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M. IMAMURA ET AL

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GASEOUS ELECTRIC DISCHARGE DEVICE

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Fig. 1

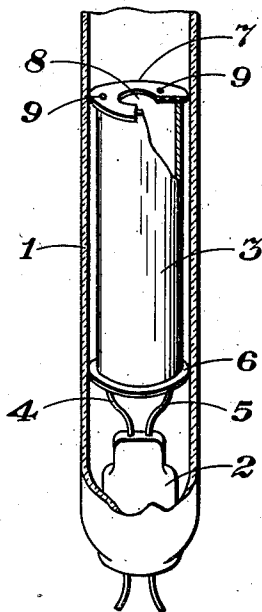
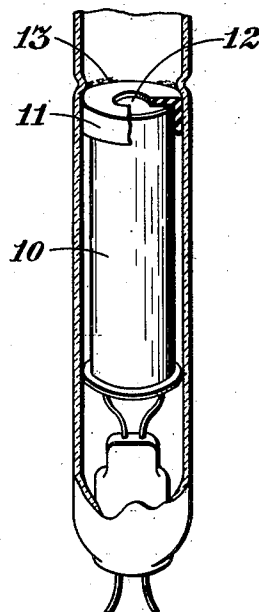


Fig. 2



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GASEOUS ELECTRIC DISCHARGE DEVICE

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2 Claims. (Cl. 176-126)

The present invention relates to gaseous electric discharge devices generally and more particularly the invention relates to electrodes for such devices.

It is well known in the art that an abnormal current intensity develops at the sharp extremities of an electrode in an electric discharge device during the operation of the device which causes a comparatively rapid sputtering and vaporization of the electrode material at those parts. The sputtered and vaporized electrode material forms opaque deposits on the walls of the container of the device to shorten the useful operating life of the device.

The object of the invention is to prevent the formation of opaque deposits of electrode material on the glass walls of the container of an electric discharge device. A further object of the invention is to prevent the development of an abnormal current intensity at the extremities of the electrodes in electric discharge devices during operation thereof. Another object of the invention is to prevent abnormal sputtering and vaporization of the electrode material at particular portions of the electrodes. Still further objects and advantages attaching to the device and to its use and operation will be apparent to those skilled in the art from the following particular description and from the appended claims.

In accordance with these objects the invention comprises a protecting means of insulating and heat resisting material covering the extremities of the electrode of an electric discharge device. Said protecting means prevents the development of abnormal conditions of current intensity at those parts of said electrode which avoids rapid sputtering and vaporization of the electrode material at said rim parts and thus prevents the formation of opaque deposits of electrode material on the glass walls of the container of the electric discharge device during operation thereof.

In the drawing accompanying and forming part of this specification two embodiments of the invention are shown in which

Fig. 1 is a perspective view of one embodiment of the invention, the container of the electric discharge device being shown partly in section and

Fig. 2 is a similar view of another embodiment of the invention.

Referring to Fig. 1 of the drawing the new and novel gaseous electric discharge device comprises a container 1 filled with the usual discharge conducting gases such as neon, argon, nitrogen, or

mercury vapor and having a stem 2. Leads 4 and 5 of electrode 3 are sealed into said stem 2. Said electrode 3 is of suitable electrode material, such as iron, well known in the art, and is a hollow cylindrical body in shape. Discs 6 and 7 of insulating and heat resisting material such as mica, porcelain, china, glass, or lavite are provided at each end of said electrode and attached thereto by studs 9, 9. The rims of said insulating discs 6 and 7 closely approach the walls of said container 1 so that the distance between said rims and said walls is less than the mean free path of electrons of the discharge in said device. An opening 8 is provided in said disc 7 but there is no similar opening in said disc 6. Leads 4 and 5 of said electrode 3 are thus protected from the electric discharge in said device so that no discharge develops at said leads 4 and 5. If the electrode 3 is closed at its lower end disc 6 may be dispensed with. Upper disc 7 may be made smaller in diameter so as to simply protect the upper rim of said electrode 3 and to permit the outer surface of said cylindrical electrode to be used to support the electric discharge in said device, disc 6 alone protecting leads 4 and 5.

The embodiment shown in Fig. 2 is in all respects similar to that shown in Fig. 1 except a cap 11 of insulating material having an opening 12 therein protects the upper rim of the cylindrical electrode 10, said cap 11 being held in position by said electrode 10 and the indented portion 13 in the inner walls of the container.

Having this construction the rim parts of the electrodes 3 and 10 are protected from the gaseous electric discharge in said device to prevent the development of abnormal current intensities at said rim parts which avoids the rapid sputtering and vaporization of the electrode material at said rim parts and prevents the formation of opaque deposits of electrode material on the walls of said container during a long operating life of the device.

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

1. An electric discharge device comprising a container, an electrode sealed therein, an electrode chamber for said electrode, a gaseous atmosphere therein, said electrode being a hollow cylinder, each of the rims of said electrode being protected by a body of insulating material from the electric discharge in said device, the insulating body protecting the rim of said electrode remote from the discharge path in said device being a solid disc closing the end of said electrode, the insulating body protecting the rim of said

electrode adjacent the discharge path being of annular shape, the diameter of the opening therein being smaller than the diameter of the opening in said electrode, the outside diameter of both
5 said insulating bodies being substantially the same as the inside diameter of said electrode chamber, said bodies supporting said electrode away from the wall of said chamber.

2. An electric discharge device comprising a
10 container, an electrode sealed therein, an electrode chamber for said electrode, a gaseous atmosphere therein, said electrode being a hollow cylinder, each of the rims of said electrode being
15 protected by a body of insulating material from the electric discharge in said device, the insulating body protecting the rim of said electrode remote

from the discharge path in said device being a solid disc closing the end of said electrode, the insulating body protecting the rim of said electrode adjacent the discharge path being of annular shape, the diameter of the opening therein
5 being smaller than the diameter of the opening in said electrode, the outside diameter of both said insulating bodies being substantially the same as the inside diameter of said electrode chamber, said bodies supporting said electrode
10 away from the wall of said chamber, and a circular indentation in the wall of said electrode chamber, said annular shaped body resting against said indentation.

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