

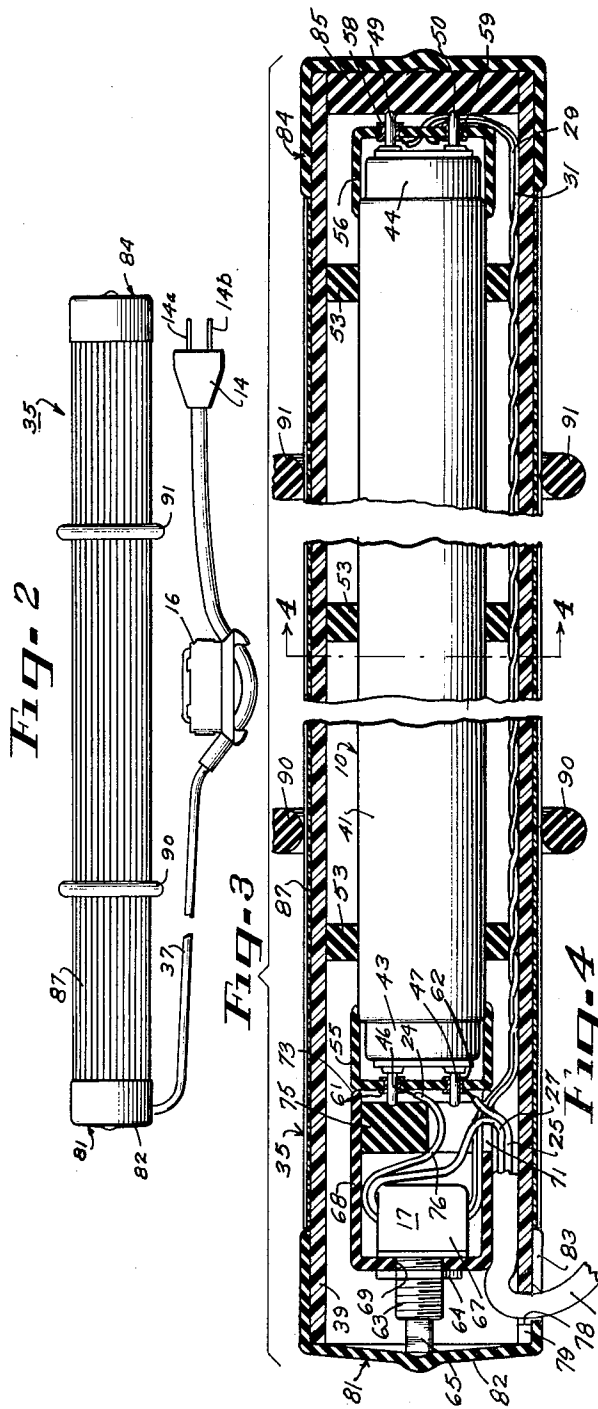
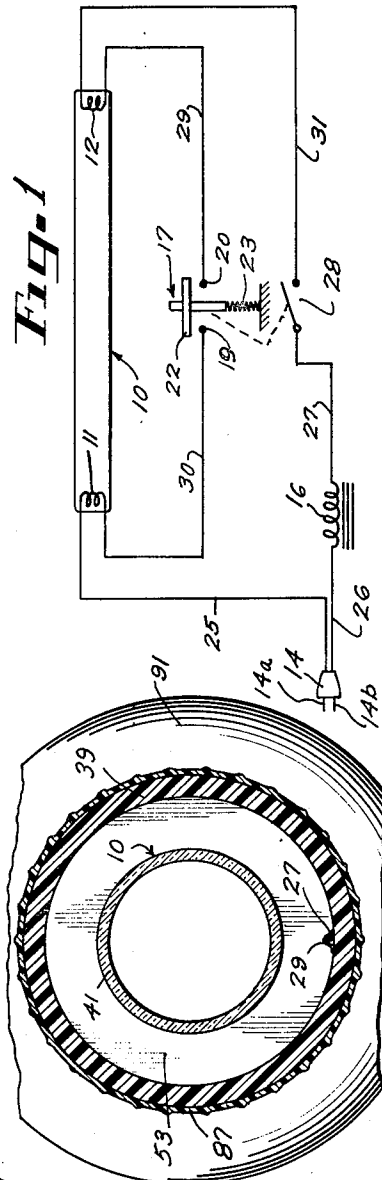
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SAFETY WORK LIGHT

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1

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SAFETY WORK LIGHT

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The present invention generally relates to safety work lights and it more particularly relates to work lights which employ a tubular fluorescent lighting element as the primary light source.

Generally speaking, in order to be effective for its intended purpose, a work light must be relatively portable so that it may be placed in proximity to the particular area in which work is being done. Also, it must be sturdy in construction so as to withstand substantial physical shocks without damage since such lights are frequently dropped on hard surfaces or accidentally struck with hard objects.

In certain applications safety work lights are used in atmospheres containing inflammable gases which are susceptible to ignition by electric arcing as sometimes occurs across switch contacts and at places in the electric circuit where severable connections are provided as, for example, between the terminal prongs of the lamp and the lamp receptacle. For use in such applications it is, therefore, desirable that the switch portions of the light, as well as the terminal portions of the fluorescent tube, be substantially sealed from the circumambient gases to prevent possible explosion or fire.

Therefore, it is the principal object of the present invention to provide a new and improved safety work light.

Another object of the present invention is to provide a new and improved infrangible safety work light employing a fluorescent lighting element.

A further object of the present invention is to provide a new and improved safety work light in which the primary light source and an associated control switch are sealed from the surrounding atmosphere.

Still another object of the present invention is to provide a new and improved means for mounting a tubular fluorescent lamp in a supporting fixture.

Briefly, the above and further objects are realized in accordance with the present invention by providing a safety work light including an infrangible tubular housing in which a tubular fluorescent lamp is mounted by means of resilient, shock-absorbing members interposed between the intermediate glass portions of the lamp and the adjacent portions of the housing. The connectors which supply electric current to the fluorescent tube are supported solely by the tube itself, independently of the housing, and a control switch is mounted in one end of the housing on shock-absorbing means separately of the lamp and is manually operable through a flexible cap which is stretched over the end of the housing to seal the contents thereof from the atmosphere. A like cap is similarly disposed over the other end of the housing.

Further objects and advantages and a better understanding of the present invention may be had by reference to the following detailed description taken in connection with the accompanying drawings in which:

FIG. 1 is a schematic electric circuit diagram of a safety work light embodying the present invention;

FIG. 2 is an elevational view of a safety work light embodying the present invention with portions of the power cord being broken away;

FIG. 3 is a fragmentary, longitudinal sectional view of the device of FIG. 2;

FIG. 4 is a sectional view taken along the line 4-4 of FIG. 3, assuming the entire device to be shown therein;

2

FIG. 5 is a longitudinal, sectional view of another embodiment of the present invention;

FIG. 6 is a sectional view taken along the line 6-6 of FIG. 5; and

FIG. 7 is a sectional view taken along the line 7-7 of FIG. 5.

Referring now to the drawings and particularly to FIG. 1 thereof, a tubular fluorescent lighting element 10 having a pair of hot cathode filaments 11 and 12 located in the respective ends thereof is adapted to be energized from a suitable source of alternating current (not shown) connected to a conventional electric plug 14. The circuit shown in FIG. 1 is of the conventional type commonly used with fluorescent lighting units and, as such, the filaments 11 and 12 are serially connected across the power terminals of the plug 14 with the winding of a ballast transformer 16 and a pair of normally open starting contacts and a pair of on-off contacts of a starting switch 17. More particularly, the starting switch includes a pair of starting contacts 19 and 20 and an armature 22 which is biased by means of a spring 23 out of engagement with the contacts 19 and 20. One end of the filament 11 is connected by means of a conducting lead 25 to a terminal prong 14a of the power plug 14, and the other power plug terminal prong 14b is connected to one side of the ballast transformer 16 by means of a conducting lead 26. The other side of the transformer 16 is connected by a lead 27 to one of a pair of on-off contacts 28, the other contact thereof being connected to the filament 12 by means of a conducting lead 31. The other end of the filament 12 is connected to the starting contact 20 by means of a conductor 29 and the starting contact 19 is connected to the remaining side of the filament 11 by means of a conducting lead 30.

In order to light the fluorescent tube 10, the power cord 14 is initially plugged into a suitable receptacle connected to a source of alternating current power and the switch 17 is actuated to close the on-off contacts 28 and to interconnect the starting contacts 19 and 20 via the armature 22. As long as the actuator of the switch is held against the force of the spring 23 the contacts 19 and 20 remain closed and when the actuator is released the contacts 28 remain closed. Accordingly, with the switch actuator held depressed, current flows through the series circuit comprising the filaments 11 and 12 and the coil of the transformer 16. The actuator of switch 17 should be held depressed for a sufficient time to allow the temperature of the filaments 11 and 12 to reach a value at which electron emission can take place therefrom at the level of voltage of the power source which, in a normal case, is about 115 volts. Since the current flowing through the circuit at this time is very high, the actuator of the switch 17 need be held in a depressed condition only momentarily to permit the filaments 11 and 12 to reach the necessary temperature. The actuator switch 17 should then be released, whereby the switch contacts 28 remain closed and the connection between the contacts 19 and 20 is broken. The high inductance of the coil of the transformer 16 maintains the high current in the circuit for a sufficient time to ionize the gas within the tube 10, thereby to support conduction between the filaments 11 and 12. Thereafter, the tube 10 continues to flow until the switch 17 is again actuated to open the on-off contacts 28 and de-energize the tube.

Referring now to FIG. 2 there is shown a safety work light 35 embodying certain features of the present invention. As there shown, the light 35 is in the form of an elongated cylindrical member having a power cord 37 extending from one end thereof to the power plug 14 via the ballast transformer 16 which is most conveniently located in proximity to the plug 14. Preferably, the

3

cord 37 includes a vulcanized sheath which encloses the leads 25 and 26 and insulates them from one another as well as from the surroundings. The ballast transformer 16 is of conventional construction and the lead 26 is serially connected thereto.

As best shown in FIGS. 3 and 4, the housing comprises a tubular member 39 which is formed of a suitable transparent plastic material which is somewhat flexible and relatively infrangible. The fluorescent tube 10 is conventional and includes a relatively frangible glass tubular portion 41 having a fluorescent coating (not shown) on the inner wall thereof and which is hermetically sealed off at the ends by means of a pair of disk-like insulating base members 43 and 44 respectively. The filaments 11 and 12 (FIG. 1) are suitably attached to the base members 43 and 44 for support thereof within the tube 41.

A pair of terminal prongs 46 and 47 extend through the base member 43 and are connected to the respective opposite ends of the filament located at the left-hand end of the tube as viewed in FIG. 3. A similar pair of terminal prongs 49 and 50 extend through the base member 44 and are connected to the opposite ends of the other tube filament.

In order to prevent damage to the fluorescent tube 10, it is supported in the housing tube 39 solely by means of a plurality of spaced resilient washers or shock-absorbers 53 which may be formed of any suitable elastomeric material such, for example, as sponge rubber or the like. As shown, the washers 53 are tightly fitted onto the tubular portion 41 of the fluorescent lamp 10 and they are also tightly fitted to the inner wall of the tubular housing member 39. In order to facilitate replacement of the fluorescent tube 10 when such is required, it is preferable that the washers 53 not be bonded in any way to either the fluorescent tube 10 or to the housing tube 39. Therefore, a tight fit is required between the tubes 10 and 39 and the washers 53 are required to hold the tube 10 firmly in place. Accordingly, the washers 53 have an internal diameter something less than the external diameter of the tubular portion 41 of the lamp 10, so that the natural resiliency of the washers holds them on the lamp 10. Similarly, the external diameter of each of the washers 53 is equal to or slightly greater than the internal diameter of the tubular housing member 39. For ease of assembly, the washers 53 should fit onto the lamp 10 more tightly than they fit within the tubular member 39 in this particular embodiment of the invention.

Connected to each end of the tube 10 is one of a pair of electric connectors 55 and 56 which function to electrically connect the tube terminals 46, 47, 49 and 50 to the remainder of the system. As such, the connector 56 comprises a pair of conductive eyelets 58 and 59 which receive the terminal prongs 49 and 50 of the tube 10 and which are respectively connected as by soldering to the leads 29 and 31, thereby to electrically connect the filaments 12 in the right-hand portion of the tube 10 to the leads 29 and 31.

The connector 55 also includes a pair of conductive eyelets 61 and 62 which are adapted to tightly receive the terminal prongs 46 and 47 and which are electrically and mechanically connected, as by soldering, to the leads 25 and 27. The connectors 55 and 56 are extremely light in weight so as to provide only a negligible moment of force on the glass portion 41 of the tube 10.

The switch 17 is conventional in construction of the type used in connection with fluorescent tubes and includes a threaded tubular mounting portion 63 from which extends an axially reciprocable switch actuating member 65 spring biased in the position shown. The switch 17 includes on-off contacts which are opened and closed upon successive actuations of the actuator 65 and a pair of starting contacts which are closed whenever the actuator 65 is depressed and open whenever it is re-

4

leased. The body portion 67 of the switch 17 is mounted within a generally cup-like flexible support member 68 having an aperture 69 in the bottom wall thereof through which the threaded switch portion 63 tightly extends. A nut 64 fastens the switch 17 to the support member 68. The support member 68 is provided with a slot 71 through which the leads 27, 29, 25 and 26 extend, and the marginal edge portion 73 seats against the connector 55. A resilient disc 75 is interposed between the switch body 67 and the terminal prongs 46 and 47 of the fluorescent tube 10, and includes a slot 76 for providing a passageway for the electrical leads 25 and 27 to the switch 17 and to the eyelet 62. The cord 37 extends through an aperture 78 in the housing 39 near the left-hand end thereof as viewed in FIG. 3. The resilient sleeve portion thereof is partially compressed by the aperture defining wall to provide a seal which substantially prevents breathing of the tube 10. A slot 79 connects the aperture 78 to the end of the housing tube 39 to facilitate placement of the cord 37 into the aperture 78 by flexing of the tube 39 in opposite directions along the slot 79. A flexible, gas impervious cap 81 is tightly fitted over the housing tube 39 to seal off the left-hand end thereof and includes a slot 83 through which the cord 37 extends. The slot 83 ends a substantial distance from the end wall 82 of the cap so that a seal is provided between the cap 81 and the tube 39. A similar cap 84 is tightly fitted over the other end of the housing tube 39 and a resilient disc 85 is positioned between the end wall of the cap 84 and the right-hand end of the terminal prongs 49 and 50.

Suitable plastics from which the tubular member 39 may be made are relatively soft and thus susceptible to scratching, so that even a very short time after initial use, such scratches may become excessive. Therefore, in accordance with another aspect of the present invention, a thin wall, soft and flexible, transparent tubular sleeve 87, which is preferably fluted throughout its length by means of a plurality of longitudinally extending grooves, is removably fitted over the housing 39 between the end caps 81 and 84. The internal diameter of the sleeve 87 is less than the external diameter of the caps 81 and 84, thereby to hold the sleeve 87 in place over the tube 39.

Safety work lights are frequently dropped onto a hard surface such, for example, as a concrete floor and, moreover, on many occasions they strike an article lying on the floor. In order to prevent excessive bending moments from occurring within the safety light under such conditions, which moments might otherwise fracture the glass portion 41 of the fluorescent tube 10, there is provided in accordance with another feature of the present invention, a plurality of rings 90 and 91 which surround the housing at spaced intervals. These rings are relatively rigid in construction, preferably having a soft outer surface, and although they may be opaque, they are sufficiently small in over-all area as to not appreciably block off the light from the lamp 10. Such rings can be formed of metal with a plastic sleeve or coating thereon.

In operation, the end wall 82 of the cap 81 is pressed toward the center of the unit to depress the switch actuator 65, which is in contact therewith, to actuate the switch 17 to energize or deenergize the tube 10. When lighting the unit, the actuator is held depressed for a sufficient time to initiate ionization of the gas in the tube 10 as heretofore described.

Referring now to FIG. 5 there is shown a fragmentary sectional view of a safety work light 110 embodying certain features of the present invention and which differs in a number of respects from the safety work light 35 heretofore described. Many of the components of the safety work light 110 are, for practical purposes, identical to those used in the safety work light 35, and, for convenience, those elements in the safety work light 110 which are like corresponding elements in the safety work

light 35 have been designated with the same reference numerals but a prime has been affixed to each such number. Accordingly, the safety work light 110 comprises a hot cathode type fluorescent tube 10' which is supported in place by means of a plurality of resilient washer-like, shock-absorbing members 53' and has attached to and supported on the ends thereof, a pair of electrical connectors 55' and 56', respectively. The electric cord 37' includes the leads 25' and 27' which are connected with the switch 17' to the socket portions of the connectors 55' and 56', respectively.

The work light 110 comprises a flexible, translucent or transparent housing member 112 which is longitudinally split throughout its length to provide a slot 114 over which is disposed an opaque arcuate shade member 116 which extends throughout the length of the light and provides a shade for blocking transmission of light in the upward direction as viewed in FIGS. 5, 6, and 7. The arcuate length of the shade 116 determines the area of transmitted light from the unit. Inasmuch as light is transmitted from only the portion of the light between the longitudinal marginal ends 116a and 116b of the shade 116, it is advantageous to include a reflector member 117 which is also generally arcuate and which is disposed as best shown in FIG. 6 within the housing member 112 at the upper end thereof in corresponding relationship with the shade 116 to increase the amount of light transmitted from the unit. The leads 29' and 31' are preferably disposed along the central longitudinal plane directly behind the tube 10' so as not to interfere with the transmission of light from the unit. The housing tube 112 and the arcuate shade 116 are each formed of resilient material, and while they each have an arcuate shape in the unstressed condition, the unstressed diameters thereof exceed the corresponding diameters in the assembled unit. The assembly of the housing tube 112, the shade 116 and the reflector 117, is held together by means of the tubular fluted member 87' against which the shade 116 and the housing tube 112 expand.

The shock absorbing washers 53' are thus disposed between the tube 10 and the housing tube 112 and the reflector 117 and a slot 120 is provided in each of the washers 53 to permit passage of the leads 27' and 29' therethrough. If desired, the leads 29' and 31' may be disposed within the slotted portion of the housing member 112 between the reflector 117 and the shade 116.

The switch 17' is mounted in a cup-like, flexible housing 122 whose marginal lip seats against a resilient shock-absorbing spacer 124 which is slightly compressed within the housing and interposed between the end of the terminal prongs 46' and 47' and the switch housing 122. The housing 122 is sufficiently self-supporting to hold the switch 17 in the position shown with the actuating member 65' extending into abutment with the end portion 82' of the flexible cap 81'. Actuation of the switch 17' by axial pressure on the cap 81' is transmitted through the switch housing 122 to the resilient member 124 which thus cushions the force from the end of the tube 10' to prevent damage thereto during operation of the switch 17'.

While the present invention has been described in connection with particular embodiments thereof, it will be understood that those skilled in the art may make many changes and modifications without departing from the true spirit and scope of this invention. Therefore, it is intended that the attached claims cover all such changes and modifications as fall within the true scope and teachings of the present invention.

I claim:

1. An electric lamp comprising a tubular support housing having a light emitting translucent portion, a generally tubular fluorescent lamp having an elongated

frangible portion, said fluorescent lamp having a length less than that of said housing and an external diameter less than the internal diameter of said housing, electric terminal means on one end of said fluorescent lamp, a switch disposed in one end of said housing adjacent to one end of said fluorescent lamp, electric leads connecting said switch to said terminal means, said switch being spring biased in a normally opened condition, an operating member included in said switch manually operable to close said switch, said operating member being disposed in proximity to one end of said housing, a pair of insulating end caps fitted over the ends of said housing, one of said caps being proximately disposed to said switch operating member whereby said switch operating member is operable by pressure applied to said one end cap, shock absorbing means mounting said switch in said housing independently of said fluorescent lamp, a plurality of resilient spacers interposed between said frangible portion of said fluorescent lamp and said housing, said spacers providing the sole support for said fluorescent lamp in said housing, and means for supplying electrical energy to said terminal means.

2. The invention claimed in claim 1 comprising an electric power cord extending into said housing and connected to said switch, said housing having an aperture near one end thereof through which said cord extends and said housing being split between said aperture and said one end thereof, and the respective one of said caps extending over said aperture.

3. The invention claimed in claim 1 comprising a plurality of rings surrounding the central portion of said housing at spaced-apart intervals.

4. The invention claimed in claim 3 wherein said housing and said caps are impervious to fluids and said caps are tightly fitted to said housing to minimize the leakage of liquids into said housing.

5. The invention claimed in claim 4 wherein said caps are formed of a flexible, resilient material stretched over the ends of said housing.

6. An electric lamp comprising a tubular support housing having a light emitting translucent portion, a generally tubular fluorescent lamp having an elongated frangible portion, said fluorescent lamp having a length less than that of said housing and an external diameter less than the internal diameter of said housing, said fluorescent lamp being disposed within said housing, a plurality of resilient spacers interposed between said frangible portion of said fluorescent lamp and said housing, said spacers providing the sole support for said fluorescent lamp in said housing, terminal means supported by said lamp for supplying electric energy to said fluorescent lamp, a pair of insulating caps fitted over the ends of said housing, a switch disposed in one end of said housing adjacent to one end of said fluorescent lamp, electric leads connecting said switch to said terminal means, and shock absorbing means mounting said switch in said housing independently of said fluorescent lamp.

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