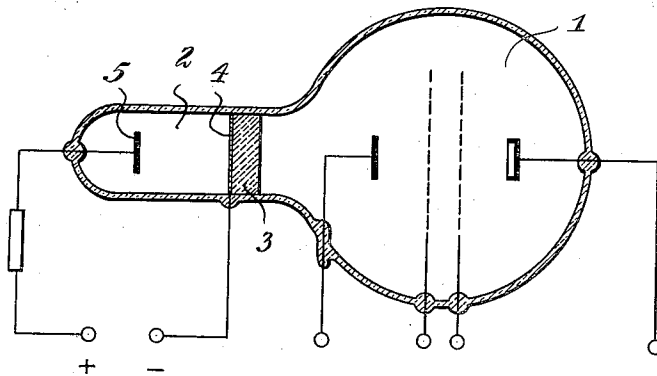


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GAS DISCHARGE DEVICE
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GAS DISCHARGE DEVICE

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3 Claims. (Cl. 250—27.5)

The invention relates to electron tubes, and especially to such tubes which operate with the gas filling in order to decrease the space charge.

5 An object of the invention is to maintain a constant pressure of gas in the discharge space of a gaseous discharge device.

10 Other objects and advantages of the invention will be apparent from the following description and drawing, in which the figure illustrates a preferred embodiment of the invention.

15 One of the problems with gas discharge devices, especially those utilizing a very low pressure of gas, is the constant maintaining of the desired gas pressure. The gas is subject to clean-up and absorption by the various interior parts of the device, especially the glass walls. For this reason the tube may be originally designed to operate upon the occurrence of a given condition, and then fail because the gas pressure has changed.

20 It is an object of this invention to provide means for constantly maintaining a fixed pressure of gas in the discharge path of such a tube. The invention in particular, is an improvement over the invention of utilizing a glow discharge on a thin metallic partition, for example, of iron, in a storage container for the gas to pump through from this storage container.

25 In particular, my invention provides means for utilizing gases with large molecular weights, and having a mechanically stronger partition than is possible with the thin metallic partition of iron, for example.

30 In particular, the invention contemplates having a storage container with a porous partition which is coated with a thin metal coating on the side facing the storage container. A glow discharge is started in the storage container in such a way that the metal coating serves at least part of the time as a cathode or is brought to cathode potential.

35 The single figure of the drawing illustrates the operation of the process according to the invention. The low pressure discharge space 1 contains many suitable electrodes, such as the anode, cathode, and one, or a plurality, as desired, of control elements diagrammatically illustrated. This portion of the vessel is partitioned off from the gas storage chamber 2 by a porous partition 3, which may, for example, be of ceramic material, such as porcelain. A metal film or coating 4 is preferably on the side of the porous partition 3, facing the storage space 2. This metal coating may be of iron, nickel, gold or other suitable metals, and may be deposited on the porous partition by evaporation.

A direct or alternating current can be used for starting the glow discharge in the storage space 2 between the electrode 5 and the metal coating 4. With direct current, the metal coating is a cathode. A glow discharge is started in the storage space and positive gas ions are accelerated to the cathode 4 and penetrate through it. The gas ions are neutralized and pass through the porous partition 3 into the evacuated space 1.

10 The partition 3 gives great strength to the arrangement so that the metal coating can be made very thin. The metal coating 4 can be made approximately 10^{-6} to 10^{-5} cm. thick. The metal coating can, of course, be made thicker, such as the order of 10^{-2} cm. On starting a glow discharge, the positive ions no longer enter through the whole partition, but they remain fixed thereon. But, after neutralization of the gas ions, a higher gas pressure results inside the partition which results in a partial diffusion of the gas molecules to the discharge space 1. The exact determination of the amount of gas introduced into the space 1, is regulated by the current and voltage of the glow discharge, and by the duration of this discharge.

25 An advantageous form of the arrangement of the invention is to utilize a metallic grid before the metal coating, so that the thin metal coating is protected. The grid can be used as a cathode for the glow discharge, and the metal coating has approximately the potential of the cathode or a somewhat higher potential.

30 The glow discharge is then extended, principally, towards the grid, but there are still several positive ions present which hit on the surface of the metal coating with such velocity that they can enter through the metallic coating and the porous partition 3 to the space 1.

35 The porous partition is preferably made of ceramic material, for example, "chamotte" and the material known under the name of "Steatite" and also some other porous materials which are permeable to gas, for example, Schotts glass filters and the like.

40 Many modifications may be made in the preferred embodiment illustrated, and its application to various devices, and accordingly, only such limitations are intended upon the invention, as are within the spirit and scope of the following claims.

What is claimed:

1. A discharge device comprising a vacuum-tight container, a cooperating anode and cathode forming a discharge space therebetween within said container, a porous wall partitioning a por-

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tion of said container, a gaseous atmosphere in said portion, a metallic coating on said porous wall for normally preventing said gaseous atmosphere from passing through said wall, and electrode means in said portion for passing gas through said wall when desired.

2. A discharge device comprising a container, a porous partition and a metallic coating thereon normally resistant to gas transfer, said porous partition and metallic coating dividing the container into compartments, a gas reservoir in a first compartment, an electrode in said first compartment for cooperating with said metallic coating on said wall to form a discharge space therebetween, said metallic coating being permeable for gas because of the discharge in said space, a

second compartment, a gaseous medium and an electrical device in said gaseous medium in said second compartment.

3. A discharge device comprising a container, a porous wall and a metallic coating on said wall dividing said container into two compartments, a gaseous medium at a higher pressure in one compartment than in the other compartment, an electrode in said compartment of higher pressure for forming a discharge to be directed at the metallic coating on said wall whereby gas is pumped through said coating and wall to the other compartment, and an electrical device in the other compartment.

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