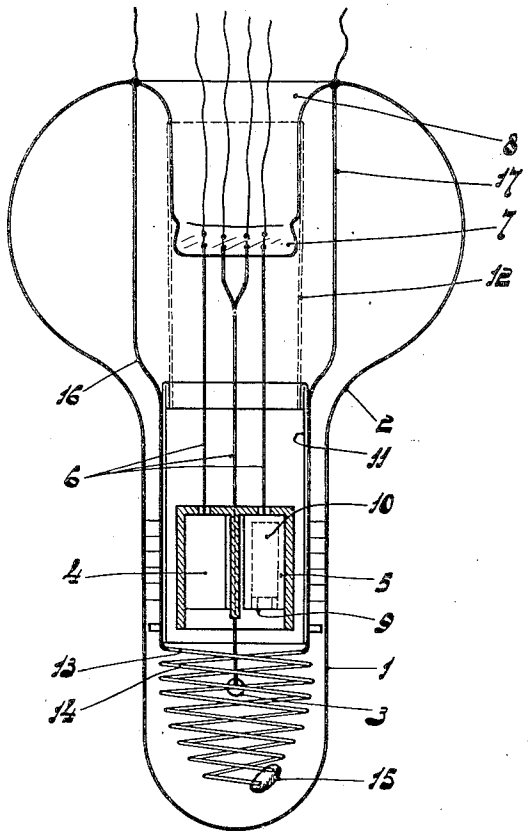
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ELECTRIC DISCHARGE TUBE FOR EMITTING RAYS

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ELECTRIC DISCHARGE TUBE FOR EMITTING RAYS

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The invention relates to electric discharge tubes adapted to emit rays, more particularly ultra-violet rays, generated by a discharge produced in a vapour atmosphere. Such discharge tubes are utilized for various purposes. Besides the application for the emission of visible light, these tubes are frequently utilized for the generation of ultra-violet rays and for this purpose they are filled with a vapour the spectrum of which shows lines in the ultra-violet portion.

During the operation of these tubes one often encounters the inconvenience that the wall portion through which the rays generated must emerge from the tube, is attacked by or covered with the substance in the vapour of which the discharge takes place, which results in a decrease of the transmissibility of this wall portion and therefore of the efficiency of the tube.

According to the invention, these inconveniences are considerably reduced by providing one or more discharge paths with cold electrodes between the discharge path in which the rays are generated and the wall portion through which the rays pass to the outside. If during the operation of such a discharge tube some of the vapour brought into the main discharge path tries to move towards the wall portion destined for the passage of the rays, the vapour molecules will be ionized by the discharges established between the cold electrodes. The vapour ions thus produced are attracted by the cold electrodes between which the glow-discharge is produced and they settle on these electrodes. The latter are arranged so as to prevent the radiation of light as little as possible. It is also possible that the vapour particles moving from the main discharge path between the cold electrodes of the auxiliary discharge path, have already a positive or negative charge owing to which without being ionized they are attracted already by the cold electrodes.

The invention will be more clearly understood by referring to the accompanying drawing which represents, by way of example, a discharge tube according to the invention.

The discharge tube represented in the drawing may be utilized for the emission of ultra-violet rays generated by a discharge produced in magnesium vapour. The portion 1 of the wall of the discharge tube consists of a material transparent to ultraviolet rays, for example of uviol glass or quartz. This wall portion is sealed to a wall portion 2 of ordinary glass, if desired, with the aid of a graded seal. The tube contains an incandescent cathode 3 and two semi-cylindrical anodes 4 and 5, said electrodes being mounted on the pinch 7 of the foot 8 with the aid of supporting rods 6 which may be surrounded by an insulating envelope. The anode 5 is constituted by a hollow body pierced at its lower end with an aperture 9 and filled with a rod 10 of magnesium. If a discharge is established between the cathode 3 and the anode 5, part of the magnesium evaporates, the magnesium vapour being brought into the path of discharge so that the arc discharge takes place in magnesium vapour.

In the discharge tube is arranged a cylinder 11 of glass or similar material which is secured to a ring 12 of gauze clamped in its turn around the foot 8.

In the lower portion of the discharge tube are arranged two cold electrodes 13 and 14 which are helically wound in one another and which are connected with each other at the ends with the aid of a glass bead 15. The electrodes 13 and 14 are carried by current supply wires 16 and 17 which pass through the foot 8 to the outside and part of which is in contact with the cylinder 11.

During the operation of the discharge tube, which contains in addition to the magnesium vapour another gas, preferably a rare gas, for example at a pressure of 150 mms, the cylinder 11 acts as a chimney so that the magnesium vapour brought into the main discharge path ascends through the cylinder 11. While ascending, the magnesium vapour comes into contact with the wall of the cylinder 11 and part of it deposits on this wall which is attacked thereby. The ascending current emerges through the apertures of the ring 12 from the chimney, some of the magnesium vapour depositing on the annular member 12. The gas subsequently flows downwards through the annular space between the cylinder 11 and the wall of the discharge tube and during this movement some of the magnesium vapour may settle on the outer wall of the cylinder 11 or on the wall portion 2 of the discharge tube.

The vapour molecules which should escape from the lower end of the cylinder 11 and should tend to move towards the wall portion 1 of the dis-

charge tube, attain the discharge path between the cold electrodes 13 and 14 between which a suitable voltage for example, of 100 volts is applied. If this voltage is such that a glow-discharge is produced, the vapour molecules reaching the discharge path are ionized and attracted by the electrodes 13 and 14 so that these electrodes are covered with the substance brought into the main discharge path and these particles are prevented from depositing on the wall portion 1. Alternatively, the voltage between the electrodes 13 and 14 may be so chosen that a dark discharge, sometimes referred to as "Townsend discharge", is established. It will be evident that between the main discharge path and the wall portion 1 one or more pairs of cold electrodes may be provided.

It is evident that the invention may also be applied to discharge tubes of other kinds, for example to tubes destined for the emission of visible light generated by a discharge produced in an atmosphere containing a vapour, for example sodium vapour.

What I claim is:

1. An electric discharge device comprising a container, a gaseous atmosphere therein, a plurality of electrodes sealed therein, a chimney in said container, at least one of said electrodes being in said chimney, another of said electrodes being out of said chimney, a pair of said electrodes being interposed between the walls of said container and the discharge path between said first named electrodes.

2. An electric discharge device comprising a container, a gaseous atmosphere therein comprising a condensible gas, a plurality of electrodes sealed therein, a chimney in said container, at least one of said electrodes being in said chimney, another of said electrodes being out of said chimney, a pair of said electrodes being interposed between the walls of said container and the discharge path between said first named electrodes.

3. An electric discharge device comprising a container, a plurality of electrodes sealed therein, a gaseous atmosphere therein comprising a condensible gas, a chimney in said container, the discharge path between at least two of said electrodes being adjacent one end of said chimney, a pair of said electrodes being interposed between the walls of said container and the discharge path between said first named electrodes.

4. An electric discharge device comprising a container, a plurality of electrodes sealed therein, a gaseous atmosphere therein comprising a condensible gas, a chimney in said container for said condensible gas, the discharge path between two of said electrodes being interposed between the wall of said container and the discharge path between two other of said electrodes.

5. An electric discharge device comprising a container, a plurality of electrodes sealed therein, a gaseous atmosphere therein comprising a condensible gas, a chimney in said container for said condensible gas, said chimney having a wall portion comprising a multitude of apertures, the discharge path between two of said electrodes being interposed between the wall of said container and the discharge path between two other of said electrodes.

6. An electric discharge device comprising a container, a plurality of electrodes sealed therein, a gaseous atmosphere therein comprising a condensible gas, a chimney in said container for said condensible gas, said chimney comprising a wall portion of gauze, the discharge path between two of said electrodes being interposed between the wall of said container and the discharge path between two other of said electrodes.

7. An electric discharge device comprising a container, a plurality of electrodes sealed therein, a gaseous atmosphere therein comprising a condensible gas, a chimney in said container for said condensible gas, the upper part of said chimney having a multitude of apertures, the discharge path between two of said electrodes being interposed between the wall of said container and the discharge path between two other of said electrodes.

8. An electric discharge device comprising a container having a narrow portion and a wide portion, a plurality of electrodes mounted in said narrow portion, a gaseous atmosphere in said container comprising a condensible gas, a chimney in said container for said condensible gas, one part of said chimney being mounted in said narrow portion and another part of said chimney in said wider portion, the discharge path between two of said electrodes being interposed between the wall of said container and the discharge path between two other of said electrodes.

9. An electric discharge device comprising a container having a cylindrical lower portion and a bulb shaped upper portion, a plurality of electrodes mounted in said cylindrical portion, a gaseous atmosphere comprising a condensible gas in said container, a chimney in said container for said condensible gas, said chimney being disposed partly in said cylindrical portion and partly in said bulb shaped portion, the last mentioned part of said chimney having a plurality of apertures, the discharge path between two of said electrodes being interposed between the wall of said container and the discharge path between two other of said electrodes.

10. An electric discharge device comprising a container, a gaseous atmosphere therein, a plurality of electrodes sealed therein, one of said electrodes being an anode consisting of a hollow body open in the direction of the discharge path thereto and containing a material the vapor of which participates in the discharge, a chimney for said vapor, the discharge path between two of said electrodes being interposed between the wall of said container and the discharge path to said anode.

11. An electric discharge device comprising a container, a gaseous atmosphere therein, a plurality of electrodes sealed therein, two of said electrodes being cold electrodes, one of said electrodes being a thermionic cathode, two of said electrodes being anodes for said cathode, a cap of insulating material surrounding said anodes, one of said anodes being a hollow body containing a vaporizable material, a chimney for the vapor of said material, the discharge path between said cold electrodes being interposed between the wall of said container and the discharge path between said thermionic cathode and said anodes.

12. An electric discharge device comprising a container, a gaseous atmosphere therein, a plurality of electrodes sealed therein, two of said electrodes being cold electrodes, one of said electrodes being a thermionic cathode, two of said electrodes being anodes for said cathode, a cap of insulating material surrounding said anodes, one of said anodes being a hollow body containing a vaporizable material, a chimney for the vapor of said material, said chimney comprising a vitreous cylindrical portion and a portion consisting

of gauze, said anodes being mounted within the vitreous portion of said chimney, the discharge path between said cold electrodes being interposed between the wall of said container and the discharge path between said thermionic cathode and said anodes.

13. An ultra violet generator comprising a container, a plurality of electrodes sealed therein, a gaseous atmosphere therein adapted to emit ultra violet radiations when excited by an electric discharge therethrough and comprising a condensible gas, a chimney mouned in said conainer for said condensible gas, a portion of said container being pervious to ultra violet radiations, the discharge path between two of said electrodes being interposed between said wall portion and the discharge path between two other of said electordes.

GILLES HOLST.