

ELECTRIC DISCHARGE DEVICE

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Fig. 1.

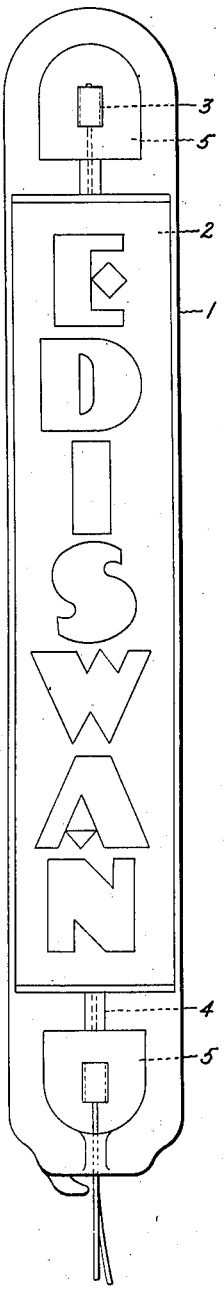


Fig. 2.

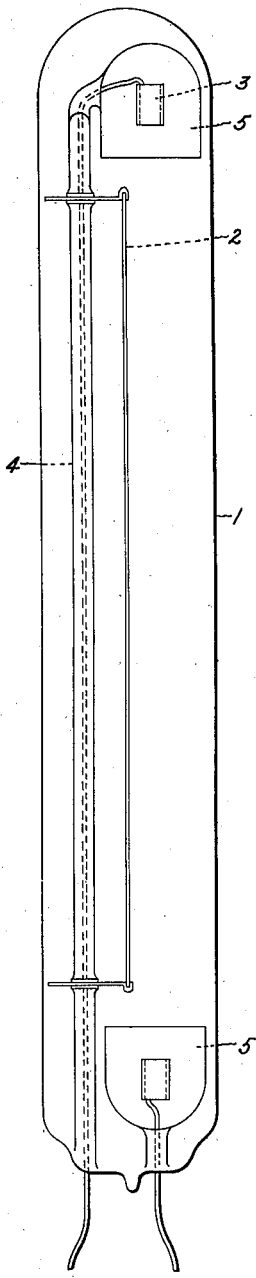
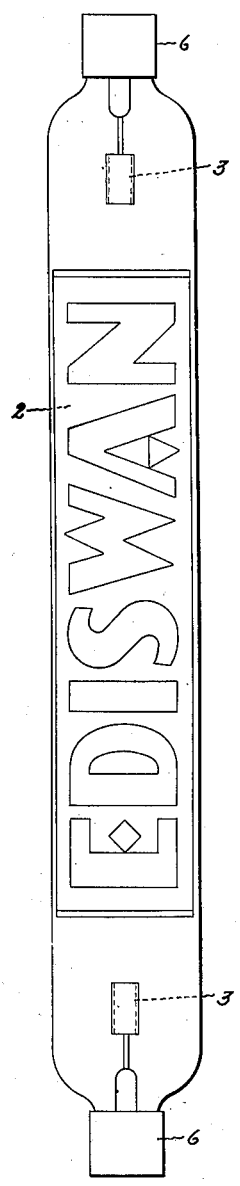


Fig. 3.



Inventor:
Thomas W. Price,
by *Harry E. Dunham*
His Attorney.

UNITED STATES PATENT OFFICE

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ELECTRIC DISCHARGE DEVICE

Thomas W. Price, Whitton, Twickenham, England, assignor to General Electric Company, a corporation of New York

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3 Claims. (Cl. 176—14)

This invention relates to electric discharge devices and more particularly such devices commonly used for advertising signs and the like of the type in which inscriptia, such as words, letters, figures or designs are mounted in a glass tube and painted or coated with a fluorescent substance which glows when an electric discharge is passed through the tube.

The object of this invention is to provide an improved device of the above type and to that end it consists in mounting the design or letters, which have previously been coated with a fluorescent substance, in a tube which is then evacuated and provided with a filling of a metallic vapor or of a rare gas mixed with a small percentage of a metallic vapor. The invention further consists in improvements in the construction of such devices more particularly described below.

The accompanying drawing illustrates one method of carrying my invention into effect, Figs. 1 and 2 being front and side elevations respectively of a single-ended device and Fig. 3 a side elevation of a double-ended device.

In carrying out this invention according to the construction illustrated in Figs. 1 and 2, a glass tube 1 is provided which may be either straight as shown, or bent into any desired shape. Inside this tube, there is mounted a sheet 2 of mica, silica, glass or other suitable substance on which the words, letters or designs are painted or outlined with a fluorescent substance, such as a sulphide of zinc, willemite, calcium tungstate or similar materials. The tube is then exhausted and filled with a rare gas such as neon, argon, helium or other suitable gas to a pressure of preferably from 8 to 10 mm. with a small percentage of mercury or other metallic vapor or vapors.

By accurately adjusting gas and vapor pressure of the discharge tube and by suitably neutralizing any charges which might accumulate on the surface of the tube, these fluorescent signs can be made to operate direct from commercial electric light supplies without transformers, a suitable ballast resistance being required.

The gas or vapor pressure may be varied within fairly wide limits but is preferably adjusted so that the discharge consists of as few ions as is possible, consistent with satisfactory and stable operation of the tube. The inscriptia painted in fluorescent materials will then glow due to the ultra-violet radiation of the discharge, giving an intense and brilliant illumination which is only very slightly obscured by the visible portion

of the glow discharge. Baffles may be introduced into the tubes to deflect the discharge onto or over the fluorescent surfaces.

In the case of a tube to be used vertically without any exterior wiring, the discharge tubes may be provided with an electrode 3 mounted on the end of a long re-entrant tube 4 passing up through the main tube to the far end, thus protecting the high voltage connections of the electrode.

The electrodes 3 may be of cylindrical construction of iron or other non-sputtering metal and may be enclosed in glass or other insulating cups 5 which serve as baffles to direct the ultra-violet rays onto the fluorescent surfaces and to prevent the surface of the envelope from blackening. Owing to the small amount of ultra-violet energy required to excite the fluorescent substances, the current required is small and the voltage across the tube low; a tube of three or four feet, consuming only four or five watts and giving a luminous intensity sufficient to attract attention even in bright daylight.

The device shown in Fig. 3 is substantially the same as that shown in Figs. 1 and 2 but is provided with electrical connections at both ends, so that the tube 4 is not required, as the electrodes 3 are each electrically connected to the caps 6 at their respective ends of the tube.

Tubes of this type are very useful for shop window advertising and a plurality of tubes may be made up to form a design, the separate tubes being connected in series or parallel with flexible or rigid connections. A single tube may be mounted directly on a base containing a transformer, the primary of which is connected to an ordinary lighting point of a commercial supply, or the transformer may be contained in a separate casing.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An electric discharge device comprising an envelope containing a plurality of electrodes and an ionizable medium providing a discharge rich in ultra-violet radiation between the electrodes, a support for inscriptia mounted in the path of the discharge, said support being of material inactive to the radiations of the discharge, said inscriptia being smaller in area than said support and being of material which fluoresces when activated by ultra-violet radiation, and baffles in said envelope for deflecting the discharge onto the fluorescent surfaces.

2. A sign lamp comprising an envelope containing a plurality of electrodes, and a mixture of inert gas at a pressure of about 8 to 10 mm.

Hg., and a metal vapor, a support mounted between the electrodes, said support being of material inactive to the radiations of the discharge, sign inscriptia coated on said support, said inscriptia being formed of material which fluoresces when activated by ultra-violet radiation, said inscriptia being smaller in area than said support and said electrodes being provided with electron-reflecting members which direct the discharge produced between the electrodes onto the fluorescent surfaces.

3. An electric sign lamp comprising a trans-

parent envelope, a gaseous medium therein, a plurality of electrodes spaced apart in said envelope, a support for inscriptia mounted between said electrodes in said envelope, fluorescent materials applied in the form of inscriptia on said support and cup shaped baffles surrounding said electrodes in said envelope, said baffles being open in the direction of the discharge path between said electrodes to direct the discharge between said electrodes into effective fluorescence exciting relation with respect to said inscriptia.

THOMAS W. PRICE.