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METALLIC VAPOR LAMP

Filed Jan. 30, 1924

Fig. 1

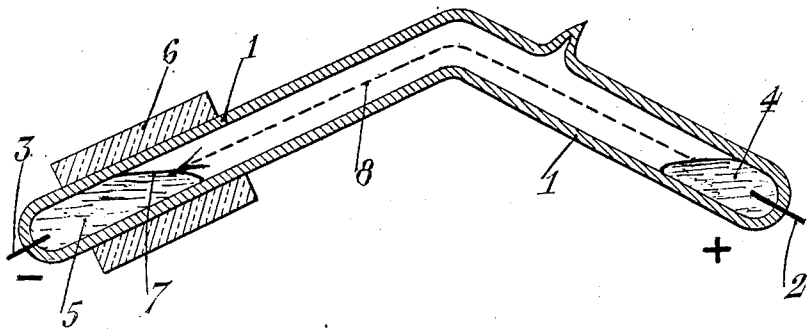
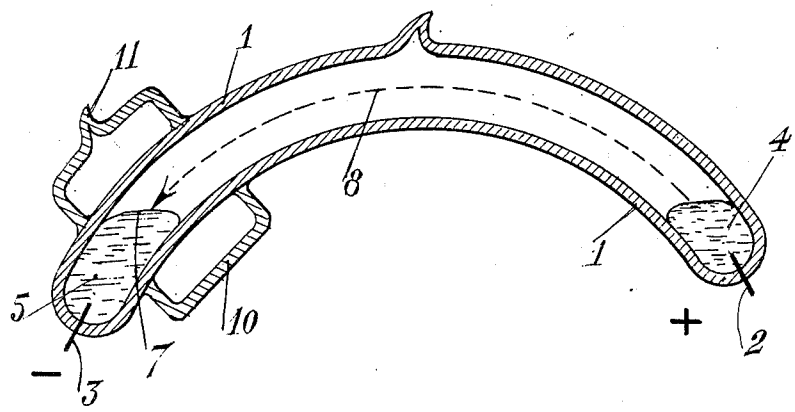


Fig. 2



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METALLIC VAPOR LAMP.

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The germicidal power of quartz mercury vapor lamps is well known. It is also well known that the maximum abiotic power, when such lamps are employed, for instance, to sterilize water, is obtained when they are immersed in the body of the liquid, the illuminating tube being then in direct contact with the water undergoing treatment.

Always, however, when the lamp consists simply of a tube, it is not long, on the lamp being in operation, before an accumulation of mercury is observed at the negative pole. Such accumulation results from electric transference of the mercury by the arc and a distillation of the mercury due to the difference of temperature between the anode and the cathode.

Our present invention provides a mercury lamp the tube of which emitting radiations of short wave length is in direct contact with the liquid in which the lamp is immersed, and in which lamp a state of mercurial equilibrium is obtained between the anode and the cathode, so that the lamp can be used without interruption for long periods of time.

Our invention consists in screening, to a sufficient extent the negative electrode of the lamp, which is the colder electrode, from the action of the medium in which the lamp is immerserd. This end we obtain by partially or completely surrounding the negative electrode with a jacket being a poor conductor of heat, or composed of one or more substances being poor conductors of heat. It is conceivable that under these conditions, when the lamp is immersed in a liquid, for example water to be sterilized, the lamp is completely in contact with the liquid and is subjected to the cooling action thereof, except at the place where the negative electrode is protected by the heat insulating jacket. The arc therefore is surrounded at the cathode by a sheath which protects it from the cooling action of the liquid and permits the cathode region to attain such a temperature that mercurial equilibrium between the anode and the cathode is obtained.

The state of equilibrium under these conditions is automatically reached, the level of the mercury at the negative pole of itself assuming the height favourable as regards the characteristics of the tube and of the electric supply current.

Lamps embodying our invention are shown, by way of example, on the accompanying drawing, in which:—

Fig. 1 is a longitudinal section of an improved mercury vapor lamp, and

Fig. 2 a longitudinal section of a modified construction.

The mercury vapor lamp shown in Fig. 1 comprises an elbowed tube 1, of quartz. 2 and 3 are the electric terminals. 4 is the mercury at the anode and 5 is the mercury at the cathode. 6 is a mass being a poor conductor of heat consisting, for example, of an agglomerate of cement and fused sand and placed around a portion of the quartz tube 1 so as to partially surround the negative electrode. The broken line 8 represents the arc.

The lamp is operated when immersed, for example in water. The arc may be started by a rocking of the tube, the negative pole being raised and the positive pole depressed, in which case some of the mercury 5 flows toward the mercury 4. The level 7 of the mercury 5 assumes a certain position within the heat insulating mass 6 and may even be below such mass. Now, it will be observed that at the beginning of the operation, the level of the positive mercury 4 tends to descend whilst the level of the negative mercury 5 on the other hand tends to rise because of the transfer of the mercury until, at a given instant the level 7 of the negative mercury 5 assumes a position wherein this mercury, being sufficiently protected by the heat insulating mass 6 against the cooling action of the surrounding liquid, acquires a temperature capable of ensuring a state of mercurial equilibrium with the positive pole.

The level 7 of the negative mercury 5 assumes different positions, in accordance with the characteristics of the tube and of the electric supply current, and such positions, corresponding to the state of mercurial equilibrium, are assumed automatically.

Obviously, without any departure from the spirit of the invention, the heat insulation embracing all or part of the negative electrode can be provided in various ways:— For example, according to Fig. 2, it may consist of a quartz envelope 10 fused to the illuminating tube 1, the annular space between the illuminating tube 1 and such envelope 10 being exhausted through a connection, subsequently sealed as a tip 11, the same as on bulbs of electric incandescent lamps.

The invention obviously is applicable to all metallic vapor lamps, whatever be the nature of the metallic vapor, whether it be produced by mercury, by an amalgam or otherwise, and whatever be the nature of the fluid (either liquid or gas) in which the lamp is immersed.

We claim—

1. In a metallic vapor tube for submersion in a liquid, an anode, a cathode, and means for retarding the transmission of heat from said cathode to the liquid in comparison with the transmission of heat from said anode to the liquid, comprising thermal insulation of said cathode only.

2. In a metallic vapor tube for submersion in a liquid, an anode, a cathode, and means for retarding the transmission of heat from said cathode to the liquid in comparison with the transmission of heat from said anode to the liquid, comprising a jacket around said cathode for thermally insulating said cathode only.

3. In a metallic vapor tube for submersion in a liquid, an anode, a cathode, and means for retarding the transmission of heat from said cathode to the liquid in comparison with the transmission of heat from said anode to the liquid, comprising an evacuated jacket around said cathode for thermally insulating said cathode only.

In testimony whereof we affix our signatures.

RENÉ LOUIS MAXIME BELLEAUD.
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