960 G. J. WAGENHAUSER 2,931,895

LIGHTING ASSEMBLY

Filed March 10, 1958

FIG. 1.

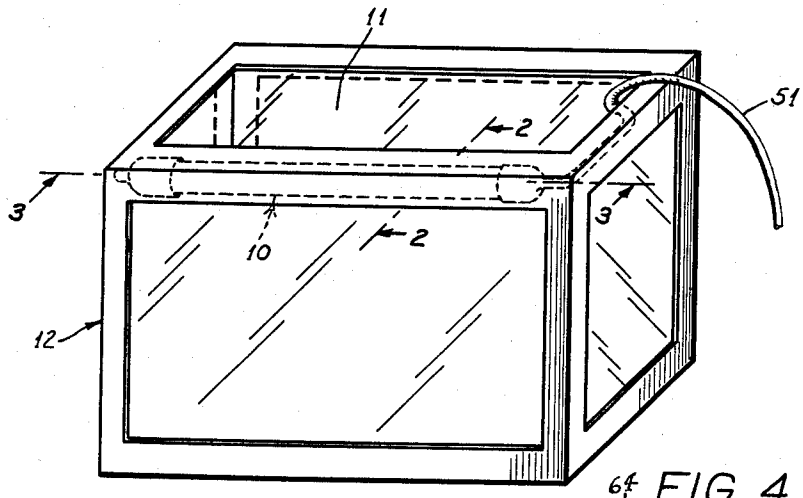



FIG. 2.

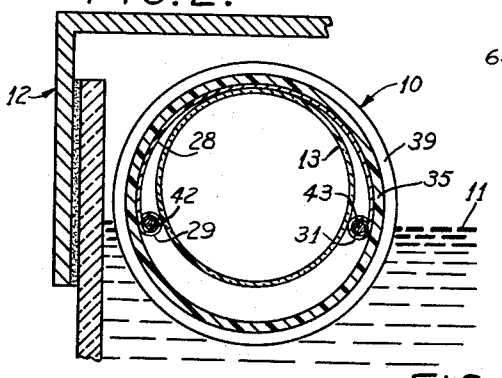



FIG. 4.

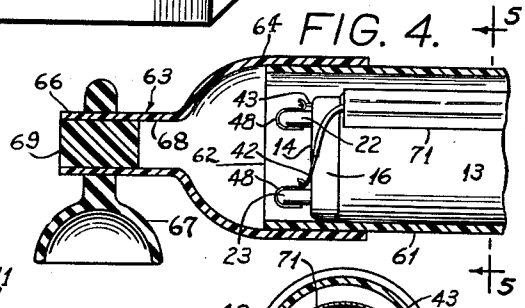



FIG. 5.

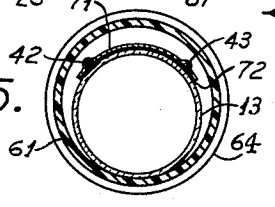
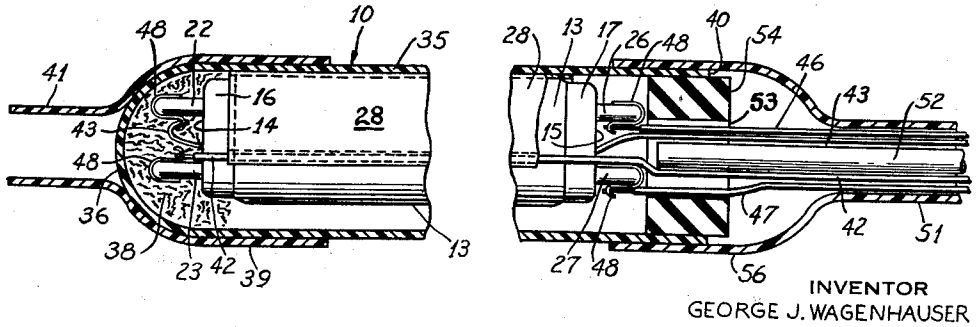



FIG. 3.




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# LIGHTING ASSEMBLY

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3 Claims. (Cl. 240—11.4)

The present invention relates generally to a lighting assembly, and it has specific relation to a lighting assembly of the type that can be used to illuminate liquids in a vessel, such as aquariums, tanks and the like.

Heretofore, there have been many different forms of lighting assemblies for illuminating liquids in vessels, such as aquariums, storage tanks, mixing tanks and the like, but in each instance the light was mounted outside of the liquid in the tank, and frequently within a top hood having built in light reflecting features. These forms of lighting assemblies had many disadvantages in that there was a considerable loss of illumination due to the reflection of the light on the surface of the liquids, and, when mounted high above the liquid in the tank, caused a silhouette effect over portions of the tank. Such mountings also caused condensation on the interior of the cover or reflecting hood, forming droplets which gravitated into the liquid causing contamination of the same. These reflecting hoods further presented a problem in cleaning.

With the present invention, all of the foregoing disadvantages are obviated, and a tubular lighting assembly is provided that may be floated or submerged in the liquid of a vessel. A floating or submerged lamp will permit positioning advantageously in the tank in such a manner as to eliminate silhouette effects, and direct the light beams through the liquid below its reflecting surface.

An object of the present invention is to provide a simple, durable and inexpensive lighting assembly that may be either floated or submerged for illuminating a liquid in a vessel.

Another object of the invention is the provision of a lighting assembly having a reflector adapted to conceal the necessary electric wires required to conduct electrical energy to an opposite end of a light tube.

A further object of the invention is to provide a lighting assembly, employing a conventional elongated lamp, as for example, an incandescent, fluorescent, ultraviolet or germicidal tube, in a simple, efficient and compact manner, which may be used in a floating or submerged position within the liquid contents of a vessel.

Another object of the invention is the provision of a simple, durable, efficient and sealed lighting assembly in which the light beams are directed below the reflecting surface of a liquid to be illuminated.

Other and further objects and advantages of the invention, which result in simplicity, economy and efficiency, will be apparent from the following detailed description, reference being had to the accompanying drawings forming a part hereof, wherein like numerals indicate like parts, in which:

Figure 1 is a perspective view of a vessel in the form of an aquarium, showing one manner in which a floating lighting assembly constructed in accordance with the invention, may be employed to illuminate its liquid contents.

Figure 2 is an enlarged fragmentary cross-sectional



view of the lighting assembly shown in Figure 1, the same having been taken substantially along the line 2—2 thereof, looking in the direction of the arrows;

Figure 3 is a longitudinal fragmentary sectional view on an enlarged scale, of the lighting assembly shown in Figure 1, the same having been taken substantially along the line 3—3 thereof, looking in the direction of the arrows;

Figure 4 is a fragmentary longitudinal sectional view of a modified form of the invention, in which the lighting assembly is enclosed within a cylindrical housing member open at both ends and having a reflector mounted on its light tube by means of an adhesive; the illustration also shows how the assembly may be mounted in a submerged position by the use of conventional suction cups; and

Figure 5 is a cross-sectional view of the modified form of lighting assembly shown in Figure 4, the same having been taken substantially along the line 5—5 thereof, looking in the direction of the arrows.

Referring now to the drawings, and particularly to Figure 1 thereof, there is shown a lighting assembly **10** constructed in accordance with the principles of the invention floating on water **11** within an aquarium **12** having an elongated lamp or tube. The lighting assembly **10** may be equipped with any desirable type of light bulb **13**, as for example, incandescent, fluorescent, ultraviolet, germicidal or any other kind of lamp required for any particular purpose, without departing from the spirit of the invention.

Referring now to Figures 2 and 3, the invention is illustrated with an elongated bulb **13**, having the conventional construction of a fluorescent tube, and consists of a glass tubular member **13** which is hermetically sealed at its opposite ends by metal caps **14** and **15**, having annular flange mounting rings **16** and **17**, respectively. The cap **14** is provided with a pair of spaced electrical terminals **22** and **23**, and the opposite cap **15** is likewise provided with a pair of similar electrical terminals **26** and **27**.

The tube or bulb **13** must be provided with a suitable reflector **28**, which will serve to direct the light beams in any desired direction. The reflector **28** may be made of any suitable material, as for example, paper treated reflectively, metal foil, opaque plastic, polished metals and the like. In the construction of Figures 2 and 3, the reflector **28** is shown made of a polished metal, which has its longitudinally extending side edges **29** and **31** curled upon themselves to provide a passageway on opposite sides thereof for receiving and concealing the necessary electric wires for the terminals **22** and **23**.

If the reflector **28** has been made of an elastic material, such as spring metal, resilient plastic and the like, having an inherent ability to expand and contract under pressure, it may be mounted to cling snugly to the outer surface of the light tube **13** without the use of unsightly fastening members. Of course, the reflector **28** must cover at least more than one-half of the arcuate perimeter of the light tube **13** so that the distance between its opposing sides edges **29** and **31** is less than the diameter of said light tube. This construction will require the reflector **28** to be expanded over the light tube **13** and insure a tight attachment to the same under its own contraction.

In the lighting assembly shown in Figures 1 to 3, the light tube **13**, and its reflector **28**, are mounted within a suitable transparent tubular housing member **35**, which is in the form of a conventional glass test tube of sufficient diameter and length to receive and enclose slidably and snuggly said light tube **13** and its mounted reflector **28**. The tubular housing member **35**, being of a conventional test tube construction, has one closed end,

as indicated at 36. Before the light tube 13 and its mounted reflector 28 is positioned within said housing member 35, it is advisable to pack said closed end 36 with a small quantity of a shock insulating material 38, such as rock wool, fibre glass and the like, which are non-conductors of electricity. The purpose of the shock insulating material 38 is to provide cushioning means for the free end 14 of the light tube 13 and to prevent its direct contact with the surface of the housing member 35 when handled roughly.

The closed end 36 of the tubular test tube housing member 35 is adapted to be provided with a suitable plastic covering cap 39, which, in the illustration shown, has a hollow axial extension 41. The annular cap 39 will serve to absorb shocks and prevent the glass test tube from becoming easily broken. The hollow extension 41 is relatively short and serves as a suitable fastening means for securing that end of the lighting assembly in a submerged position within the liquid 11 of the tank 12, as it provides means for engagement by a conventional suction cup or other fastening device (not shown). The material of which the cap 39 is formed and the manner of mounting the same on the housing member 35 will be described hereinafter, as they are the same as that employed in closing the opposite end of said housing member.

Referring again to Figure 3, it will be noted that the opposite end of the tubular housing member 35 is open, as indicated at 40. The light tube 13 has four electric terminals 22, 23, 26 and 27, which require suitable connection with an outside source of electrical energy through a conventional starter, ballast, switch, etc. (not shown). Therefore, four lead-in wires 42, 43, 46 and 47 must be provided for said terminals 22, 23, 26 and 27, respectively. A conventional resilient connector 48 is mounted releasably on the end of each of the wires 42, 43, 46 and 47, and provides readily adaptable means for mounting the same removably on their respective terminals 22, 23, 26 and 27.

It is obvious that the open end 40 of the test tube housing member 35 must be closed in a liquid tight manner, and that the lead-in wires 42, 43, 46 and 47 must be similarly covered with a material that is impervious to liquids. A suitable covering is a plastic material that is unaffected by water, acids, alcohols, oils and other liquid materials, and one that is stretchable when heated and will contract when allowed to cool. Vinyl plastics are such kind of material, but, of course, other suitable materials may be used if desired.

The lead-in wires 42, 43, 46 and 47 are mounted within a plastic tube 51 of suitable length to lead from the lighting assembly 10 in the vessel 12 to an outside source of electric energy (not shown). Since these wires 42, 43, 46 and 47 are generally made up of a plurality of strands of relatively fine wires, having no rigidity, and since the plastic tubing material 51 has insufficient rigidity to maintain any position, it cannot be given an arrangement and expected to remain in such arrangement. Therefore, it is necessary to provide suitable means for making the tube 51 deformable but form-retaining in any desired position. This may be accomplished by inserting within the tube 51 and among the wires 42, 43, 46 and 47 a heavy gauge insulated electric wire 52, whose conductor is a solid wire core, which has sufficient flexibility to be deformed into a particular shape and sufficient rigidity to remain in such shape thereafter.

The group of wires 42, 43, 46 and 47 and the heavy gauge wire 52, which remains unconnected at its ends, are grouped together after the wires 42, 43, 46 and 47 are connected to their respective terminals 22, 23, 26 and 27 for assembly into the housing 35. They are positioned through an axial opening 53 in a rubber stopper or plug 54 adapted to fit slidably and snugly within the open end 40 of the tubular housing member 35. The end 56 of the tubing material 51 is then heated and stretched telescopically over the open end 40 of the housing member 35, and, upon cooling, contracts to form a liquid tight seal about said end. The end 56 of the tubing material 51 provides a suitable cap and annular buffer ring adjacent the end of the housing member 35 to absorb shocks and prevent the glass test tube from becoming easily broken. The tube 51, forming the passageway for the wires connecting the lamp 13 with a source of electrical energy, is relatively long as compared to the extension 41 of the cap member 39. This construction makes the sealing cap 56 and the lead-in tube 51 integral and liquid tight in a very simple, efficient and satisfactory manner.

Referring now to Figures 4 and 5 of the drawings, wherein a modified form of the invention is shown in which the tubular housing member 61 is made of a hard, clear and form-retaining plastic, as for example, an acrylic resin, and is in the form of a cylindrically shaped tube open at both ends. Therefore, it is necessary to provide an effective liquid tight seal over each end of said housing member 61.

The open end 62 of the housing member 61 is shown being closed with a relatively short section of plastic tubing 63, which, like the vinyl plastics, has the property of permitting expansion when heated and contracts when cooled. One end of the short piece of tubing 63 is expaned, as indicated at 64, to fit telescopically over the open end 62 of said housing member 61, and the opposite end 66, which is that portion of the tubing 61 that was not expanded, provides a suitable integral axial extension for use as a mounting member when the lighting assembly is to be secured in a submerged position, as for example, by means of a conventional suction cup 67. Of course, in this modification, the opening 68 in the hollow axial extension 66 must be closed in a liquid tight manner. This may be accomplished by mounting therein a section of a plastic cord or plug 69, using heat treatment to seal the parts together in a liquid tight manner. The reflector 71 in this modification is made of a relatively thin and narrow piece of flexible reflecting tape, as for example, metal foil, paper treated with a reflecting material, and the like. Such reflector 71 is made of a piece of material approximately as long as the light tube 13 and having a width approximately equal to that of an arc extending over a quarter of the circumference thereof. It is coated on one side with any suitable adhesive, preferably a pressure-sensitive adhesive 72, which will provide a satisfactory means for mounting the same on the outer surface of the light tube 13. In this arrangement, the electric wires 42 and 43, leading to the far terminals 22 and 23 of the lamp assembly, are mounted in a spaced position on the pressure-sensitive adhesive 72, which has been applied to one side of the reflector 71. With the wires 42 and 43 mounted in the pressure-sensitive adhesive 72, the reflector 71 is now ready to be pressed into its final position covering a portion of the outer surface of the light tube 13, and becomes satisfactorily secured thereto.

It is not necessary to show or describe the opposite end of this modified lighting assembly, since its construction and arrangement of parts are identical to that shown in Figures 2 and 3, with the following exception: Instead of using the rubber plug or stopper 54 to close the open end of the tubular housing member 35 and hold the wires 42, 43, 46 and 47 with the centering wire 52 in a suitable grouping, the invention contemplates the use of a suitable "potting compound." Such compounds are well known in the trade, and may be packed into a conventional caulking gun from which they may be extruded around and between the electric wires and the sides of the housing 35 until the interstices thereof are completely filled. Such so-called "potting compounds" are soft and pliable when first extruded, but become hard upon exposure to the atmosphere and will serve as a good substitute for the rubber plug or stopper 54.

Such compounds do not adhere too strongly to a highly polished surface, such as glass or plastics, to prevent separation, as for example, when the light **13** requires replacing.

It is appreciated that light tubes of the kind described in use with this invention will eventually be made available with a built-in reflecting surface. In such an event, it will be appreciated that the present invention may be practised with such light tubes by merely affixing the wires **42** and **43** directly to the outer surface of said tubes by the use of adhesive behind said reflector.

It will also be appreciated that the plastic tubing used in the construction of this invention may be colored, if desired, to blend with a particular color scheme, and that such colorings will render the same opaque to hide the unsightliness of the wires extending therethrough.

It is obvious that the lighting assembly may be constructed for use in the illumination of a chemical solution, such as for example photography, where it would be used as a viewing light to follow the processes involved. Of course, the light must be sufficient for viewing, but must also be filtered sufficiently to prevent exposure of light-sensitive materials, as for example, photographic paper, film and associated materials. For these particular applications, the lamp may be surrounded by a dyed film, the transparent housing member may be dyed or tinted, or the fluorescent or incandescent lamp may be procured from the manufacturer that is already equipped with a colored phosphor or glass. All of these filtering possibilities would emit light only of a chosen wavelength dependent upon the material to be illuminated.

Although I have described in detail and illustrated in the drawings but two forms which the invention may assume, it will be apparent to those skilled in the art that the same need not be so limited, but that various modifications may be made therein without departing from the spirit thereof or from the scope of the appended claims.

What I claim is:

1. An immersible lighting assembly comprising an elongated lamp, a reflector mounted arcuately and extending longitudinally of said lamp, said reflector concealing electric wires extending along the sides of said lamp, a tubular housing member enclosing said lamp and reflector, a liquid tight cap member of resilient material stretched over and shrunk onto one end of said housing member, and a second liquid tight cap member of resilient material stretched over and shrunk onto the opposite end of said housing member, said second cap member having an integral hollow and deformable extension for enclosing a plurality of electric wires leading from said lamp, said extension containing means which renders it form-retaining whereby it may be arranged in any desirable position.



2. An immersible lighting assembly comprising an elongated lamp, a reflector mounted arcuately and extending longitudinally of said lamp, said reflector having each of its side edges curled to provide a hollow passageway for an electric wire, a tubular housing member enclosing said lamp and reflector, a liquid tight cap member of resilient material stretched over and shrunk onto one end of said housing member, and a second liquid tight cap member of resilient material stretched over and shrunk onto the opposite end of said housing member, said second cap member having an integral hollow and deformable extension for enclosing a plurality of electric wires leading from said lamp, said extension containing means which renders it form-retaining whereby it may be arranged in any desirable position.

3. An immersible lighting assembly comprising an elongated lamp, a reflector mounted arcuately and extending longitudinally of said lamp, said reflector being connected adhesively to said lamp and concealing spaced wires extending longitudinally thereof, a tubular housing member enclosing said lamp and reflector, a liquid tight cap member of resilient material stretched over and shrunk onto one end of said housing member, and a second liquid tight cap member of resilient material stretched over and shrunk onto the opposite end of said housing member, said second cap member having an integral hollow and deformable extension for enclosing a plurality of electric wires leading from said lamp, said extension containing means which renders it form-retaining whereby it may be arranged in any desirable position.


**References Cited in the file of this patent**

UNITED STATES PATENTS

| | | |
|---|---|---|
| 2,691,092 | McConnell et al. | Oct. 5, 1954 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 408,970 | Great Britain | Apr. 18, 1934 |
| 1,113,311 | France | Dec. 5, 1955 |