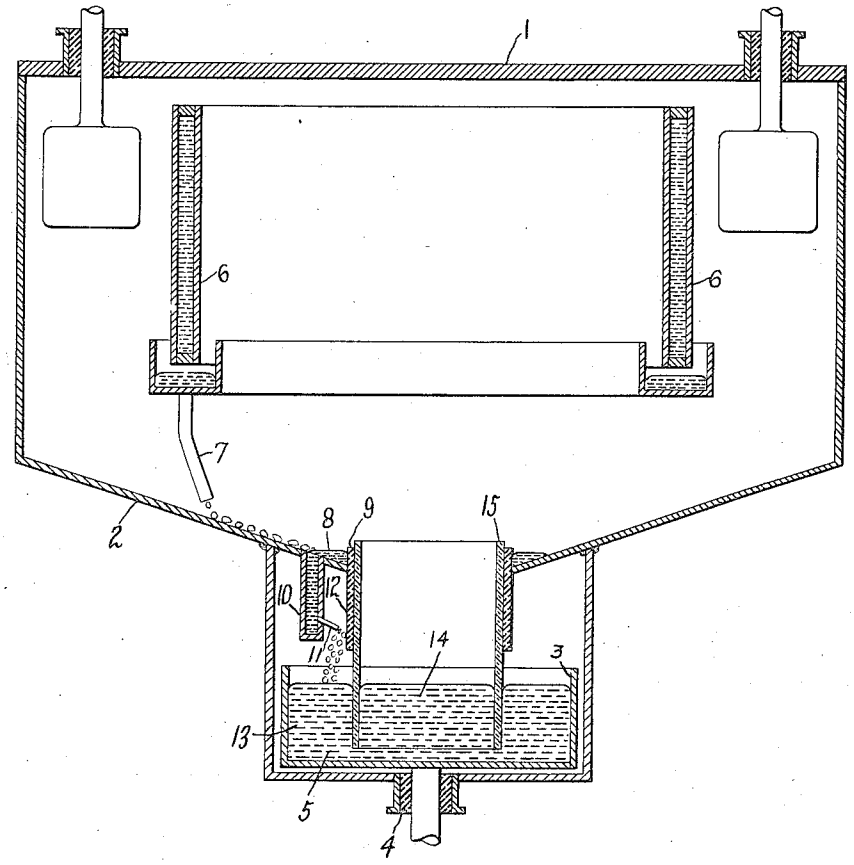
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VAPOR DISCHARGE DEVICE

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VAPOR DISCHARGE DEVICE

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1 Claim. (Cl. 250—27.5)

This invention relates to vapor discharge devices, more particularly to mercury vapor devices such as rectifiers or inverters which include an evacuated metal-walled container, and has for its principal object the provision of means for preventing short-circuits between the cathode and container through the mercury flowing back to the cathode from the condensing surfaces within the container.

In metal vapor discharge apparatus, for example mercury vapor rectifiers, comprising a receptacle or container wall of metal and in which the mercury which has been vaporized and thereafter condensed flows back in the liquid state to an electrode, usually a cathode, short-circuits often occur between the metal tank or container and this electrode through the stream of metal condensate which is flowing back.

In accordance with my invention this difficulty is overcome by reducing the streams of condensate to the form of drops before the returning metal reaches the electrode. This result is accomplished by causing the metal which is flowing back from the usual condensate receptacle, channel or trough at the bottom of the tank to flow from the trough through conduits or pipes only, provided with small nozzles or openings, and to issue from these openings in thin jets which separate into drops before reaching the electrode surface. The arrangement of the conduits and apertures is advantageously such that the fine jets of mercury fall to the cathode in a long arc, the mercury thereby being separated into drops before reaching the cathode, or the jets on issuing from the conduit nozzles may be arranged to strike a surface or member which is at a potential different from that of the cathode or which consists of insulating material. On this surface the jets split up into small drops.

The breaking up of the jet into small drops is attained, however, only if the jet of liquid metal is sufficiently fine and moves at high velocity. Therefore, the conduit or outflow pipe is made of such length and the jet openings therein so narrow that a velocity head of approximately 2 to 3 cm. height of the mercury is attained at the outflow.

In order to prevent the returning mercury from passing directly into the active portion of the cathode it is further of advantage to divide the cathode surface into two parts by means of a quartz cylinder which is otherwise also usually employed by reason of temperature considerations. If then the condensate is arranged to flow to the outer annular surface of the cathode the impurities which flow back with the condensate, assuming these impurities are not alloyed with the mercury, will be separated from the condensate since the impurities float on the surface of the mercury. The returning mercury or condensate itself, however, is conducted back in a usual manner, through an opening in the quartz cylinder below the surface of the mercury, into that portion of the cathode which comprises the inner circular surface thereof.

My invention will be better understood from the following description when considered in connection with the accompanying drawing and its scope will be pointed out in the appended claim.

Referring to the drawing, the single figure thereof illustratives a vapor discharge device embodying the invention.

In the figure the vapor discharge device 1 comprises a metal-walled container or tank 2 at the bottom of which is mounted a cathode vessel 3 insulated from the container 2 by insulator 4 and containing the liquid metal or mercury cathode 5. Mercury vaporized by the arc discharge during operation of the device and rising from the cathode is thereafter condensed on cooling surfaces 6 and flows therefrom through a pipe 7 back into the lower portion of the tank to a condensate collecting basin or receptacle 8 formed by a raised edge or flange 9 connected to the container wall.

From the collecting receptacle 8 the condensate is arranged to drain off only through a plurality of conduits such as tubes 10 only one of which is shown in the drawing. These tubes are closed at the bottom and provided with small openings or nozzles 11, through which the condensate flows out in the form of thin jets or streams which break up into drops before reaching the surface of the mercury cathode, or which strike the surface of a member 12 which is insulated from the cathode or may be formed of insulating material, the jets being finely divided into drops on the surface of this member. The cathode is preferably divided into the annular portion 13 and the central portion 14 by the quartz cylinder 15, and the returning mercury flows to the annular portion and thence to the central active portion 14, any impurities not alloyed with the mercury floating on the surface of the annular portion and thus being kept away from the surface of the active portion.

Since the streams of the returning mercury condensate are caused to be discontinuous in all or a part of that portion of their path which is between the lower end of the conduits 10 and

the surface of the mercury cathode, the condensate traversing all or a part of this portion of its path in the form of drops, short-circuits between the cathode and parts of the device insulated therefrom, due to current flowing through the returning mercury condensate, are prevented.

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

In a vapor discharge device comprising an evacuated metallic receptacle, a mercury cathode insulated from said receptacle, means including a cylindrical member of insulating material immersed in said mercury cathode and projecting upwardly a substantial distance from the surface of said cathode to separate said mercury cathode into a central active portion and an annular portion surrounding said central active portion, means to condense vapor rising from the cathode, and a condensate collecting receptacle arranged above said annular portion of the cathode, a plurality of condensate discharge conduits mounted outside said cylindrical insulating member and depending from said condensate collecting receptacle, each of said conduits having a small opening adjacent the bottom thereof to cause said condensate to flow from said conduits under pressure in the form of a plurality of fine jets, and means including a member insulated from said cathode and in the path of said jets to cause said condensate to flow to said annular portion of said cathode in the form of drops.

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