

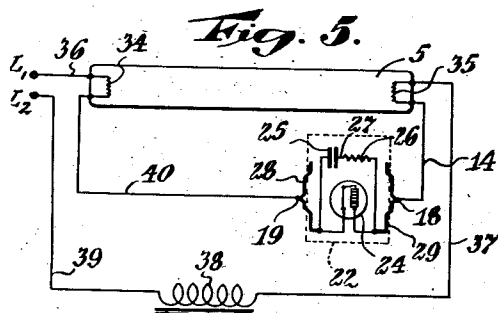
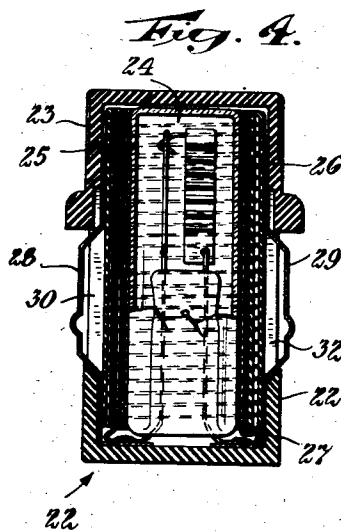
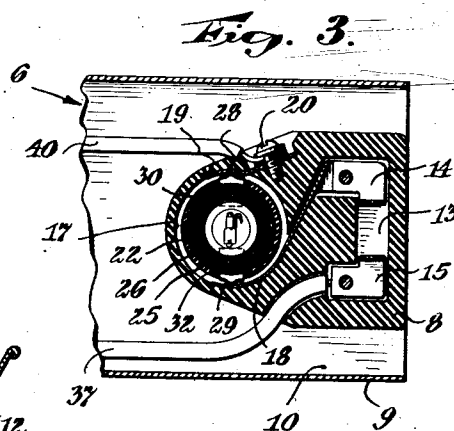
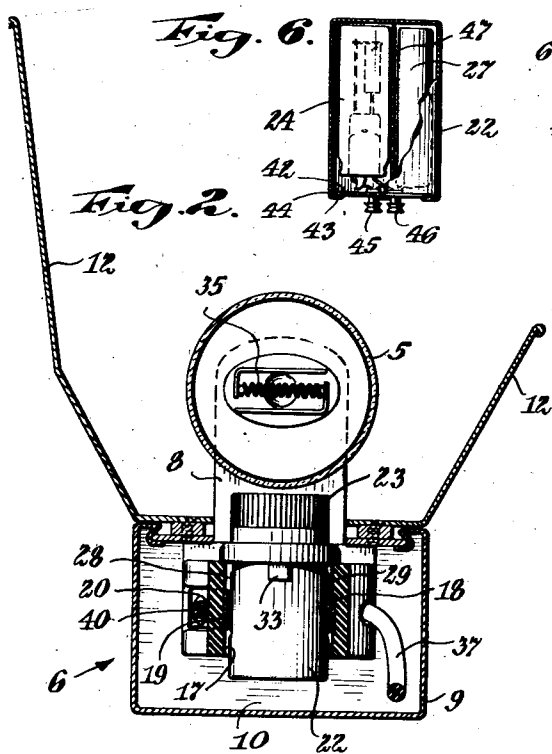
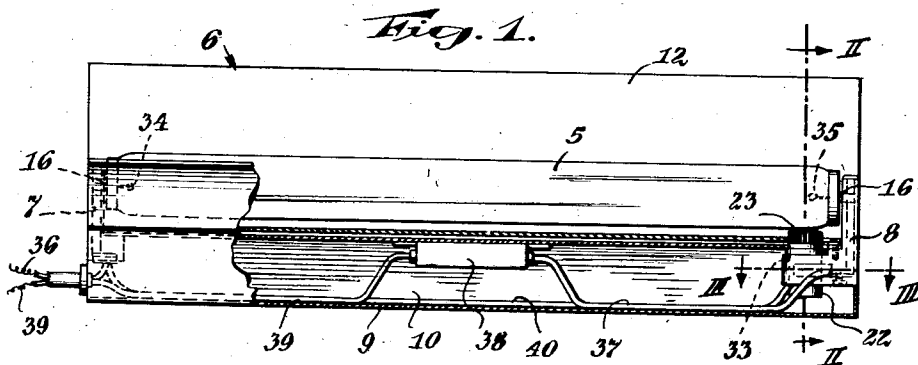
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2,297,886

GLOW RELAY MOUNTING

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2,297,886

GLOW RELAY MOUNTING

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5 Claims. (Cl. 176—124)

The present invention relates to discharge lamps and more particularly to the manner of mounting what are known to the art as fluorescent lamps and the auxiliary equipment required for their starting and operation.

Lamps of this type are now in extensive commercial use and in order to adapt them to operation at customary domestic voltages, auxiliary starting equipment is required since a voltage higher than the domestic source is necessary and after initiation of the discharge between the electrodes, the operating voltage is substantially less than that of the domestic source of supply.

An inductance element is therefore incorporated in the energizing circuit for the lamp which supplies a momentary high voltage "kick" to initiate the discharge and which limits the current during operation. To further facilitate starting of the discharge, filamentary electrodes having a coating of a material which emits a copious flow of electrons when heated are employed. These electrodes are initially connected in a series circuit to the domestic source until an electron emitting temperature is reached and a relay device then interrupts the series circuit causing the inductance element to then supply the high voltage "kick" and initiate the discharge. During operation of the lamp the relay device is held open to prevent re-establishment of the series heating circuit with operation of the relay consuming energy from the source, which thus decreases the efficiency of the lamp circuit.

In the patent to Edward C. Dench, No. 2,200,443, issued May 14, 1940, and assigned to the same assignee as the present invention, a glow relay device is shown and claimed which eliminates the disadvantages of prior devices since it consumes no power, thus increasing the efficiency of the lamp circuit and which tends to lengthen the useful life of the relay device. The present invention is in the nature of an improvement in the glow relay device as shown and claimed in above noted patent.

Heretofore it has been customary in mounting fluorescent lamps to conceal the auxiliary equipment by forming the inductance element and relay in a compact unit and positioning it in a compartment or canopy of the lamp fixture. This has proven to be objectionable because it requires dismantling of the lamp fixture in the event of failure of the relay device and a discarding of the entire unit.

It is accordingly an object of the present invention to provide a compact glow relay unit separate from the remainder of the auxiliary

equipment so that in the event of failure of the glow relay tube or associated elements of the unit, it may be readily removed and replaced.

Another object of the present invention is the provision of a compact glow relay unit housing a glow relay tube which consumes no energy during operation, as well as impedance elements for the suppression of radiations of radio frequency which might otherwise interfere with radio reception.

Another object of the present invention is the provision of a compact glow relay unit incorporating a glow relay tube which consumes no energy during operation, together with impedance elements for suppressing radiations of radio frequency and wherein the unit may be mounted in a readily accessible part of the lamp fixture.

A further object of the present invention is the provision of a compact glow relay unit incorporating a glow relay tube which consumes no energy during operation, together with impedance elements for suppressing radiations of radio frequency and wherein the unit is provided with contact terminals for mounting in the socket which forms a supporting terminal for one end of the lamp.

Still further objects of the present invention will become obvious to those skilled in the art by reference to the accompanying drawing wherein:

Fig. 1 is a front view partly in section of a fixture for a fluorescent lamp employing a compact glow relay unit in accordance with the present invention and showing the unit mounted in the socket forming the support for one end of the fluorescent lamp;

Fig. 2 is a sectional view taken on the line II—II of Fig. 1;

Fig. 3 is a fragmentary sectional view taken on the line III—III of Fig. 1;

Fig. 4 is a sectional view on an enlarged scale of the compact glow relay unit of the present invention as shown mounted in the socket of Fig. 1;

Fig. 5 is a schematic diagram of the compact relay unit together with the energizing circuit for the fluorescent lamp, and

Fig. 6 is a sectional view of a slight modification which the compact glow relay unit of the present invention may take.

Referring now to the drawing in detail, a fluorescent lamp 5 is shown in Fig. 1 which is supported within a fixture 6 by a pair of sockets or terminals 7 and 8. The fixture, as shown, has a base portion 9 forming a hollow trough-like compartment 10 and projecting upwardly from

the base is a reflector portion 12 for directing radiation from the lamp in a desired direction. The sockets 7 and 8 are formed of suitable insulating material, such as a phenolic condensation product, porcelain, hard rubber or the like, and are rigidly secured to the base portion 9 and extend above and below the top of the base 9, as can be more readily appreciated from Fig. 2.

Each socket is provided with a race-way 13 through which extend conducting strips 14 and 15 (see Fig. 3) so that the lamp terminals 16, when inserted in the sockets, establish electrical engagement therewith. By reference more particularly to Fig. 1 it will be noted that the socket 8 is L-shaped and in the base thereof a recess 17 is provided for the reception of the compact glow relay unit, as hereinafter more fully described. Within the recess 17 are a pair of peripheral contacts 18 and 19, one of which 18 (Fig. 3) is connected to the conductor strip 14, while the other contact 19 is connected to a terminal screw 20 adapted to be engaged by a conductor extending from the other socket 7.

The compact glow relay unit of the present invention, as shown more in detail in Fig. 4, is adapted to be inserted into the recess 17 to complete the electrical circuit for the lamp 5. This unit as shown comprises a molded casing 22, which may be formed of any suitable material, such as a phenolic condensation product, hard rubber or the like, or may be of metal such as aluminum provided the contact terminals are properly insulated from the metal casing, and is in two parts to facilitate assembly with the top portion having a knurled surface 23 to enable ready insertion and removal from the recess 17.

Disposed within the casing is a glow relay tube 24 such as shown in the above noted patent of Edward C. Dench and as still more specifically shown in the copending application in the name of R. F. Hays, Jr., et al., Ser. No. 265,164, filed March 31, 1939, and assigned to the same assignee as the present invention. Since this glow relay tube per se forms no part of the present invention, it is believed unnecessary that the same be described in detail. It should suffice to say that the relay 24 is provided with a pair of electrodes between which a glow discharge occurs upon the application of a potential thereto. The ensuing discharge heats one of the electrodes which is of bimetal, causing it to flex into contact with the other electrode, thus extinguishing the discharge. Upon cooling, the bimetallic electrode returns to its normal position, thus interrupting the circuit established upon engagement of the electrodes causing a high voltage surge or "kick" from an inductance element included in the lamp circuit with the glow relay tube.

In order to suppress radiations of radio frequency it has been suggested to employ a condenser of preselected capacity in electrical parallel with the glow relay tube or, to decrease the size of the condenser required, to utilize a series connected capacitance and resistance in shunt or electrical parallel with the glow relay tube.

According to the present invention the condenser 25 is wound in the form of a hollow tube having an inside diameter slightly larger than the diameter of the glow relay tube 24 so that the latter may be slipped inside the condenser substantially forming a loose core therefor. In addition a resistance 26 is wound upon the hollow tube with the condenser, as shown more particularly in Fig. 4, and one end of the resistance is connected at 27 to one plate of the condenser 25

to form a series connection. The remaining plate of the condenser 27, together with the leading-in conductor for one of the electrodes of the glow relay tube 24, are soldered or otherwise secured to an angular projection of a spring clip 28, and in a similar manner the other electrode lead-in and opposite end of the resistance 26 are secured to a similar spring clip 29, thus connecting the series connected condenser and resistance in parallel with the electrodes of the glow relay tube, as can be more readily appreciated from Fig. 5.

After making the necessary connections, the condenser tube and glow relay tube together with the spring clips 28 and 29 are pushed into the lower cylindrical portion of the casing 22. A pair of slotted openings 30 and 32 are provided in the casing 22 through which project the spring clips 28 and 29 for the dual purpose of retaining the assembly within the casing and to enable the spring clips to establish contact with the contacts 18 and 19 within the recess 17. The top of the casing 22 is then fitted to the lower half and the compact glow relay unit ready for insertion in the recess 17. As will be seen in Figs. 1 and 2 the casing 22 is provided with a projection or lug 33 which engages a recess in the periphery of the recess 17 so as to properly align the spring clips 28 and 29 with the contacts 18 and 19. The compact glow relay unit is accordingly positioned in the socket 8 and upon the lamp 5 being placed between the sockets 7 and 8, the relay unit, while readily accessible, is nevertheless concealed from view and entirely mechanically independent of the remainder of the auxiliary equipment.

By reference now more particularly to Fig. 5 a suitable source of electrical energy L1—L2 is shown which is of the customary domestic potential of 110 or 220 volts. The lamp 5, as previously mentioned, is provided with filamentary electrodes 34 and 35. One end of the filamentary electrode 34 is connected directly to the supply source L1 by a conductor 36, while one end of the filamentary electrode 35 is connected by a conductor 37 to one end of an inductance element 38, which for convenience is mounted in the trough 10 of the base 9 as shown in Fig. 1. A conductor 39 connects the opposite end of the inductance element 38 to the source of supply L2.

To complete a series heating circuit for the filamentary electrodes, the opposite end of the electrode 34 is connected by a conductor 40 to the contact terminal 19 and hence to the condenser 25 and glow relay tube 24, while the contact 18 together with the conducting strip 14 (Fig. 3) form the conductor which connects the opposite end of the filamentary electrode 35 to the remaining electrode of the glow relay tube 24 and resistance element 26.

In order to energize the lamp 5 a switch (not shown) is closed, supplying energy from the source L1—L2 which thus causes a glow discharge between the electrodes of the glow relay tube 24 since it is in a series circuit including the filamentary electrodes 34 and 35 of the lamp 5. The glow discharge heats the bimetallic electrode in a few seconds, causing engagement of the two electrodes of the glow relay tube accompanied by extinguishment of the glow discharge and positive completion of a series heating circuit for the filamentary electrodes 34 and 35 from the source L1—L2 through the inductance element 38.

The bimetallic electrode accordingly cools sufficiently in a few seconds and flexes back to normal position, thus interrupting the series

heating circuit. This "breaking" of the electrodes causes the inductance element to supply a voltage "kick" which is higher than normal line voltage and, since the electrodes 34 and 35 have now reached an electron emitting temperature, a discharge ensues between the filamentary electrodes 34 and 35, thus initiating operation of the lamp 5. During operation of the lamp the resistance of the glow relay tube is such that no further discharge occurs between its electrodes until the lamp 5 is extinguished by opening the switch.

The modification shown in Fig. 6 differs slightly from that previously described in that the casing 22 is of one piece cylindrical construction closed at one end and preferably is formed of light metal, such as aluminum. An insulated disc 42 supports the glow relay tube 24 and condenser 27 and forms a closure for the open end of the casing which as shown is held in place by bending lugs 43 projecting from the casing parallel to the disc as they pass through slots 44 in the insulated disc. The latter is provided with contacts 45 and 46 to which the glow relay tube 24 and condenser 27 are connected in electrical parallel as previously described, and in addition a strip of insulating material 47, such as mica or the like, may be inserted between the glow relay tube and the condenser merely as a precautionary measure to prevent short-circuiting of the conductors. This modification has the advantage that since the condenser 27 is mounted adjacent the glow relay tube, it may be of "stock" size and shape procurable on the market, thus eliminating the necessity of its being especially wound to a given dimension so as to surround the glow relay tube. Moreover, the contacts 45 and 46 may engage the terminals within the recess 17 through a suitable mechanical connection, such for example as a bayonet clutch arrangement.

If for any reason the glow relay tube, condenser or resistance burns out, it is not necessary to dismantle the entire fixture to replace the defective element as has heretofore been the case. On the contrary, the lamp need only be removed by one hand and other hand utilized to replace the compact glow relay unit, after which the lamp 5 is replaced in the fixture ready for operation, with the compact glow relay unit concealed by the lamp itself. The inductance element, which very rarely becomes defective, may be concealed on the rear of the fixture or in the trough as shown.

It thus becomes obvious to those skilled in the art that a compact glow relay unit is herein provided which is mounted in an accessible position on the socket for the fluorescent lamp entirely independent of any other auxiliary equipment required to initiate operation of the lamp so that the unit can be readily removed and replaced. Moreover, during operation the compact unit is concealed from view in the fixture by the lamp itself.

Although one embodiment of the present invention has been shown and described, other modifications thereof may be made without departing from the spirit and scope of the appended claims.

What is claimed is:

1. A compact relay unit for closing an electric circuit to a discharge lamp, comprising a casing, a relay within said casing provided with a pair of contacts, an impedance element within said casing and connected in electrical parallel with

the contacts of said relay for suppressing radiations of radio frequency, said relay and said impedance being spaced in close proximity to each other and to the interior wall of said casing to confine the dimensions of said casing to a minimum, and contact terminals on said casing connected to the contacts of said relay and to said impedance element and adapted to detachably engage a socket upon insertion of said relay unit therein.

2. A compact glow relay unit for starting gaseous discharge lamps comprising a casing, a glow relay tube carried by said casing and provided with electrodes therein between which a discharge occurs upon the application of a suitable potential thereto and adapted to be connected to the electrodes of said discharge lamp for completing a series heating circuit therefor, an impedance element carried by said casing and connected in electrical parallel with the electrodes of said glow relay tube for suppressing radiations of radio frequency, said glow relay tube and said impedance being spaced in close proximity to each other and to the walls of said casing to confine the dimensions of said casing to a minimum, and contact terminals carried by said casing connected to the electrodes of said glow relay tube and to said impedance element and for detachably engaging a socket upon insertion of said glow relay unit therein to complete the connection to the electrodes of said discharge lamp.

3. A compact glow relay unit for starting gaseous discharge lamps comprising a casing, a glow relay tube carried by said casing and provided with electrodes therein between which a discharge occurs upon the application of a suitable potential thereto and adapted to be connected to the electrodes of said discharge lamp for completing a series heating circuit therefor, a condenser disposed interiorly of said casing and connected in electrical parallel with the electrodes of said glow relay tube for suppressing radiations of radio frequency, said glow relay tube and said condenser being spaced in close proximity to each other and to the walls of said casing to confine the dimensions of said casing to a minimum, and contact terminals extending through said casing and connected to the electrodes of said glow relay tube and to said condenser for detachably engaging a socket upon insertion of said glow relay unit therein to complete the connection to the electrodes of said discharge lamp.

4. A compact glow relay unit for starting gaseous discharge lamps comprising a casing, a glow relay tube carried by said casing and provided with electrodes therein between which a discharge occurs upon the application of a suitable potential thereto and adapted to be connected to the electrodes of said discharge lamp for completing a series heating circuit therefor, an impedance element comprising a condenser and a series connected resistance connected in electrical parallel with the electrodes of said glow relay tube for suppressing radiations of radio frequency, said glow relay tube, said condenser and resistance being spaced in close proximity to each other and to the walls of said casing to confine the dimensions of said casing to a minimum; and contact terminals extending through said casing and connected to the electrodes of said glow relay tube and to said condenser and resistance for detachably engaging a socket upon insertion of said glow relay unit therein to complete the connection to the electrodes of said discharge lamp.

5. A compact glow relay unit for starting gase-

ous discharge lamps comprising a cylindrical casing, a glow relay tube disposed in said casing and provided with electrodes therein between which a discharge occurs upon the application of a suitable potential thereto and adapted to be connected to the electrodes of said discharge lamp for completing a series heating circuit therefor, a tubular wound condenser and a series connected resistance disposed between said glow relay tube and the interior wall of said casing and connected in electrical parallel with the electrodes of said glow relay tube for suppressing radiations of radio frequency, said glow relay tube,

5 said condenser and resistance being spaced in close proximity to each other and to the walls of said casing to confine the dimensions of said casing to a minimum; and contact terminals extending through said casing and connected to the electrodes of said glow relay tube and to said condenser and resistance for engaging a socket upon insertion of said glow relay unit therein to complete the connection to the electrodes of said discharge lamp.

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