Nov. 17, 1953 E. GERMER 2,659,835

ELECTRIC DISCHARGE DEVICE

Filed Jan. 20, 1951

Fig. 3

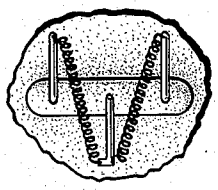


Fig. 1

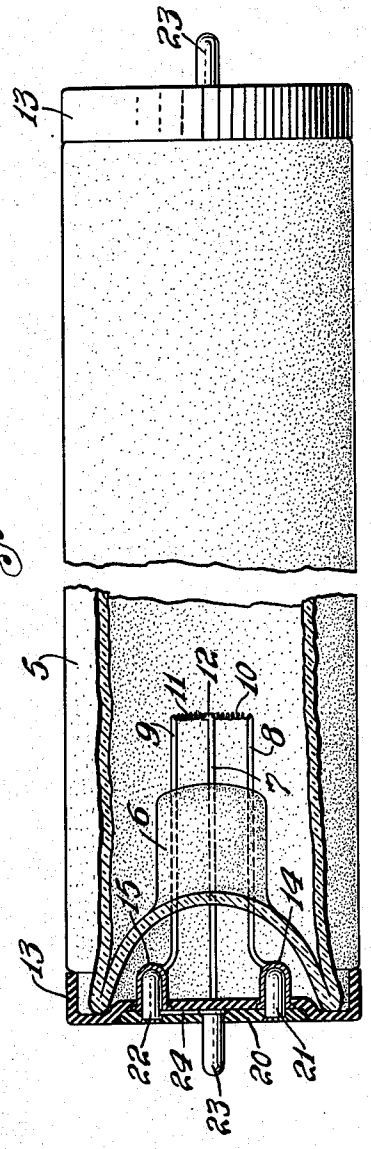


Fig. 4

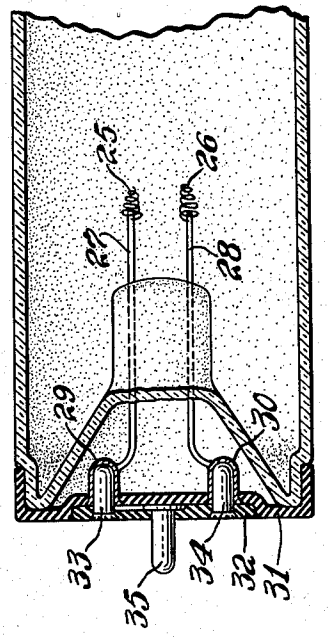
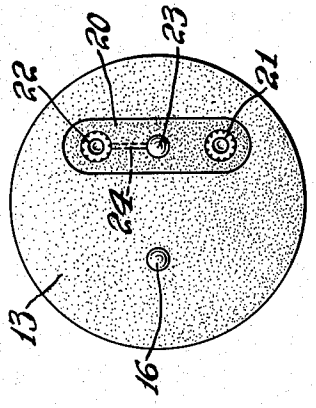


Fig. 2



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ELECTRIC DISCHARGE DEVICE

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1 Claim. (Cl. 313—211)

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This invention relates to electric discharge devices and is concerned in particular with arrangements for electrodes and terminals in such devices.

Electric discharge devices fail during operation usually because of failure of the electrodes or of a lead-in conductor connecting an electrode to a contact terminal of the device. The electrodes may become broken or when activated electrodes are used they may in time become inactivated, whereby the device can no longer function in the manner for which it was designed.

It is a general object of the invention to provide an electric discharge device having a substantially longer useful life than devices of such type manufactured heretofore. Another object is to provide a discharge device having the above stated advantage and yet is simple in construction and inexpensive to manufacture. A further object of the invention is to construct the new device in a manner whereby it may be employed in conjunction with already existing auxiliary equipment such as lamp sockets, reflectors, etc., without requiring alteration of such auxiliary equipment. Further objects and various advantages will appear from the following detailed description, taken in connection with the accompanying drawing in which:

Fig. 1 is a view, partly in section, of a discharge device constructed according to the invention,

Fig. 2 is an end view of the device shown in Fig. 1,

Fig. 3 is an end view of the electrode structure of the device illustrated in Fig. 1, and

Fig. 4 is a sectional view of an end portion of a modified form of a lamp constructed in accordance with the invention.

Like numerals designate corresponding parts throughout the several views of the drawing.

Broadly stated, the invention resides in the provision in a vapor discharge device of a plurality of electrodes and connecting them to the contact terminals of the device in a suitable manner, whereby upon failure of one electrode, or of a lead-in conductor, another electrode may be readily connected to the source of current and the device again be used as before the failure.

Referring now to Fig. 1 of said drawing, there is illustrated a lamp, constructed in accordance with the invention, having an envelope 5 of light transmissive material. If the lamp is designed to emit ultra-violet rays, its envelope is formed of quartz or other ultra-violet transmissive material as is well understood by those skilled in the art. The lamp may be of the known fluorescent type, i. e. it may have a coating of fluorescent material on its inner surface for converting invisible radiations to visible light. The lamp is preferably filled with rare gas and contains a small amount of mercury or other vaporizable metal. Each end of the tubular envelope 5 is closed by a flared seal-stem 6 in known fashion.

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Stem 6 has three lead-in conductors 7, 8 and 9 vacuum tightly sealed therein for supporting the two electrodes 10 and 11 within the envelope. The center conductor 7 is provided with a head 12 on its inner end which may be suitably formed by bending the end of the wire 7 as shown in the drawing. Electrode 10 is fastened to the end of wire conductor 8 and to the head 12 while electrode 11 is connected between head 12 and conductor 9. The head 12 separates the two electrodes so that heat from one of them will not be directly conducted to the other during operation of the lamp. Electrodes 10 and 11 may be of the known activated or non-activated types depending on the use for which the lamp is designed.

On each end of the tubular envelope 5 is fixed an insulating cap 13. Instead of being in one piece as shown in the drawing the cap 13 may comprise an insulating plate held against the sealed end of the glass tube by a flanged sleeve that fits over the end of the tube. The cap 13 is provided with two inwardly projecting sockets 14 and 15, and with an outwardly extending terminal pin 16, said sockets and pin being formed of an electrically conductive material. The center conductor 7 is electrically connected to the pin 16 while conductors 8 and 9 are connected to the sockets 14 and 15 respectively.

For connecting the sockets 14 and 15 into the lamp circuit, the cap 13 is provided with a plate 20 of insulating material having plugs 21 and 22, located on the same side of the plate 20 and dimensional to form a tight fit in the sockets 14 and 15. Also supported on the plate but on the opposite side of the plate from the sockets is a terminal pin 23 similar in construction to the terminal pin 16. A suitable electrical conductor 24 connects the terminal pin 23 with the plug 22, the plate 20 being recessed to accommodate the conductor 24 for permitting the plate 20 to lie flush against the cap 13. The cap 13 may also be recessed as illustrated to accommodate the plate 20.

When the lamp, illustrated in Fig. 2 is connected into an electric circuit, current will pass

between the terminal pins 16 and 23, through lead-in conductor 7, electrode 11, lead-in conductor 9, socket 15, plug 22, and conductor 24 which is connected to the terminal pin 23. The electrode 11 will thus become heated and will cause an arc to form between it and an electrode located in the opposite end of the lamp, all as is well understood by those skilled in the art.

When the electrode 11 fails for any reason as by being burned out or by becoming inactivated, if originally activated, it may be easily disconnected from the electric circuit and replaced by the electrode 10 by merely removing the plate 20 and inserting the plug 22 into the socket 14, whereby current will pass through the lead-in conductor and the electrode 10 to energize the electrode 10 in a manner similar to that described above for the electrode 11.

As is best shown in Fig. 3, each of the electrodes 10 and 11, may be located nearer to the axis of the tubular envelope by bending the inner portion of the center conductor 7 out of the plane of the conductors 3 and 9, whereby the electrodes 10 and 11 lie substantially side by side, rather than in an end to end relation.

The invention is adapted for use in devices employing self-heated electrodes. Such devices require only one terminal pin on each end of the lamp, the pin being connected by a single lead-in conductor to an electrode. The modification illustrated in Fig. 4, shows a portion of a lamp constructed in accordance with the invention, and employing self-heated electrodes. Referring to Fig. 4 electrodes 25 and 26 are supported on the lead-in conductors 27 and 28, representative the lead-in conductors 27 and 28, respectively, which in turn are connected to the sockets 29 and 30 respectively, in the end cap 31. The end cap 31 is provided with a plate 32 having plugs 33 and 34 and terminal pin 35 similar in construction to the plate 20 described above. Switching from one electrode to another is effected in the manner explained in the above description of Fig. 1.

It has been proposed heretofore to construct radio tubes, X-ray tubes, and incandescent lamps with supplementary filaments which could be connected in circuit upon failure of the first used filament. This, to my knowledge, has not, however, been done heretofore with electric discharge devices, and it has not been accomplished with the simplicity and effectiveness that characterize this invention.

While I have described the invention more specifically with reference to a mercury or other vapor lamp, which may be a low pressure lamp, e. g. a germicidal or fluorescent lamp, or a high pressure lamp, it will be noted that the invention is equally applicable to other types of electric discharge devices having a gaseous or metal vapor filling, or both.

The foregoing disclosure is to be regarded as descriptive and illustrative only and not as restrictive or limitative of the invention, of which obviously an embodiment may be constructed without departing from the general scope herein indicated and denoted in the appended claim.

What I claim is:

Electrical discharge lamp comprising a tubular envelope of vitreous material, a rare gas and a small amount of vaporizable metal in said envelope, each end of said envelope having a pair of separate conductors sealed therethrough, a self-heating electrode on each of said conductors inside of said envelope, a cap positioned on each end of said envelope, said cap being recessed inwardly thereof, a pair of spaced electrically conductive sockets in said recess, one of said conductors on the outside of said envelope being connected to one of said sockets and the other of said conductors being connected to the other of said sockets, a movable nonconductive plate member fitted into said recess, a single terminal pin projecting outwardly of the outer surface of said plate member, a pair of plugs on the under surface of said plate member, each engageable with one of said sockets, a conductor on the under surface of said plate member alternately connectable between one and the other of said sockets and said terminal pin by movement of said plate member.

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