

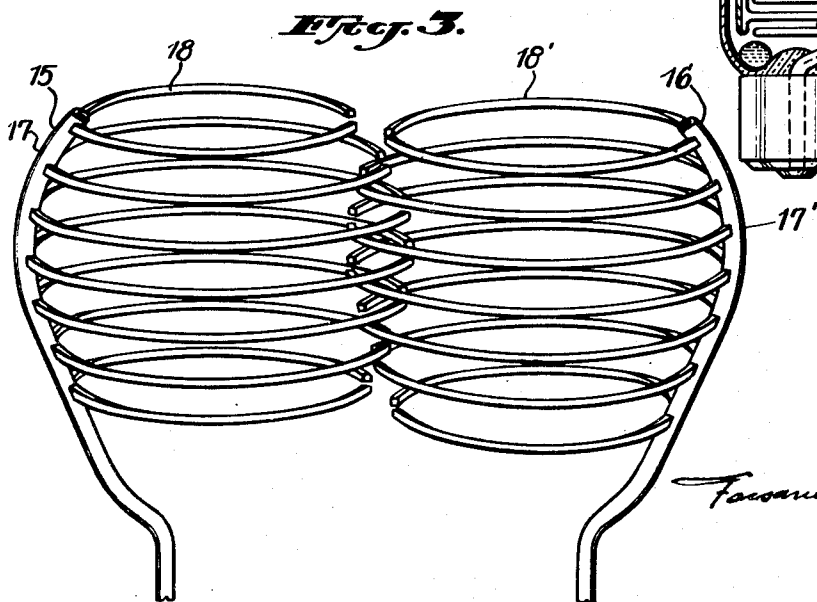
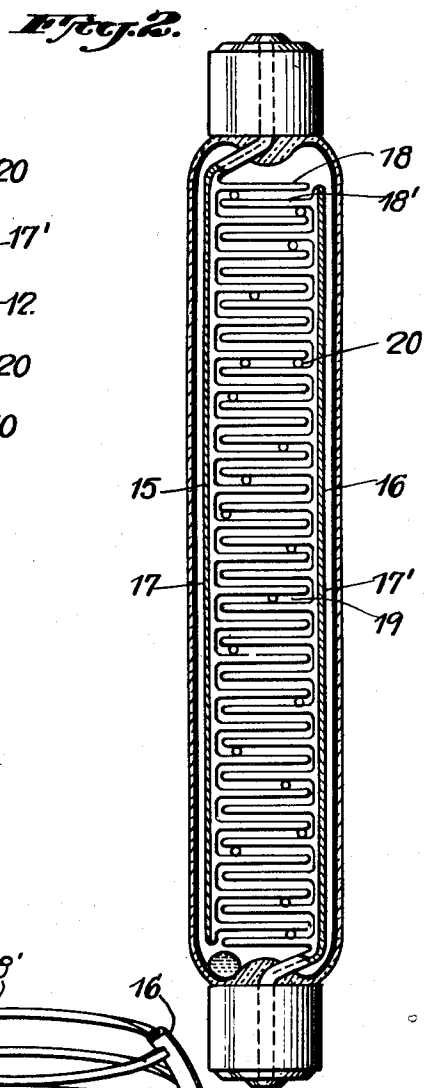
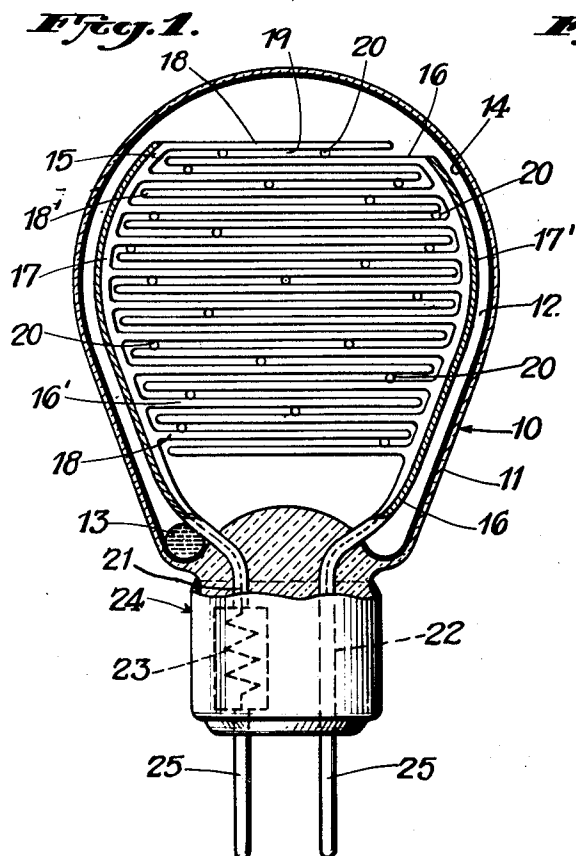
March 23, 1948.

F. ALEXANDER
GASEOUS DISCHARGE DEVICE

2,438,356

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2 Sheets-Sheet 1



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Fig. 4.

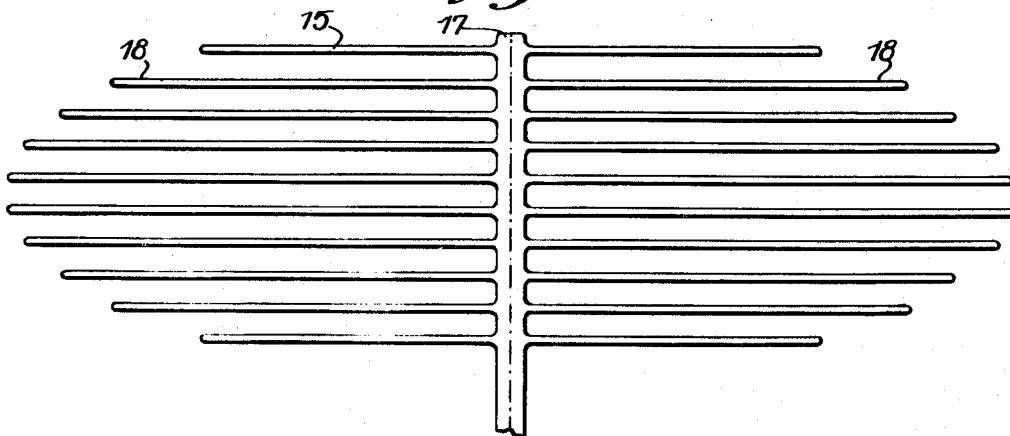


Fig. 5.

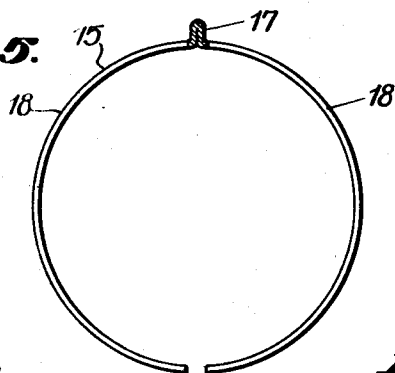


Fig. 6.

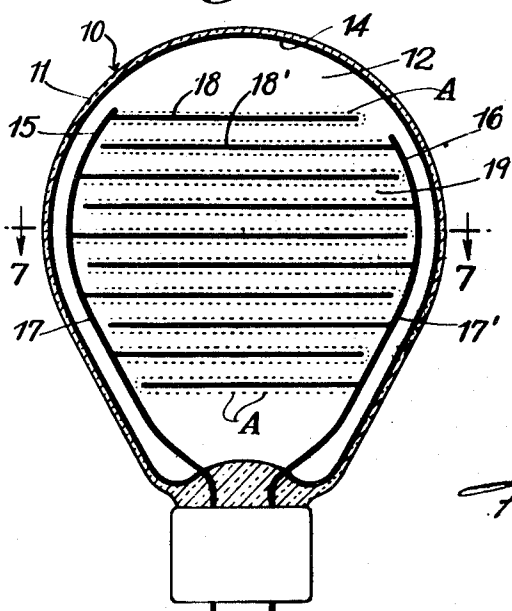
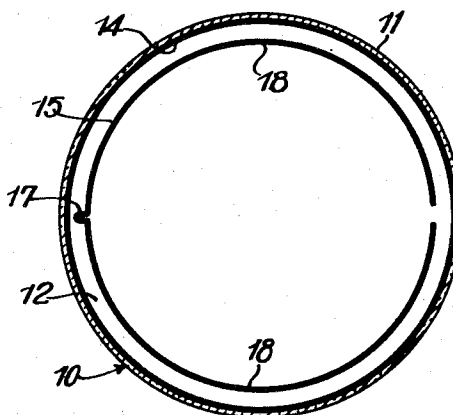


Fig. 7.



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GASEOUS DISCHARGE DEVICE

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5 Claims. (Cl. 176-122)

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This invention relates to gaseous discharge devices of the glow discharge type, such as fluorescent, sterilizing, ultra violet and glow discharge lamps, and more particularly to a lamp having electrodes assembled in grid-like form within the glass envelope.

An object of the invention is to provide an electrode arrangement having a plurality of paths of active glow discharge along the electrodes, in close proximity to the inner wall of the envelope, and in the case of fluorescent material, to excite substantially the entire fluorescent material and produce a fluorescent lamp of maximum light.

Another object is to provide short circuited electrodes in such lamps, so that, when the lamp is started, there is immediate starting and immediate vaporization of the ionizable medium in the envelope will occur, and thus produce increased ultra violet output.

A further object is to provide the lamp in bulb, tube, or other suitable forms and shapes, having electrode terminals at opposed ends, or at one end, so that the lamp may be plugged or screwed into conventional electric light sockets.

Still further objects will be made apparent by reference to the accompanying drawings, in which:

Fig. 1 is a sectional elevation of the lamp in bulb form embodying the invention.

Fig. 2 is a sectional elevation of the lamp in elongated tube form.

Fig. 3 is a perspective view showing the two electrodes of the lamp withdrawn from one another.

Fig. 4 is a preferred plan view of an electrode blank with fins or branches on both sides of the electrode rib.

Fig. 5 is a sectional view of the above electrode after shaping.

Fig. 6 is a diagrammatic view of the operating lamp showing the plurality of glow discharge paths.

Fig. 7 is a sectional view of Fig. 6.

In the specific embodiment of the invention illustrated in Fig. 1 the reference character 10 designates generally a gaseous discharge device, in this instance, a fluorescent lamp of bulb-like construction, comprising envelope 11 of relatively thin glass blown to desired shape, and enclosing a space constituting the sealed discharge chamber 12, containing mercury vapor or an ionizable medium including mercury vapor 13, and having a coating of suitable fluorescent material 14 covering the inner walls of the envelope 11.

Within the chamber are opposed and spaced

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electrodes 15 and 16. Each electrode has a rib 17 and 17' and a plurality of branches or fins 18 and 18' preferably arranged in a row, and so assembled or disposed that the fins 18 of rib 17 closely overlap the fins 18' of rib 17' and spaced as closely together as possible, $\frac{1}{8}$ inch or less and preferably $\frac{1}{16}$ inch apart. Thus the fins of each electrode are arranged between and in spaced relation to the fins of the other electrode. All the fins have their peripheries adjacent to and as close as possible to the fluorescent coating 14, and preferably conform to the said coating or inner wall of the envelope as shown in the drawings. These electrodes may be formed to any suitable shape or arranged or assembled to form a cylinder and have a grid-like appearance.

At many points on and between the fins 18 and 18', and due to the short paths 19 therebetween, there is deposited or held dispersed condensation mercury particles from said mercury vapor 20, which may be part of an ionizable medium combination. The short paths 19 are such that capillarity of dispersed condensation particles of mercury from the mercury vapor bridges said fins. For a short wave length generator, the preferred ionizable medium is a combination of krypton at about 5 mm. pressure and mercury vapor. Employing such combination the particles so held or deposited between the fins will be mercury particles 20. The lamp may be started and operated by having mercury vapor alone in the chamber and omitting the krypton or other rare gas.

The electrodes and fins may preferably be of iron, but any suitable metal, such as aluminum, nickel may be used. The fins are preferably in strip form and preferably integral with the respective ribs 17 and 17'. The electrodes and their fins are preferably coated with a fine layer of an oxide, such as aluminum or zirconium, or by oxidizing the metal itself, so as to obtain larger wattage lamps. As shown in Fig. 4, each of the electrodes, such as electrode 15, may have fins 18 extending from both sides of the rib 17.

As shown in Fig. 1, each of the electrodes 15 and 16 has respective leads or terminals 21 and 22 mounted in a stem (not shown) of approved or conventional form. A resistor 23 of suitable value to limit current may be connected between one of the electrodes and its respective terminal, and this resistor may be mounted within the base 24, or therebetween, or outside the lamp (not shown). The base 24 may be either the usual prong type or screw type 25 at one or the sealed end of the lamp

for insertion in conventional electric light sockets.

The electrodes are short circuited at many points by the mercury particles or globules 20 held or deposited in the short paths 19 between opposed fins 18 and 18'. In operation, when the lamp is started and due to the short circuiting of the electrodes, and the mercury particles vaporizing and eliminating the short circuit, immediate starting and immediate vaporization of the mercury in the chamber 12 occurs, and active glow discharges A are set up along opposed fins. These plurality of discharges are of the order of 2500 Angstrom units, and are generated in all directions in the chamber 12. There is a minimum loss of short wave ultra violet output due to the close proximity of the fins to the fluorescent material 14, and substantially the entire fluorescent material is excited, and a lamp of increased light efficiency is obtained.

To operate the lamp as a sterilizing, ultra violet or glow discharge lamp, and not as a fluorescent lamp, a similar electrode assembly or arrangement may be employed, but the fluorescent material 14 is omitted, and different glass suitable for passing the wave of the character desired is used. When employed as a long wave length generator, for active long wave length fluorescent material, and for other purposes, a mixture of argon and nitrogen is preferably used as the ionizable material within the chamber. The lamp may be in elongated form as shown in Fig. 2, in which like numerals of reference indicate similar parts as shown in Fig. 1.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. A glow discharge lamp comprising an envelope containing mercury vapor, electrodes within said envelope, each electrode having a rib having a plurality of spaced fins of electrically conductive material with the fins of the rib of one of the electrodes being disposed closely between and in spaced relation to opposed fins of the rib of another of the electrodes and presenting a plurality of short paths between opposed fins, and mercury particles from said vapor each connecting opposed fins thereby providing a plurality of short circuited paths between said electrodes.

2. A glow discharge lamp comprising an en-

velope containing mercury vapor, electrodes within said envelope, each electrode having a rib and each rib having a plurality of spaced fins on one side of electrically conductive material with the fins of the rib of one of the electrodes being disposed closely between and in spaced relation to opposed fins of the other rib thereby presenting a plurality of short paths between opposed fins, and mercury particles from said vapor connecting opposed fins in a plurality of said paths for short circuiting said electrodes.

3. A glow discharge lamp comprising an envelope containing mercury vapor, electrodes within said envelope, each electrode having a rib of electrically conductive material and each rib having a plurality of spaced fins on both sides of said rib with the fins of the rib of one of the electrodes being disposed closely between and in spaced relation to opposed fins of another of the electrodes and presenting a plurality of short paths between opposed fins, and mercury particles from said vapor connecting opposed fins in a plurality of said paths for short circuiting said electrodes.

4. A glow discharge lamp comprising an envelope containing mercury vapor, electrodes within said envelope, each electrode having a rib and each rib having a plurality of spaced fins of electrically conductive material with the fins of the rib of one of the electrodes being disposed closely between and in spaced relation to opposed fins of another of the electrodes and presenting a plurality of short paths between opposed fins, the peripheries of the fins of each electrode being disposed closely adjacent to and spaced from the inner wall of said envelope, and mercury particles from said vapor connecting opposed fins in a plurality of said paths for short circuiting said electrodes and for producing a plurality of paths of active glow discharge substantially in all directions in said envelope.

5. A claim according to claim 4, and a coating of fluorescent material on the inner wall of the envelope.

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