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ELECTRODE FOR DISCHARGE DEVICES

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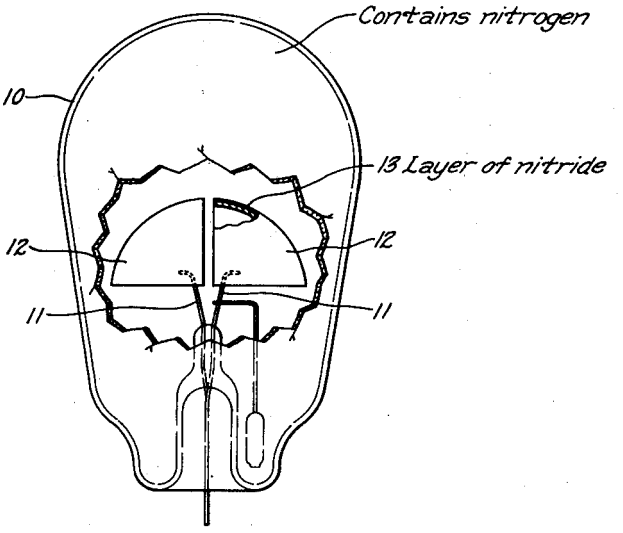

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ELECTRODE FOR DISCHARGE DEVICES

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3 Claims. (Cl. 176—122)

This invention relates to electrodes for discharge devices of the type wherein the medium through which the discharge is adapted to pass is a mixture of nitrogen with a rare gas. More especially it relates to electrodes for cathode-glow devices of this type, that is to say devices of the type wherein the greater part of the light emitted from the discharge comes from immediately around that electrode which is acting as cathode.

Discharge devices of this type are used mainly for exciting luminescent materials; for the proportion of near ultra-violet radiation that they emit is large. Those manufactured commercially hitherto have been mainly low-voltage cathode-glow devices (operating on about 110 volts A. C.) and have had electrodes of nickel or iron activated by alkaline earths. In these circumstances the loss of nitrogen by clean-up is not rapid. But when attempts are made to modify this kind of device so that it is adapted to operate on the high mains voltages (i. e. 200–260) usual in Great Britain, the rate of clean-up is apt to increase so greatly that the life of the device is short. The object of this invention is to overcome this difficulty.

It is attained, according to the invention in its narrower respect, by making the electrodes of iron and coating them with a layer of nitride. For it is found that iron nitride is stable under the discharge and that, if electrodes are coated with it, the clean-up of nitrogen is very slow. At the same time (perhaps it is cause and effect) the nitrided electrodes sputter very little.

The layer of nitride can often be formed by running a discharge in nitrogen between the electrodes for a long period. But a more economical procedure is to use one of the well known nitriding processes used in surface-hardening iron. Thus the electrodes may be coated with nitride by heating them to a suitable temperature, e. g., about 600° C., in ammonia.

The shape of the electrodes can apparently be any that is usual; thus in cathode-glow devices, the usual beehive construction is suitable.

In the foregoing statements the provision that the electrodes shall be of iron is inserted because no other metal is known on which a stable layer of nitride can easily be formed by known methods and which is suitable as an electrode. It is conceivable however that methods of forming a stable layer of nitride on other metals suitable as electrodes may be discovered. According to the invention in its more general respect, the electrodes are formed of a metal on which a layer of nitride can be formed by treating suitably the pre-formed electrode, which layer is stable under the discharge.

The accompanying drawing is an elevation, partly in section, of one form of cathode glow discharge device to which my invention may be applied. The device comprises a glass bulb 10 containing a gaseous atmosphere comprising nitrogen. Lead wires 11, 11 extend into the bulb 10 and carry electrodes 12, 12 which are formed as quadrants of a hollow sphere, so arranged as to jointly present a hemispherical surface toward the end of the bulb 10. Electrodes of this shape are sometimes referred to as a beehive construction. The said electrodes 12, 12 are preferably made of iron and, in accordance with this invention, are provided with a surface layer 13 of iron nitride.

We claim:

1. As a new article of manufacture, an electric discharge device comprising an envelope containing a gaseous atmosphere comprising nitrogen, and having therein iron electrodes initially surfaced with a layer of iron nitride.

2. As a new article of manufacture, an electric discharge device of the cathode-glow type comprising an envelope containing a gaseous atmosphere comprising nitrogen, and having therein metal electrodes initially surfaced with a layer of nitride on the electrode metal.

3. As a new article of manufacture, an electric discharge device of the cathode-glow type comprising an envelope containing a gaseous atmosphere comprising nitrogen, and having therein iron electrodes initially surfaced with a layer of iron nitride.

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