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ELECTRICAL SYSTEM AND APPARATUS

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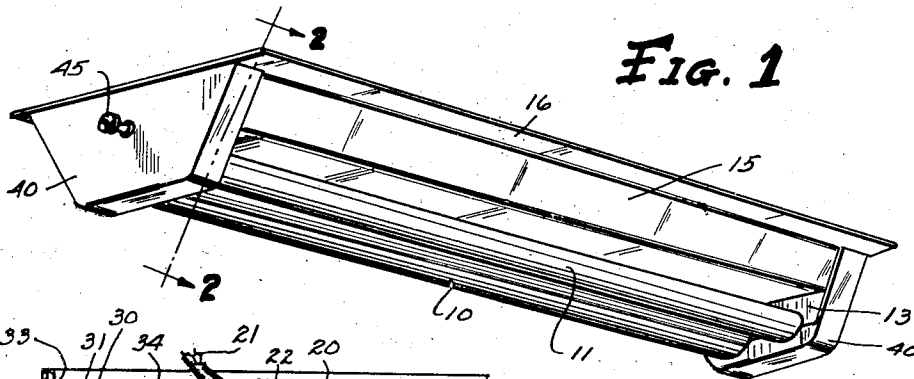


Fig. 1

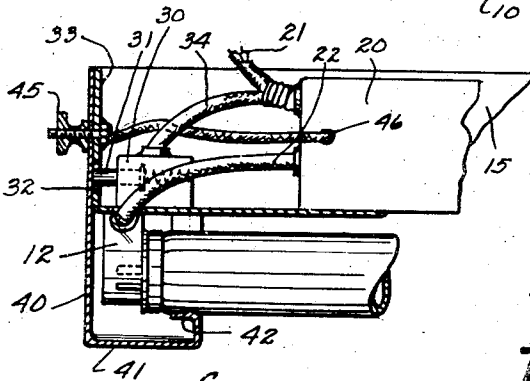


Fig. 2

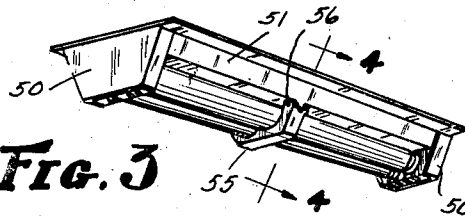


Fig. 3

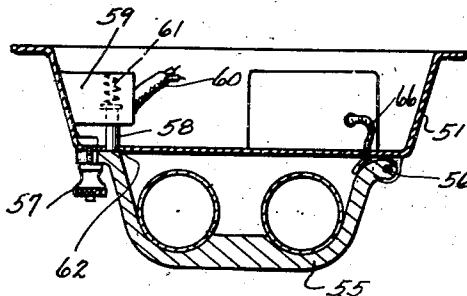


Fig. 4

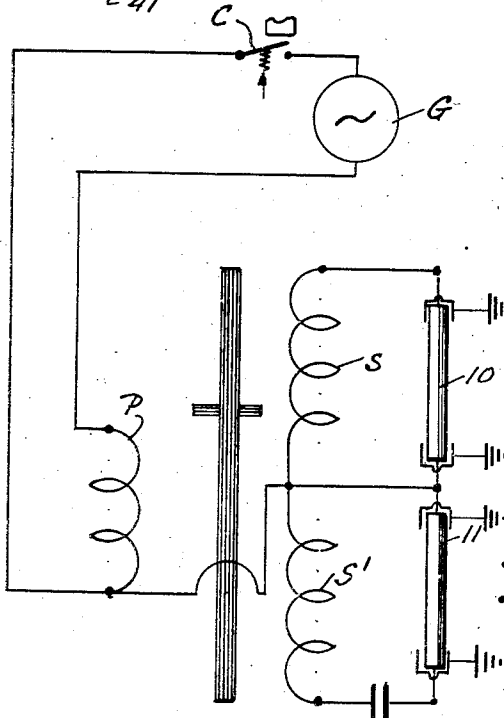


Fig. 5

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ELECTRICAL SYSTEM AND APPARATUS

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9 Claims. (Cl. 315-84)

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This invention relates to gaseous tube systems and particularly to systems that embody the use of fluorescent tubes as a lighting medium.

In the operation of fluorescent tubes, the system usually includes a primary circuit and a secondary circuit, wherein the secondary circuit is relatively high with respect to the primary circuit, and in such installations, the danger of electrical shock from contact with the exposed terminals of the secondary circuit is always imminent whenever a tube is removed from the socket. Moreover, in factory installations or in locations where considerable vibration is present, there is danger of the tubes falling out of the sockets. Additionally, the more tubes connected in series, the greater the voltage necessary, hence, the greater the need for protection against electrical shock.

An object of the present invention is to provide means for holding the tubes securely in place upon a supporting structure, and at the same time for effecting an automatic opening of the circuit upon detachment of the tube holding means, whereby dangers incident to the liability of electrical shock heretofore present whenever a tube was removed from the support are eliminated. In this connection, my invention contemplates a construction which may be readily incorporated as a unitary part of the fixture construction, or may be applied to existing fixtures without extensive changes in the construction or cost thereof.

Referring now to the drawing, Fig. 1 is a perspective view of a gaseous tube system embodying my invention; Fig. 2 is a section taken on a plane indicated by the line 2-2 in Fig. 1; Fig. 3 is a perspective view showing a modified form of the present invention; Fig. 4 is a section taken on the plane indicated by the line 4-4 in Fig. 3, and Fig. 5 is a wiring diagram.

In Figs. 1 and 2, I have shown a gaseous tube fixture as including tubes 10 and 11 which are supported in sockets 12 and 13 at opposite ends of a supporting structure 15, that is shown in the form of a hollow housing that is provided with a flange 16 extending around the marginal edges thereof for facilitating attachment to a ceiling or other supporting surface. The housing carries a transformer 20 which has a primary and secondary circuit, the primary of which is connected by conductors 21 to a source of current supply, while the secondary leads 22 extend to suitable conductors in the sockets 12 and 13 in the customary way.

The present invention embodies the use of a switch that is connected in the primary circuit, together with a device for holding the tubes in position with respect to the support, coupled with means for automatically actuating the switch to closed position whenever the device is applied

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to the tube and for automatically opening the switch whenever the device is removed therefrom. In the form shown in Figs. 1 and 2, the switch in the primary circuit is indicated in general at 30 as having a spring pressed operating plunger 31 which is adapted to project through an opening 32 in an end wall 33 of the housing 15. The spring normally holds the plunger 31 in such position that the outer end thereof is disposed outside the wall 33, at which time the primary circuit connected thereto through conductors 34 is normally open. The arrangement is also such that whenever the plunger 31 is moved inwardly to the position shown in Fig. 2, the primary circuit is closed.

The device for supporting the tubes and actuating the primary circuit switch is illustrated in Fig. 2 as comprising a cap that is adapted to engage the end wall 33 of the housing, and to extend around the tubes, preferably contacting them, for holding them in operative position in their respective sockets. The cap thus has an end wall 40, a bottom wall 41, and a flange 42 shaped to fit around the housing and tubes and to be attached to the housing by a fastening member 45. The tube supporting device serves a dual purpose; providing an end cap for the tubes, a support for them, and as a means for holding the primary circuit switch closed whenever the device is in position upon the support. Tightening of the fastening member 45, therefore, serves not only to hold the cap in place, but at the same time operates to prevent removal of any tube and to maintain the primary circuit closed. I have found that better starting characteristics are obtained if the tube supporter is grounded, as is shown at 46 in Fig. 2.

In Figs. 3 and 4, I have illustrated a modification of my invention, wherein the end pieces 50 are affixed to the housing 51 in the manner heretofore used, but wherein the device embodying my invention comprises a bar 55 that is adapted to straddle and preferably to contact the tubes and to be hinged, as at 56, to the housing. The other end of the bar is detachably connected to the housing by a fastener 57 and is adapted to actuate a plunger 58 for controlling a switch, indicated at 59, which is connected through conductors 60 to the primary circuit in the same manner as that described in connection with the arrangement illustrated in Fig. 2. Thus, the bar 55 serves the dual purpose of preventing the tubes from falling out of place inadvertently, and also serves the purpose of interrupting the flow of current in the primary circuit whenever the bar is opened. At such time the plunger 58 under the force of a spring 61 is forced outwardly through an opening 62 where it is subsequently in a position to be forced backwardly to close the circuit whenever the bar is again moved to the closed

position. The grounded connection for the modified structure is illustrated at 66 in Fig. 4.

In Fig. 5, I have shown a wiring diagram wherein the source of current, designated G is used for energizing a primary winding P. The secondary windings are indicated at S and S' as being connected in circuit with tubes 10 and 11 respectively. The switch in the primary circuit that is adapted to be actuated either by the end cap of Fig. 2, or by the bar 55 of Fig. 4, is indicated in general at C, the connections to which are diagrammatic and are sufficient to enable those skilled in the art to understand the operation thereof.

An advantage of the present invention is the fact that the gaseous tubes are securely held in position under conditions wherein excessive vibration is present, and that the primary circuit is automatically broken whenever the tube holder is placed in such condition that a tube can be removed from the fixture. The invention operates automatically also to reset the primary circuit before the tubes can be lighted, so that there is no danger of an operator replacing a tube and then forgetting to replace the tube supporting member. By making the tube holder of current conducting material and grounding it, better starting characteristics are obtained.

I claim:

1. In a gaseous tube lighting system, the combination of a gaseous tube having primary and secondary circuits associated therewith, a support for the tubes, a switch in series with the primary circuit, a member detachably positioned on the support for locking the tubes in position thereon, said member being arranged to close said switch automatically whenever the member is applied to the support in tube holding position, and to open said switch automatically whenever the member is detached sufficiently to effect removal of said tube.

2. In a gaseous tube lighting system, the combination of a tube, a support therefor, a transformer having a primary and secondary circuit, the secondary circuit being connected to the tube, a source of current for the primary circuit, a switch in the primary circuit, a member for holding the tube in position on the support and simultaneously closing the switch, and means for automatically opening the switch whenever the member is removed from said tube.

3. In a gaseous tube lighting system, the combination of a gaseous tube, a transformer having a primary and secondary circuit, means for connecting the tube in circuit with the secondary circuit, current controlling switch in series with the primary circuit, means for holding the tube in operative position and simultaneously and automatically holding the switch in closed position, the switch being opened automatically whenever said means is withdrawn.

4. In an electric lighting system, the combination of a fluorescent tube, a support for the tube, means for supplying current to the tube and a device for preventing removal of the tube from the support, said device being detachably mounted on the support, and means for controlling the flow of current to said tube, said means being automatically moved to closed position upon positioning said device against the tube, said means being operable automatically to stop the flow of

current in said circuit upon removal of said device from said tube.

5. In an electric lighting system, the combination of one or more tubes, a support including a housing extending longitudinally of the tube, a transformer within the housing, a switch mounted within the housing and having a spring-pressed plunger therein adapted to be moved with respect to the housing for controlling the flow of current in said transformer, and a member detachably mounted on the end of the housing and extending around the tube and operating to prevent removal of the tube, such member also operating to engage said plunger and to close the circuit whenever the member is applied to the support, the removal of said member operating to effect automatic opening of the switch by releasing the restraining pressure on said plunger.

6. In a gaseous tube lighting system, the combination of a housing having a gaseous tube adapted to be supported thereby, an electric circuit for the tube, a controller in said circuit, and a member carried by the support and adapted to straddle the tube and operating to actuate said controller, whereby the circuit is closed when said member is in closed position upon the support, and whereby the circuit is automatically opened whenever the member is moved with respect to the support sufficient to enable the tube to be removed therefrom.

7. In a gaseous tube lighting system, the combination of a tube, a support therefor, a member hinged to the support and adapted to straddle the tube and to be detachably connected to the support at the end opposite the hinge, an electrical circuit for the tube, and a switch in series with said circuit, said switch having an actuating part disposed in the path of movement of said member, whereby the circuit is automatically closed when the member is positioned on the support, and is automatically opened when the member is moved with respect to the support a distance sufficient for removal of the tube therefrom.

8. In a gaseous tube lighting system, the combination of a support having a gaseous tube adapted to be mounted thereon, an end cap embracing the tube and detachably connected to the support, an electric circuit for the tube, a switch in series with said circuit, said switch having a part thereof adapted to be engaged by the cap and moved thereby to closed position, whenever the cap is applied to the support, and means for automatically actuating said part to open the circuit whenever the cap is removed from the support an amount sufficient to permit removal of the tube therefrom.

9. In an electric lighting system, the combination of a fluorescent tube, a support therefor, a source of current supply for the tube, and a member disposed in close proximity to the tube for preventing removal thereof from the support, said member having a grounded connection and being detachably mounted on the support, means for controlling the flow of current to said tube, said member operating automatically to actuate said means for permitting the flow of current to the tube upon attachment of the member to the support and operating automatically to stop the flow of current upon removal of said member from said support.

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