Aug. 15, 1933. L. H. DAWSON 1,922,281

LAMP FOR PRODUCING ULTRA-VIOLET RADIATION

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FIG. 1

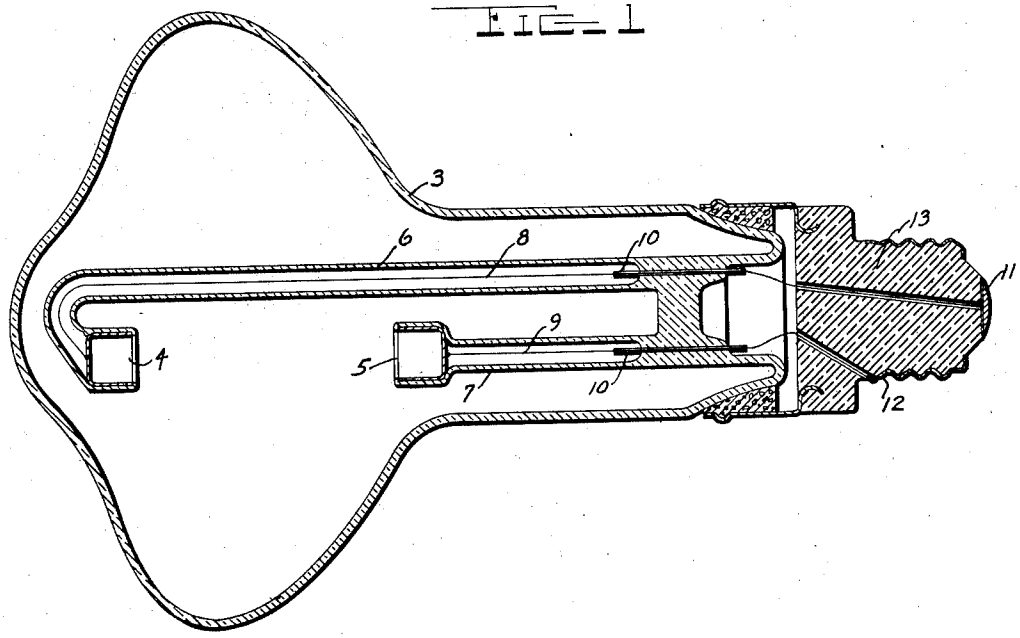
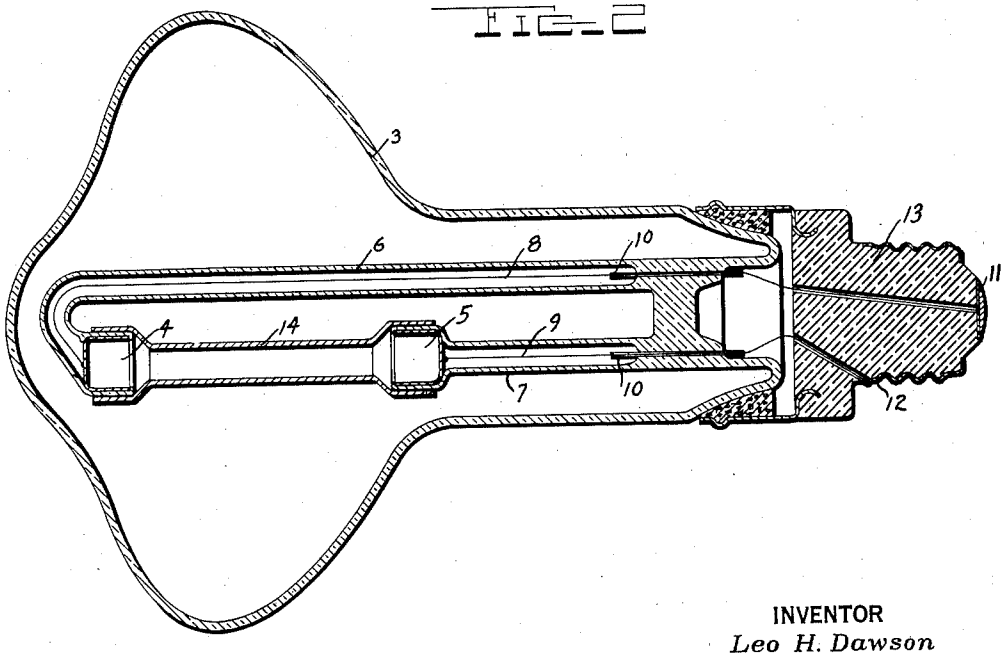


FIG. 2



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LAMP FOR PRODUCING ULTRA-VIOLET RADIATION

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Serial No. 565,807

11 Claims. (Cl. 250—34)

(Granted under the Act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

My invention relates to a lamp for producing ultra-violet radiation.

The object of this invention is to provide an efficient source of ultra-violet light with a range of wave lengths from about 5,000 Angstrom units down to 980 Angstrom units.

In the drawing:

Fig. 1 illustrates one embodiment of my invention in medial longitudinal section;

Fig. 2 is a like view of a form which produces shorter radiations than does that shown in Fig. 1.

Extensive investigation into the action of an electrical discharge in an atmosphere of hydrogen has shown that when the gas is under certain optimum pressures; viz., about 30 to 100 mm of mercury, the discharge becomes an efficient source of ultra-violet radiation in the range above mentioned.

In Fig. 1 bulb 3 is of a size and configuration suitable for the purpose, made of material readily pervious to ultra-violet light such as one of the known glasses now used for transmitting the ultra-visible waves, or quartz, the tube being either evacuated or filled with gas under suitable pressure. Electrodes 4 and 5 are preferably cylindrical with one end of each closed and are disposed with their open ends facing each other, which causes the discharge to take place from the inside of the electrode and prevents cathodic disintegration of the electrode material. Electrodes 4 and 5 are respectively enclosed in rigid supporting tubes 6 and 7 of glass or other insulating material. The cylindrical form of electrode is preferred because of its greater heat radiating power.

Lead wires 8 and 9 are connected to electrodes 4 and 5 respectively and pass through the respective insulating supporting tube to prevent discharge between the wires. Through suitable seals 10 the wires 8 and 9 are led to the exterior of the bulb where they connect to contact members 11 and 12 on the base 13. It is desirable to prevent cathodic disintegration of the electrodes not only to preserve them intact but also to prevent deposition of the electrode material on the bulb.

In this type of source the discharge fills more or less the entire bulb and the spectral character of the discharge is that of a line spectrum superimposed on a continuous background.

The modification illustrated in Fig. 2 does not allow the discharge to fill the entire bulb, the luminous portion together with the electrodes being enclosed in a constricted tube 14 made of quartz or other suitable ultra-violet transparent material. This modification changes the spectrum of the discharge from a line spectrum to a completely continuous spectrum which lies between 4300 Angstrom units and 980 Angstrom units.

In order that the discharge shall pass between the electrodes, a suitable voltage must be applied between them. This may be of the order of 1,000 volts or more, it being sufficient to cause the discharge and yet convenient for insulation.

While the ordinary screw base is shown on bulbs 3, it is to be understood that any of the other known bases adapted to this use may be employed.

The invention described herein may be manufactured or used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

1. A source of ultra-violet light, comprising a bulb transparent to ultra-violet rays, a base on said bulb, contact elements on said base, an insulating tube substantially as long as the space in said bulb, said tube being disposed in said bulb with one end fixed to the bulb and the other end reflexed and free, an electrode in the free end of said tube, said electrode being cylindrical and having one end closed, the open end thereof facing outwardly from the tube, a lead wire in the tube with one end connected to the electrode and the other end connected to one of the contact elements on said base, a second tube in said bulb disposed with a free end spaced from and facing the free end of the other tube, a second cylindrical electrode in the free end of the second tube and a lead wire connected to the second electrode and to the other of the contact elements on the base.

2. A source of ultra-violet light, comprising a bulb transparent to ultra-violet rays, a base on said bulb, contact elements on said base, an insulating tube substantially as long as the space in said bulb, said tube being disposed in said bulb with one end fixed to the bulb and the other end reflexed and free, an electrode in the free end of said tube, said electrode being cylindrical and having one end closed, the open end thereof facing outwardly from the tube, a lead wire in the tube with one end connected to the electrode and the other end connected to one of the contact elements on said base, a second tube in said bulb disposed with a free end spaced from and facing the free end of the other tube,

a second cylindrical electrode in the free end of the second tube, a lead wire connected to the second electrode and to the other of the contact elements on the base, and a constricted tube of material that is transparent to ultra-violet light connecting the free ends of both tubes, said constricted tube containing a gas.

3. A source of ultra-violet light, comprising a bulb transparent to ultra-violet rays, two insulating tubes disposed therein, each of which has an end fixed to the bulb and a free end, the free end of one tube being reflexed to face the free end of the other tube from which it is spaced, a cup-shaped electrode in the free end of each tube with the openings in the electrodes facing each other, a wire connected to each electrode and passing through the respective tubes, and two contact elements exteriorly of the tube to each of which one of the said wires is connected.

4. A source of ultra-violet light, comprising a bulb transparent to ultra-violet rays, two insulating tubes disposed therein, each of which has an end fixed to the bulb and a free end, the free end of one tube being reflexed to face the free end of the other tube from which it is spaced, a cup-shaped electrode in the free end of each tube with the openings in the electrodes facing each other, a wire connected to each electrode and passing through the respective tubes, two contact elements exteriorly of the tube to each of which one of said wires is connected, and a tube of material transparent to ultra-violet light connecting the free ends of both tubes.

5. A source of ultra-violet light, comprising a bulb transparent to ultra-violet rays, spaced apart cup-shaped electrodes disposed in said bulb with their open ends facing each other, a constricted tube defining a restricted discharge path the entire distance between said electrodes, a gas in said tube, and lead wires insulated from each other connecting said electrodes to exterior contact elements.

6. A source of ultra-violet light, comprising a bulb transparent to ultra-violet rays, spaced apart cup-shaped electrodes disposed in said bulb with their open ends facing each other, a constricted tube defining a restricted discharge path the entire distance between said electrodes, a gas in said tube, and lead wires insulated from each other connecting said electrodes to exterior contact elements.

7. A source of ultra-violet light, comprising a bulb transparent to ultra-violet rays, spaced apart cup-shaped electrodes disposed in said bulb with their open ends facing each other, a constricted tube defining a restricted discharge path the entire distance between said electrodes, hydrogen gas in said tube, and lead wires insulated from each other connecting said electrodes to exterior contact elements.

8. A source of ultra-violet light having a continuous spectrum, comprising a constricted tube defining a restricted discharge path the entire distance between said electrodes, hydrogen gas in said tube under suitable pressure, and means to cause an electric discharge through said tube.

9. A source of ultra-violet light, comprising a bulb transparent to ultra-violet rays, two insulating tubes disposed therein, each of which has an end fixed to the bulb and a free end, the free end of one tube being reflexed to face the free end of the other tube from which it is spaced, a cup-shaped electrode in the free end of each tube with the openings in the electrodes facing each other, a wire connected to each electrode and passing through the respective tubes, contact elements exteriorly of the tube to each of which one of said wires is connected, and means defining a restricted zone of light emission between the electrodes.

10. A source of ultra-violet light, comprising a bulb, electrodes operatively mounted therein in spaced relation to each other, a constricted tube of less cross-sectional area than said electrodes connecting the electrodes defining a restricted discharge path the entire distance between said electrodes, and hydrogen gas in said tube.

11. A source of ultra-violet light having a continuous spectrum, comprising a bulb, cup-shaped electrodes operatively mounted therein, a constricted tube in the ends of which said electrodes are seated defining a restricted discharge path the entire distance between said electrodes, and a gas in said tube under suitable pressure.

LEO H. DAWSON.