

[54] **FLUORESCENT LIGHTING FIXTURES**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 620,806, Mar. 6, 1967, abandoned.

[52] U.S. Cl. **240/81 C, 240/51.11**

[51] Int. Cl. **F21s 1/12**

[58] Field of Search **240/51.11, 47, 36, 81, 81 C**

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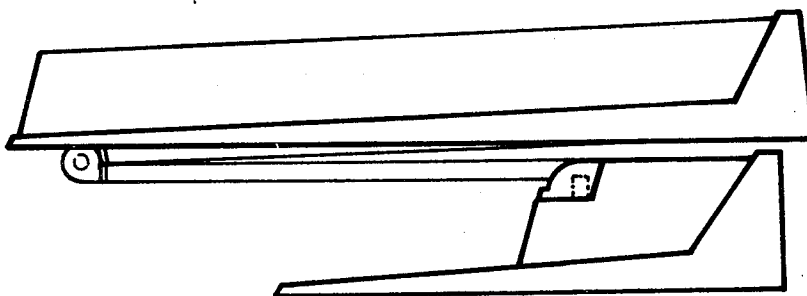
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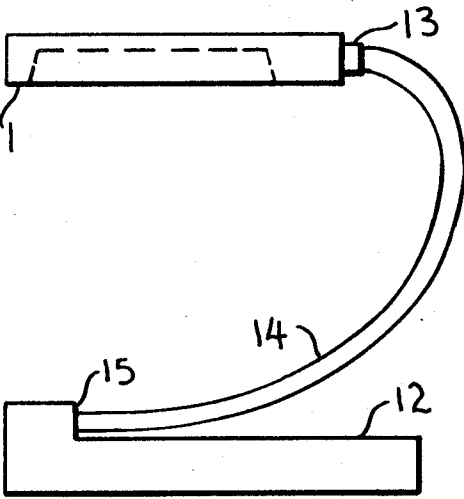
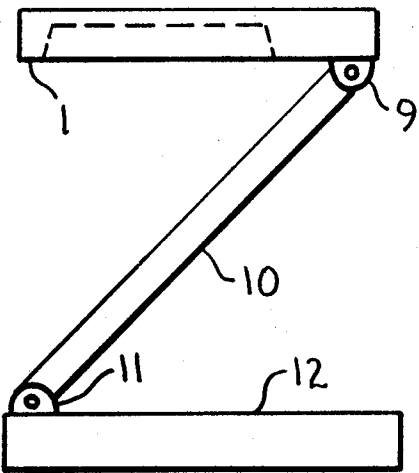
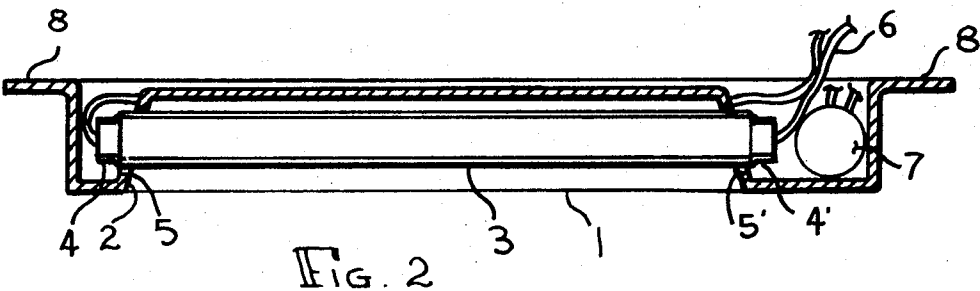
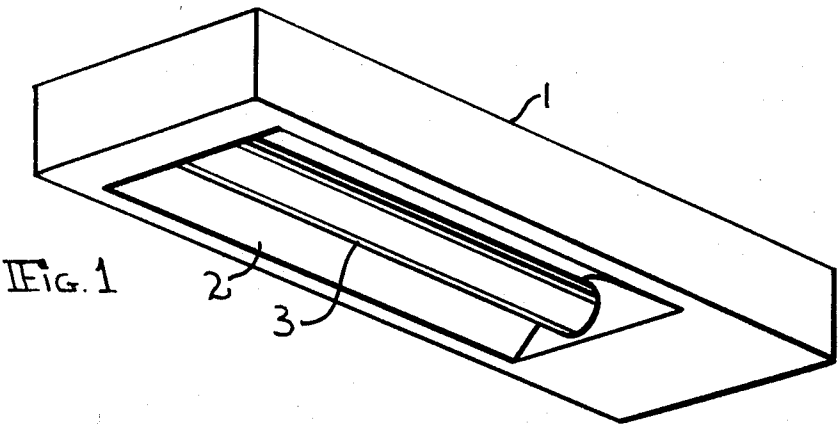
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[57] **ABSTRACT**

A fluorescent lighting fixture for use in conjunction with relatively small fluorescent tubes employed in portable lamps, desk lamps and vehicle interior lamps. The fluorescent tube is mounted within a simple, elongated housing. The housing is a multisided shell which has a trough or recess formed in one of its sides, the recess being both the support and reflector for the fluorescent tube mounted therein. The lamp housing is adapted to fasten directly to a wall or ceiling in one embodiment, and is adapted to being supported by a cantilevered arm and base for desk or table use in another embodiment.

2 Claims, 11 Drawing Figures





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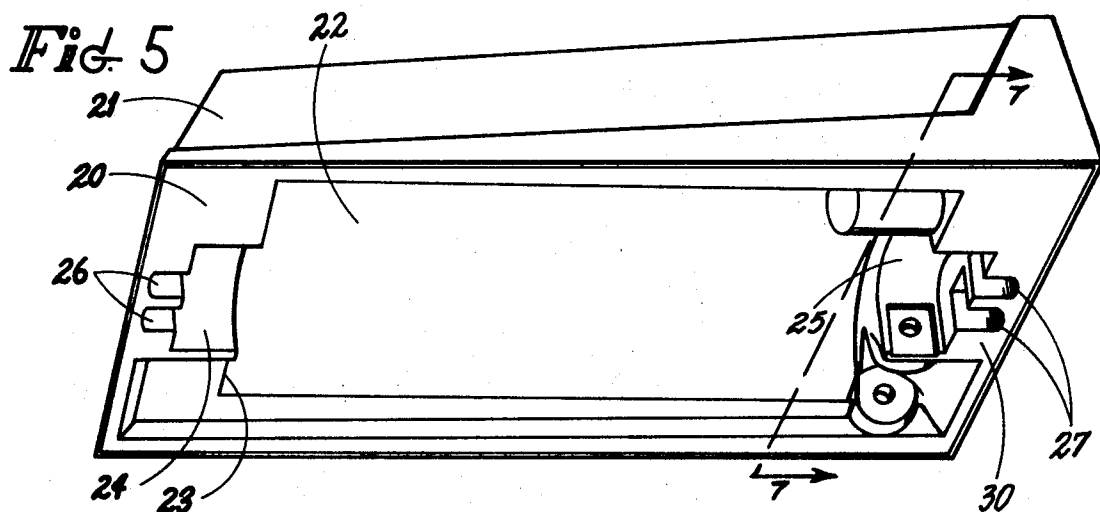


Fig. 6

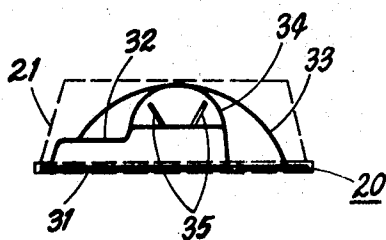


Fig. 7

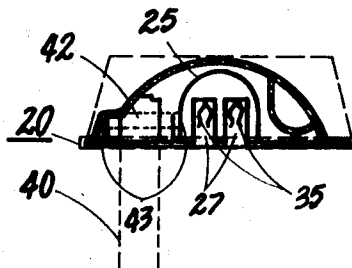


Fig. 8

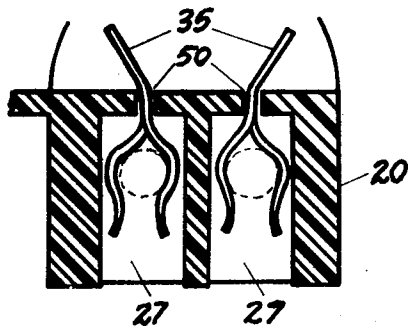


Fig. 9

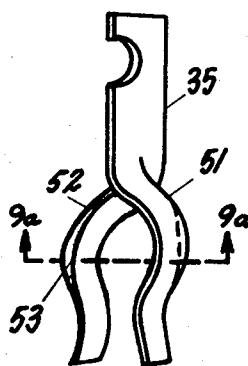


Fig. 9a

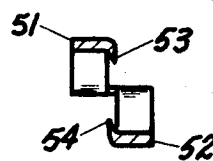
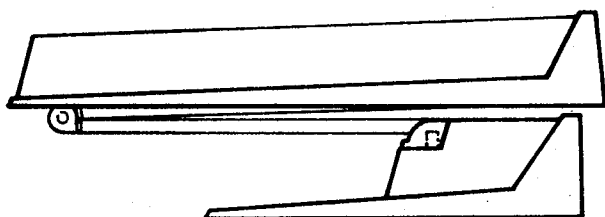


Fig. 10



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FLUORESCENT LIGHTING FIXTURES

CROSS REFERENCES AND RELATED APPLICATIONS

This is continuation in part application of the pending application Ser. No. 620,806, filed Mar. 6, 1967, now abandoned

BACKGROUND OF THE INVENTION

This invention relates to fluorescent lighting fixtures, and particularly those of compact construction which are best suited for use as desk lamps, drawing board lamps, and for illumination of the interiors of vehicles. This type of light normally comprises a considerable number of separate parts in the form of reflectors, housings and fluorescent tube base sockets. There are a large number of conventionally constructed fluorescent lighting fixtures available on the current market. They are characterized by the assembly of a number of complex parts, all contributing to the overall cost of production and physical weight of the fixture. The disadvantages of high cost are self-evident. The weight of the fixture presents problems in terms of additional size, weight and complexity of supporting members for those lights used on cantilevered arms.

SUMMARY OF THE INVENTION

It is well accepted that fluorescent lights are more efficient and less tiring to the eyes than incandescent types. They produce a soft uniformly distributed light which does not produce harsh shadows which are characteristic of incandescent lights. In addition, the efficiency of the fluorescent light precludes the generation of excess heat in the beam of the light and in the reflector or housing of the lamp. These obvious advantages of the fluorescent types of lamps over incandescent lamps are overshadowed in many applications by the physical size and weight, as well as the expense of fluorescent light fixtures. Therefore, the disadvantages of fluorescent lights have made them non-competitive with incandescent lights for small, semi-portable, portable and low cost lamps.

The general purpose of this invention is to provide a fluorescent light fixture which is small, lightweight and very inexpensive to manufacture. The first specific object of the invention is to provide a fluorescent light fixture of such simple construction that the functions of the lamp housing, fluorescent tube supports and light reflector are performed by a single piece of formed structure. The second specific object of the invention is to provide a fluorescent light fixture of small size and weight which is well suited to installation by direct fastening to a wall or ceiling, and which minimizes the profile of the lamp while at the same time protects the lamp tube from accidental damage from a blow. The third specific object of the invention is to provide a fluorescent light fixture of suitable low weight and geometry for being supported by a movable cantilever arm.

One further object of this invention is to provide in a single unitary member, a lamp structural body, reflector and socket for a fluorescent tube.

Another object of the invention is to provide a unitary fluorescent lamp housing and reflector which provides additionally a hidden hinge and recess for holding the lamp support arm when in a folded condition for minimum volume while allowing its use in a folded condition as a night light.

The general purpose and specific objects of the invention have been achieved by providing a fluorescent light fixture including a lamp housing in the form of an elongated thin-wall shell. One surface of the shell has formed within it an elongated cavity in the form of a trough, which serves as both a support and reflector for the lamp tube. The lamp tube is disposed within the cavity so that at least the major central portion of the tube lies within the cavity and is visible to the exterior of the housing structure, and the portions of the housing surrounding the cavity form protective guards against tube breakage. The lamp tube ends protrude through generally round holes at opposite ends of the cavity.

In another embodiment of this invention, the shell includes small end cavities of proper placement and dimensions to accept the end pins of the fluorescent tube and thereby constitute the end sockets for the lamp. This embodiment also employs a novel electrical contact for the integral socket constituting a simple bifurcated strip including sheared contact edges for reliable electrical contact with the lamp pins.

The fluorescent lighting fixture thus constructed provides a sufficiently small, lightweight and low cost device to be at least comparable to small incandescent lamps in such functions as wall lights and dome lights in motor vehicles, house trailers, boats, etc., as well as cantilevered arm lamps such as desk and drawing board lamps, including the miniature, "high-intensity" lamps.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the lamp housing;

FIG. 2 is a longitudinal cross section view of the lamp housing;

FIG. 3 is a side elevation view of the lamp housing employed in a hinged, rigid strut, cantilever arm desk lamp;

FIG. 4 is a side elevation view of the lamp housing employed in a flexible arm desk lamp;

FIG. 5 is a perspective view of another embodiment of this invention;

FIG. 6 is an end view of the lamp shell of Fig. 5;

FIG. 7 is a vertical section thru the assembly of Fig. 5 taken on long line 7-7;

FIG. 8 is an enlarged vertical sectional view through the shell of Fig. 5 in the region of the electrical contacts;

FIG. 9 is a greatly enlarged perspective view of the bifurcated electrical contacts of FIGS. 7 and 8;

FIG. 9a is a sectional view of the terminal of Fig. 9 taken along line 9a-9a of FIG. 9; and,

FIG. 10 is a side view of a lamp in accordance with this invention shown in folded or stowed position.

In Fig. 1 the lighting fixture is shown having a formed or molded housing 1 of elongated configuration. One side of housing 1 has formed within it an elongated cavity 2 having fluorescent tube 3 disposed within the cavity. The depth and width of cavity 2 is less than the length of tube 3.

In FIG. 2 the ends 4 and 4' of tube 3 are shown extending through generally round holes 5 and 5' at the respective end walls of cavity 2, so that the major central portion of tube 3 is visible to the exterior of housing 1 and the surface of cavity 2 functions as a light reflector for tube 3. Housing 1 is fabricated from a material which inherently, or through surface coating, has a high reflectance. The lamp ends 4 and 4' extending through holes 5 and 5' are electrically connected to conductors 6 which lead from the housing. A starting means 7 may optionally be included in the housing and included in the circuit in appropriate applications. Wall mounting lugs 8 are formed as an integral part of housing 1.

In FIG. 3 housing 1 is shown including a hinge 9 in lieu of lugs 8. Hinge 9 is attached to one end of a rigid, elongated strut 10 which in turn attaches through hinge 11 to a generally flat desk base 12.

In FIG. 4 housing 1 is shown including a mounting boss 13 for an elongated deformable arm 14. Arm 14 attaches to base 12 through a second mounting boss 15.

Now referring to FIG. 5, you may see an alternate embodiment of the invention includes a shell member 20 and a cover 21 which together form a fluorescent lamp housing. The shell 20 is the basic structural element of the assembly and the cover 21 is merely for ornamental appearances to cover internal wiring. The shell is preferably manufactured from an easily moldable temperature stable plastic material such as acrylonitrile butadiene styrene in particular the material sold under the trademark Cyclocac, produced by the Marban Chemical Division of Borg Warner Corporation. The material is metallized with a coating of highly reflective metal such as aluminum in thickness in the order of one millionth of an inch

providing a highly reflective surface of 99 percent plus efficiency. The metallic plastic coating is protected from oxidation by a transparent laquer. The shell includes a major semicylindrical cavity 22 which extends approximately the same length as the glass envelope of a standard fluorescent tube. The cavity ends in generally planar end walls one of which is shown in the drawing as wall 23 and defines arch-like recesses 24 and 25 at opposite ends of the cavity 22 adapted to receive the metallic ends of the fluorescent tube. Within the base of the recesses 24 and 25 are further recesses 26 and 27 of appropriate size to receive the end pins of the fluorescent lamp. As may be seen, the shell is of such configuration that the fluorescent tube of the appropriate size may be simply positioned in the cavity 22 and snapped into place being held by the electrical contacts within the recesses 26 and 27.

Adjacent to the recess 25 is an integral hinge including one wall 30 of the cavity 25 and the portion of the outer wall of the shell, these two wall portions each have planar boss regions and central holes therethrough to accept a hinge pin for the support structure which is shown below in connection with FIG. 7. The shell-like configuration of member 20 is more clearly seen in FIG. 6 which is an end view taken from an adjacent cavity 24 with the cover 21 removed and shown in dashed lines. The shell 20 has a planar lower wall portion 31 and end recessed defining portion 32 along with the reflector cavity portion 33. Centrally located is the lamp socket cavity 24 which includes a pair of bifurcated metal contacts 35 which extend through slots in the shell 20 to allow electrical connection to the inside of the hood 21.

The operative arrangement of the shell 20, the fluorescent lamp, and the support arm are more clearly illustrated in the sectional view FIG. 7 showing the right or secured end of the lamp assembly. A support arm 40 in phantom is shown secured by a pin 42 passing through the mating holes 43 forming an integral hinge. Adjacent to the hinge cavity is the lamp recess 25 and the individual pin recesses 27 which contains a respective terminals 35. The terminals 35 may be seen extending from the outer side of the shell 20, into the respective recesses 26 or 27 with the bifurcated arms defining a pin receiving area toward the base of the recess.

Referring now to FIG. 8, the terminals 35 can be seen confined in slots 50. The terminals 35 are prevented from movement either in or out of the slots 50 by the bifurcated contact portion on the recess side of the body 20 and by angular bends in the upper or connection side of the terminal. The terminals 35 fit loosely into the body 20 so that they can move slightly to adjust to the variations of terminal pins of fluorescent tubes. It should be noted that the terminals include only two arms which define a narrow restricted throat and that the arms are maintain a sufficient clearance in the recesses 27 to allow their deformation outward to accept terminal pins. The pins are indicated by the dash circles. The recesses 27 are relatively deep for two significant reasons. One is the depth of the recess 27 maintains the contacts and contact pins well below the surface and therefore is protected from contact by the user or by inadvertent short circuiting across if the lamp comes in contact with conductors. The second advantage of the deep confining recesses 27 is apparent in connection with the description below of the method of manufacture of the lamp shell. In particular, the shell is metallized and the depth of the recesses 27 provide natural shielding of the electrical contact areas from the conductive metal of the metallized coating.

One other detail of the electrical contacts of this invention is clearly illustrated in FIG. 9. The contacts are of simple design made up of a unitary flat strip including a pair of sheared and formed arm members. The arms 51 and 52 each include a segmental circular portion plus a confining throat and an outer lip portion as is common in connectors of this general type. However, the terminal in the formation process is produced by a shearing and bending operation forming the two legs simultaneously. By adjustment of the shearing blade registration, a shear of poor quality has been obtained which is characterized by the sharp sheared edge on the inner or ad-

jacent faces of both arms. This sharp sheared edge is protected from contact by individuals either during assembly of the lamp or in its use but the edges are presented to terminal pins as cutting edge capable of removing oxide coating from the lamp pins and insuring an efficient electrical contact. The relationship of the sheared edges is illustrated in FIG. 9a where the arms 51 and 52 are seen as joined in a common body and include their respective sheared edges 53 and 54 extending into the pin holding area. Since the lamp of this invention is designed for low power operation and 1 with producing a minimum of electrical power wasted in the form of heat, the low resistance contact to the pins produced by this novel terminal is of significant importance to the efficiency of the lamp as a whole.

One of the advantages of the structure of this invention is apparent from FIG. 10 adding the compactness with which the lamp of this invention may be folded when either in an unused condition or when being used as a night light. As described above in connection with FIG. 5, support arms for the lamp housing fold neatly with the upper or longer arm recessed almost completely within the shell 20 whereby the lamp in its folded condition is approximately 20 percent of its maximum height. The lamp switch remains available for operation and sufficient area of the recess 22 remains exposed to produce a highly efficient night light. It should be noted in particular that using a fluorescent tube that a softer more diffuse light is produced than existing incandescent and particular high intensity lamps; moreover when in the folded position as illustrated in FIG. 10, the highly efficient lamp for example of 4 watt consumption produces negligible radiated heat whereby the lamp may be operated continuously as a night light while resting on a surface which would be subject to heat damage.

In the manufacture of the lamp housing or shell in accordance with the invention, the first step is the formation of the shell body which may be formed by a number of processes and using a variety of materials. Typically, the shell is injection molded from a polymeric material having suitable strength mold or formability temperature stability, dielectric properties. A material should have strength and stability against deformation as denoted by a cold flow temperature in the order of 150°-200° F. Typically, any material having a molding temperature in the range of 300°-600° would meet this requirement. The preferred material as indicated above is acrylonitrile butadiene styrene but any of a number of styrene polymers are useful. Likewise, melomene plastics may be used successfully.

After molding or forming to the configuration shown in FIGS. 1 and 2 or 5, 6 and 7, the shell is metallized applying one of the conventional metallizing processes. Preferably, the shell placed in a vacuum chamber and the metallic highly reflective coating such as aluminum vapor deposited on the surface. As indicated above, the shell when exposed to the metallization process particularly of the vapor type develops a highly reflective surface on the exposed areas and in particular the recesses constituting the light collector and reflector surfaces 22. In the configuration shown in FIGS. 1 and 2, the portion of the metallization exposed to the under face will extend into the end holes 5 but the opposite side of the housing may remain relatively metal free. Similarly, when metallizing the structure of FIG. 5, the back side may be protected from metallization and the metal coning will cover the exposed area of the shell with the exception that the confined recesses 26 and 27 are of such depth and narrow width that they remain relatively free of metal coating. This is significant in that the dielectric properties of the base polymeric material will then serve to maintain electrical isolation between the electrical contacts and essential to successful operation of the lamp. This is accomplished without any masking steps and is effective to produce a socket, body, hinge and reflector as a unitary structure without further steps. The highly reflective aluminum or other metal surface may tend with passage of time to become tarnished or oxidized. For this reason, it is desirable to apply a flash coat of transparent laquer to the metallized

surface for protection. Typically, the laquer will penetrate into the pin recesses 26 and 27 at least as well as the metal vapor whereby the pin recesses are effectively insulated from each other and from the remaining of the metallized coating.

The above-described embodiments and processes are furnished as illustrative of the principles of this invention and are not intended to define the only embodiments possible in accordance with out teaching. Rather, the scope of protection under the United States Patent Law shall be afforded to us not only to the specific embodiments shown but to those falling within the spirit and terms of the invention as defined by the following claims.

We claim:

1. A foldable lamp comprising:
a base;

an elongated lamp assembly having opposed ends;

an articulated arm including at least two elongated arm portions hinged together at one end of each by a first hinge means;

the opposite end of one of said arm portions being hinged to said base by a second hinge means;

the opposite end of the other of said arm portions being hinged to said elongated lamp assembly at one of said ends by a third hinge means;

said articulated arm and elongated lamp assembly being

secured through said plurality of hinge means to said base whereby said elongated lamp assembly may be elevated above said base to provide lamp illumination and foldable into contact with said base;

said lamp assembly comprising a shell of dielectric material including an elongated lamp receiving cavity extending generally transverse to the axis of said first hinge means;

said lamp receiving cavity having metallized reflective coating thereon to constitute a reflector for said lamp assembly;

said shell also including an elongated recess extending parallel to said lamp receiving cavity and dimensioned to receive said other arm portion of said articulated arm and having an enlarged portion at the other of said ends of said lamp assembly to receive said first hinge means when the lamp is in its folded condition;

said one arm portion of said articulated arm spacing said lamp assembly from said base when said lamp is in a folded condition.

2. The combination in accordance with claim 1 wherein said lamp assembly overhangs said base exposing a portion of said lamp receiving cavity whereby light is emitted from said lamp receiving cavity when the lamp is in a folded condition.

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