May 24, 1938. P. J. KAYATT 2,118,437

ELECTRIC LUMINESCENT GAS TUBE PROTECTIVE DEVICE

Filed March 9, 1936 2 Sheets-Sheet 1

Fig. 1.

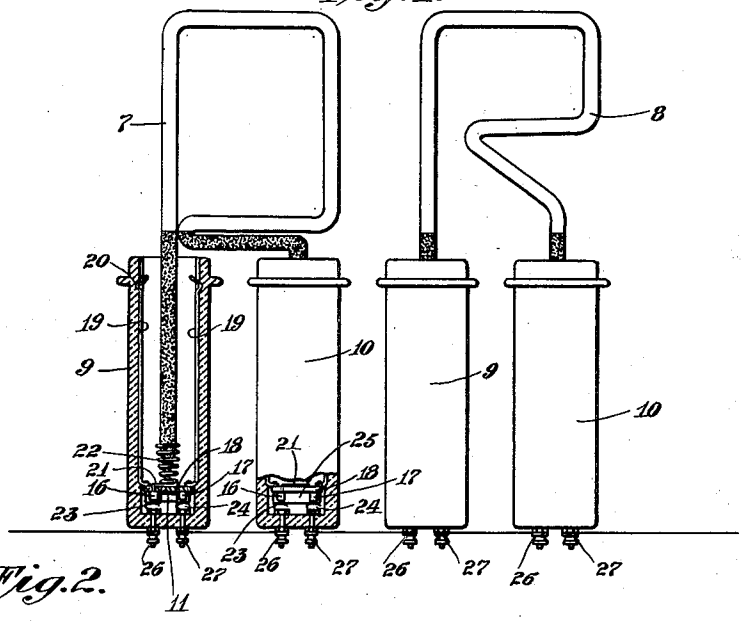


Fig. 2.

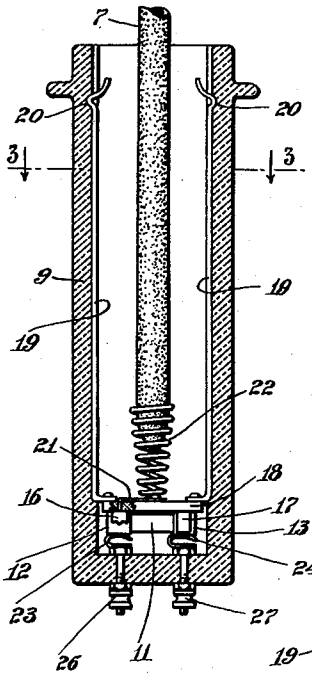


Fig. 3.

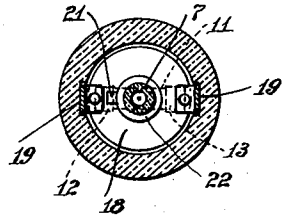


Fig. 4.

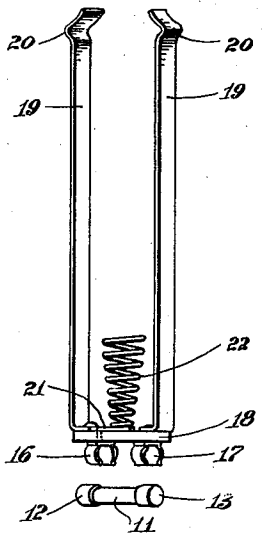


Fig. 5.

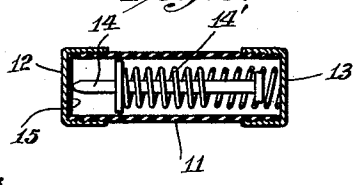
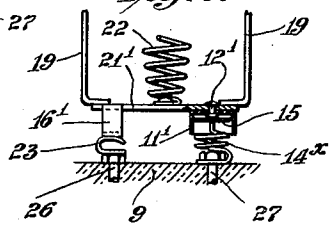


Fig. 6.



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ELECTRIC LUMINESCENT GAS TUBE PROTECTIVE DEVICE

Filed March 9, 1936 2 Sheets-Sheet 2

Fig. 7.

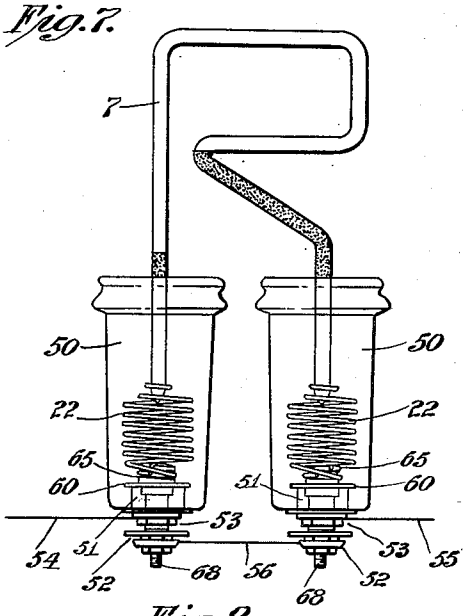


Fig. 9.

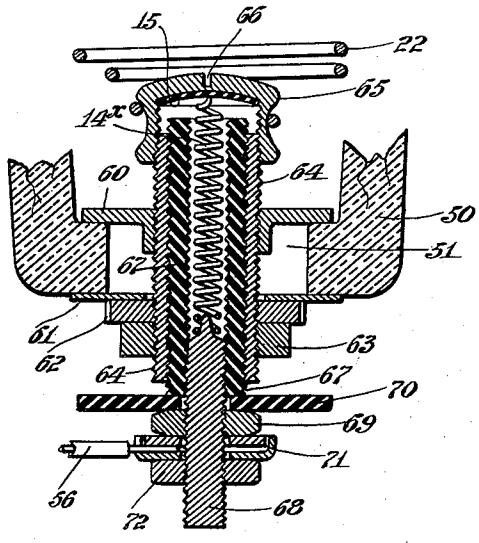


Fig. 8.

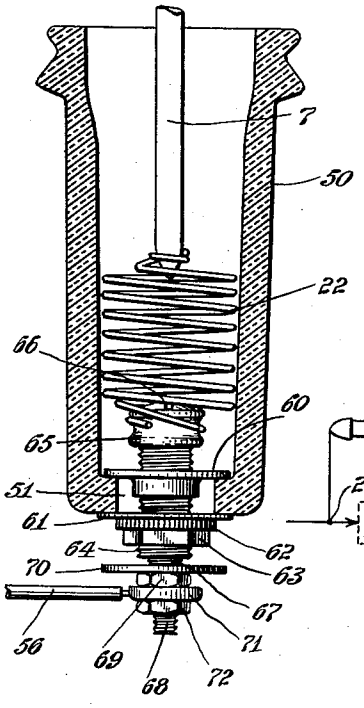


Fig. 10.

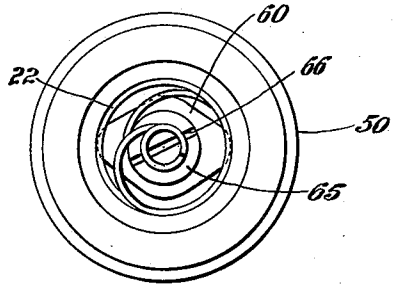


Fig. 11.

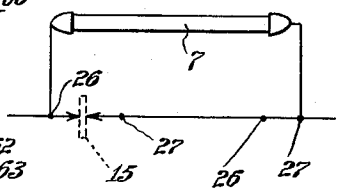
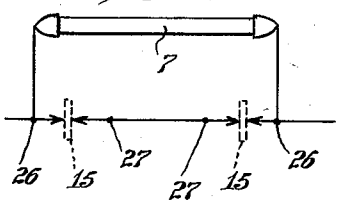


Fig. 12.



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ELECTRIC LUMINESCENT GAS TUBE PROTECTIVE DEVICE

Philip J. Kayatt, Yonkers, N. Y.

Application March 9, 1936, Serial No. 67,775

8 Claims. (Cl. 200—118)

My invention relates to electric lighting by means of incandescent gas tubes.

Such tubes are frequently employed for ornamental lighting and for advertising signs in which a number of separately mounted tubes are connected in a series circuit and supplied with current from a single source. In case of a breakdown causing an open circuit in any one of the tubes the entire circuit becomes useless.

The main object of my invention is to provide a means for automatically cutting out any one of the tubes which may thus become inoperative.

A special object is to provide a form of support for a tube, which support embodies a protective cutout.

Another object is to provide a form of protective support or housing for the end of a tube, which can be made of standard type and interchangeably used with or without the protective cutout.

Another object is to provide an automatic cutout which can be employed in a system of this character.

In carrying out the invention I provide a relay or cutout which can be mounted in an insulating housing for the end of the tube and which provides means for automatically short circuiting the tube in case of a breakdown of that tube.

This cutout may conveniently consist of a spring pressed plunger enclosed in a housing which is adapted to cause a short circuit automatically in case of an excessive voltage overload caused for instance by destruction of the tube and the consequent impression of an abnormally great potential difference across the terminals of the tube.

Such a relay may conveniently be mounted in a yoke adapted to be readily inserted into and removed from a terminal housing for a tube.

Fig. 1 is a side view showing two tubes with their terminals arranged in a single circuit. Two of the supports or housings for one of the tubes are shown in partial section with the cutout devices in place.

Fig. 2 is a longitudinal sectional view of one of the tube terminal housings with the cutout in place.

Fig. 3 is a transverse sectional view on the plane of the line 3—3 of Fig. 2.

Fig. 4 is a perspective view of the detachable relay carrying yoke and the relay detached.

Fig. 5 is a longitudinal sectional view showing one of the cutouts.

Fig. 6 is a fragmentary detail section and side view showing a modified form of cut-out.

Fig. 7 is a side elevation of a structure embodying yet another modified form of cutout, as connected in circuit.

Fig. 8 is a longitudinal partly sectional view of one housing with the cutout in place.

Fig. 9 is a detail of the modified cutout and terminal combination.

Fig. 10 is a top plan view of the terminal of Fig. 9.

Figs. 11 and 12 are schematic electrical circuits showing alternative modes of connection of my cutouts.

Two tubes 7 and 8 are shown as typical, with housings such as 9 and 10 for supporting the ends of the respective tubes. These housings will ordinarily be formed of insulating material of suitable design providing for ventilation and support in the usual manner.

The protective relay may consist of an insulating tube 11 with conductive caps 12 and 13 enclosing a plunger 14 and actuating spring 14'. The spring is in electric contact with the cap 13 and the opposite end of the plunger 14 is normally insulated from the cap 12 by a disc 15 which may be formed of paper, fibre or other suitable material adapted to be punctured by a high tension spark so as to permit the plunger to electrically engage the cap 12 in case of a breakdown of the tube.

The relay or protective device is adapted to be mounted in clips 16 and 17 carried by an insulating disc 18 which in turn is provided with spring arms 19 forming a yoke adapted to be inserted into an insulating housing and adapted to be resiliently held in place for instance by latching lugs 20 in corresponding recesses in the inner wall of the housing.

One of the clips, for instance 16, is provided with an extension conducting strip 21 which carries the spring socket 22 connecting with one end of the gas tube.

The housing is provided with interior spring terminals 23 and 24 adapted to engage the terminal caps 12 and 13 of the cutout or alternatively to engage a conducting tube 25 carried by the clips 16 and 17 as shown in housing 10 of Fig. 1. These spring contacts 23 and 24 are provided with external binding post terminals 26 and 27.

When the parts are assembled as shown in Fig. 1 and Fig. 2, current passes through terminal 26, spring 23, cap 12, clip 16, conductor 21, spring socket 22 through the tube to the spring socket 22 of the other housing 10, thence through its conductor 21, clip 16, conductor 25, spring 24 and terminal 27 of the housing 10.

Terminal 27 of housing 9 is connected to terminal 26 of housing 10 but of course there is no current passing through because of the insulating disc 15 in the cutout of housing 9.

In case of the destruction of tube 7 the high tension current will cause a spark between the plunger 14 and the cap 12 and current can then pass from terminal 26 of the housing 9 through the plunger 14, spring 14', cap 13, contact 24, to terminal 27 of the first housing and thence to terminal 26 of the next housing, thence through spring 23, conductor 25, spring 24 and terminal 27 to the next tube 8, which will thus remain lighted notwithstanding the destruction of tube 7.

Such constructions can be readily installed in place of the terminal housings usually employed in such systems.

Such a cutout may also be inserted between the ends of adjacent tubes in such a system where there is space to permit it and its terminals connected across the terminals of one or more such tubes.

In the form shown in Fig. 6 the removable unit has the conducting strip 21' and center contact socket 22 and the contact 16' adapted to engage the housing contact 23. The cutout has the spring 14^x connected to the housing terminal 27. This spring presses against the insulating disc 15 which is frictionally held in the cup-like housing or sleeve 11' which in turn is secured to the connecting member 21' by a rivet 12'. This cup 11' may be of insulating material. When the disc is punctured by an arc the spring 14^x completes the shunt circuit through the rivet 12' and conductor 21'. The position of the spring 14^x and the cup 11' and disc 15 may be reversed although the form shown makes it easier to replace the disc when a tube becomes defective.

When using the form of Fig. 6 in both housings, the live line wire must be connected to terminal 26, whether this form is employed in housing 9 or housing 10 of Fig. 1, thus leaving terminals 27 of both housings to be connected together. Alternatively, the insulating disc 15 may be omitted in the case of housing 10, which will give the same effect as the use of conducting strip 25 and cause the cutout in housing 9 to effect the short circuit in the case of a tube breakdown.

Reference to Figs. 11 and 12 will show schematically the equivalent electrical circuits, Fig. 11 illustrating the circuit when one protective device only is active and Fig. 12 the circuit when both housings have the cutouts actively connected, thus acting as two gaps in series with one another.

Referring now to Figs. 7, 8 and 9, I have here illustrated a modified form of combined housing, terminal, and cutout. Elements 50—50 are terminal housings of insulating material such as glass, provided at their narrower end with an aperture 51 through which extends the combined terminal and protective device. This latter has two portions electrically discrete from one another and affording at 52 and 53 respectively, electrical binding posts for the attachment thereto of conducting line wires 54 and 55 and interconnecting protective wire 56.

The combined terminal and cutout may be held in place, passing through aperture 51, by means of a threaded flange 60 and a washer 61 which latter is forced into contact with the glass 50 by a threaded nut 62.

Threaded nut 63 allows a wire to be clamped between it and nut 62, thereby affording electrical contact with the main metallic body 64, of the device. Body 64 is externally threaded, whereby all the nuts and flanges just described can move longitudinally therealong, when rotatively moved thereupon.

The inner end of body 64 is provided with a metal cap 65 affixed thereunto by means of an internal thread in the cap and readily removable by a slot 66 therein.

Body 64 is provided with a longitudinal concentric passage lined with suitable insulation, such as sleeve 67, threaded thereinto. This lining is also concentrically passaged to allow conducting rod 68 to be threaded therein and retained in place by nut 69 which clamps insulating washer or shield 70 over the outside end of the entire assembly. Washer 71 and additional nut 72 allow another wire to be affixed in contact with rod 68.

Cap 65 has its internal end surface lined with insulating disc 15 and rod 68 has at its inside end spring 14^x, whose pointed end pushes against disc 15.

The operation of this form of my invention is the same as described in connection with Fig. 6. The breakdown of the tube will cause a high potential to be developed between spring 14^x and cap 65. This will puncture disc 15 and spring 14^x will force its pointed end into contact with cap 65, thereby giving the desired cutout effect.

Fig. 10 illustrates how cap 35 may readily be removed by inserting a screw driver in the end of housing 50. The disc 15 may thus easily be replaced and the cutout rendered again effective, after the defective tube has been substituted by an operative tube.

As described in connection with Figs. 6, 11 and 12, I may use an effective cutout unit in both terminal housings, giving the equivalent circuit of Fig. 12, or else the insulating disc may be omitted from one terminal housing, thus giving the equivalent electrical circuit of Fig. 11.

Other uses and modes of connecting the cutout device of my invention will be apparent to those skilled in the art. Such uses include the protection of series filament type lamps, where a single cutout device may be connected directly in shunt with the lamp socket terminals, and will function as previously described, to short circuit a burned out or broken lamp, and to afford a sparkless and arcless cutout thereof.

I claim:

1. A safety device for a luminescent gas tube comprising an insulating housing, a yoke detachably mounted in said housing, a normally open circuit cut-out demountably supported in said yoke, and electrical terminals carried by the housing and connected to opposite ends of the cut-out.

2. A luminescent tube housing having two terminals, a yoke detachably mounted in the housing and a safety cut-out carried by the yoke and having electrical connection with said terminals.

3. As an article of manufacture, a yoke adapted to be detachably mounted in a terminal housing and having an insulating disc and spring arms, spring clips carried by said disc and a cut-out detachably carried by said clips and adapted to be automatically connected to terminal contacts in the housing when the yoke is inserted in the housing.

4. A combination terminal and cut-out for a luminescent tube, comprising an insulating housing open at both ends for the insertion of a tube in one end thereof, a body passing through the other end thereof, said body comprising two metallic portions electrically discrete from one an-

other, a detachable conducting cap on the inner extremity of said body and connected to one electric portion thereof, an insulating cap, puncturable by high electric potentials and insulating said cap from the other electric portion of said body, a spring member carried by and connected to said other electrical portion of said body, said spring member having one end pointed and compressibly forced against said insulating cap, whereby the puncturing of said cap will cause said pointed end of said spring to contact said conducting cap and thus electrically connect said two portions of the body, means for supporting a tube in electrical contact with said cap and means affording external electrical connections to said two discrete portions of said body.

5. A device according to claim 4, wherein said conducting cap lies completely within said insulating housing and is removable through the interior thereof.

6. A combined luminescent gas tube housing and protective device, including a housing open at one end to receive one end of a tube and at least partly closed at the other end, means within said housing for making contact with said tube end, a first terminal external to said housing and connected to said internal contact making means, a protective device of the short-circuiting type extending partly within said housing and partly exterior thereof, and connected to said internal contact means, a second terminal connecting to said protective device and exterior of said housing, and means lying wholly within said housing whereby said protective device is removable from within said housing and whereby both said external terminals are not disturbed by the removal of said protective device through the interior of said housing.

7. A combination gas tube housing and cut-out including a housing open at one end to receive the contact bearing end of a tube, resilient means for making contact therewith, located within the housing, a cut-out of the removable unit type located at least partly within the housing, means for connecting said resilient means to said cut-out and to an external circuit, means for additionally connecting another portion of said cut-out to another external circuit, and means for removing and replacing the removable unit of said cut-out, lying wholly within said housing and accessible through the open end thereof.

8. A combined terminal housing and cut-out for supporting and safeguarding an electric light bulb of elongated shape, including a housing of insulating material having an opening at one extremity for the insertion therein of one end of said bulb and having a second aperture at the opposite extremity thereof, a composite body passing through said second aperture, said body including two discrete portions comprising electrically conductive material, means for insulating said two respective portions from one another, a removable cap of conducting material located upon the inner end of said body and connected to one electrically discrete portion thereof, a wafer of insulating material located within said cap and capable of puncture by electrical potentials greater than those normally impressed upon said bulb, a conductive spring member having one extremity forcibly compressed against said wafer and having the other extremity thereof resting against part of the portion of said body which is electrically discrete from said cap, whereby the electrical puncture of said wafer will allow said spring member to expand and to interconnect said conducting cap and said other discrete portion of said body, means for supporting said bulb in electrical contact with said cap and means affording external electrical connections to said two discrete portions of said body.

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