April 10, 1934. S. F. MARVIN ET AL 1,954,421

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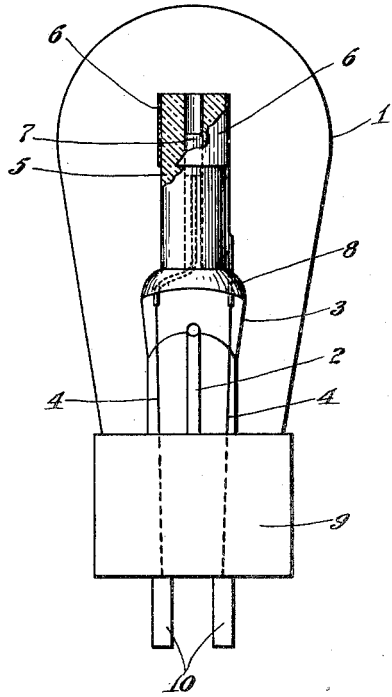
Filed May 8, 1931



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Patented Apr. 10, 1934 1,954,421

UNITED STATES PATENT OFFICE

1,954,421

GLOWLAMP

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Application May 8, 1931, Serial No. 535,934

5 Claims. (Cl. 176—122)

The present invention relates to gaseous glow lamps as employed for television and the like.

This invention relates more particularly to such lamps having their optical output in a concentrated beam or at a point of restricted area.

This invention particularly relates to the mechanical and electrical construction and shape of such gaseous glow lamps.

One object of the invention is the production of a concentrated light beam which shall be capable of rapidly varying its intensity in accordance with rapid changes of the electrical exciting current applied thereunto.

Another object is the production of such concentrated light beam at a point and in such manner that it can readily be subjected to any suitable manipulation thereof by means of optical apparatus such as lenses, mirrors and the like.

A further object is the production of a lamp having the foregoing characteristics in a form suitable for commercial production, and possessing a great degree of mechanical strength and rigidity.

A further object is the production of a lamp operable on electrical potentials and currents not exceeding the values usual in television receivers.

A further object of this invention is to confine the glow in such a lamp to the immediate neighborhood of the electrodes thereof, and to prevent its diffusion throughout the entire gas containing chamber thereof.

Other objects and uses of this invention will be apparent to one skilled in the art from the accompanying drawing which is a view partially in cross section of one form of this invention.

In the drawing, 1 represents the outer vessel which contains the elements of a tube constructed according to this invention. This vessel may be constructed entirely of transparent material such as glass, or may be constructed of a material opaque to the light produced, except at certain points thereof opposite the source of light therein. Such a transparent spot or window may be of glass, or of quartz in case that ultra violet rays are to be projected therefrom. This vessel contains the light producing elements of the invention surrounded by an atmosphere of a suitable gas such as neon, helium, argon, nitrogen, mercury vapor or other suitable gases.

2 represents the sealed-off exhaust tube employed in the exhaustion and filling of vessel 1 with such gas or gases as are contained therein. It is to be noted that this exhaust tube occupies a position out of line with the light beam projected from the elements within the tube.

3 represents the customary press or squeeze employed to simultaneously furnish a mechanical support for the elements within the tube and to allow current conductors indicated at 4 to pass from these interior elements to the exterior of the tube.

5 represents the interior light confining chamber of this invention which may be constructed of isolantite or other similar insulating material and which should be capable of ready degassification as well as of withstanding such moderate elevation of temperature as may be produced during the operation of the tube. This chamber may have an external diameter of three-eighths of an inch and an internal diameter of three-sixteenths of an inch, but this invention is not confied to such exact sizes.

At the upper end of this chamber is located, surrounding the exterior thereof, an electrode 6 in the form of an annular band, connected to one of the lead wires 4. This band may snugly embrace chamber 5 and may terminate at its extremity, short of the extremity, or extend beyond the same.

Within the lower end of chamber 5 is located the other electrode 7 which may be either solid or hollow, and in close contact with the interior walls of the chamber 5, or separated therefrom by a distance preferably smaller than the minimum distance required for gas ionization under the conditions of use.

Both electrodes 6 and 7, may be constructed of, or coated with such materials as reduce the starting and/or operating potentials required for an electrical discharge between them. Such materials are well known in the art, as for example; alkali metals, alkali-earth oxides, light metals such as aluminum or magnesium, and/or the like.

Chamber 5 is supported from press 3 by the leads to the electrodes, one of which latter is within it and the other embracing a portion of its exterior. It is preferred that the space between the bottom of this chamber and the top of the press be filled with a suitable insulating cement, 8, in order to increase the mechanical rigidity of the structure, and also to obviate undesired electrical discharges, or gas ionization, which might occur between the leads to the respective electrodes.

It is possible to still further constrict the beam produced by this invention by narrowing the interior diameter of chamber 5 at its upper end.

With a structure according to this invention of the dimensions hereinbefore given, it is preferred to make the electrode within the chamber

the cathode, in order that the visible glow be confined substantially within the chamber, and that the anode dark space extend substantially from the exterior anode, at least to the confines of the chamber.

The electrodes of this invention operate at a temperature substantially below incandescence and accordingly fall within the category commonly referred to as cold electrodes, notwithstanding that their temperature may be considerably elevated.

For convenience in handling and connecting it is preferable that a structure according to this invention be mounted at its lower extremity in some base 9, such as the type customarily employed with thermionic vacuum tubes. In this case the leads 4 will terminate in the contact pins 10 of such base. By manufacturing these tubes with uniform size of interior parts, and with such parts uniformly located with respect to the pins of the mounting base, one tube may be rapidly and easily replaced by another similar tube, in case of failure. Such rapid replacement can be made in a minimum of time, and will not necessitate extensive readjustment of any optical systems employed exteriorly to the tube.

While there have been mentioned certain specific sizes of the parts of this structure, such sizes are purely illustrative and they do not in any way restrict the invention to such sizes or ratio of sizes.

While this invention is not confined to any specific pressure of the gaseous atmosphere within the tube, it has been found that when neon is employed a pressure of 6 to 12 mm. of mercury is very suitable, although a suitable discharge may be obtained at pressures ranging from 2 to 20 mm. With such sizes of apparatus as given, a suitable potential is found to be from 250 to 400 volts with a current of 15 to 50 milliamperes.

With suitable arrangement and sizes of parts, selection of gas and pressure, this invention may operate on substantially lower voltages, of the order of 100 volts. Likewise, with appropriate design and gas filling, this invention can be embodied in a form capable of employing voltages between 500 and 1000, or even higher. In this last case, it may be desirable to employ a base larger, or of different type, than the ordinary radio tube base herein described.

It has been found desirable to ascertain and secure the optimum operating pressure of gas within the tube by connecting thereunto a source of current supply correspondent to the desired operating values while the tube is still connected to the gas supply employed for filling the same and adjusting said pressure of gas for optimum luminous effects before tube 7 is finally sealed off.

One advantage of this invention is that it allows a comparatively large quantity of gas to be contained within the vessel 1, while only a small quantity of this gas is electrically activated in any one instant of operation. It is well known that such gases when electrically excited tend to disappear from the interior of the tube, as far as their presence in a free state is concerned. This tends to reduce the gas pressure and to set a limit to the useful life of such tubes. By the construction of this invention it is posisble to utilize the outer vessel 1 as a species of gas reservoir, continuously in comunication with the interior of chamber 5. Since the electrical action in this invention is confined in a great degree to the interior of chamber 5, a structure according to this invention will have a useful life much greater than types hitherto employed where a great portion of the included gas was undergoing electrical ionization at all times.

Another advantage of this invention is that the beam of useful light produced may be of substantially uniform brightness throughout its cross section.

A further advantage of this structure is its production of a light beam which can be efficiently and advantageously utilized by optical reflection, refraction and the like in distinction to previous structures whose glow covered a comparatively large area.

Other changes in the parts and dimensions of this invention can be readily made by one skilled in the art, in order to adapt it to special purposes, and it is not limited to such special forms or sizes as have been hereinbefore set forth, except in as far as they are limited by the claims hereunto appended.

We claim:

1. In television reproducing glow lamps, a structure including in combination, a vessel having a re-entrant stem, an insulating chamber parallel to the axis of said vessel formed of a solid mass of heat-resistant material of high thermal capacity, one electrode within said chamber, another electrode without said chamber and substantially embracing at least the most heated parts of the exterior surface of the same, connecting and supporting wires passing through said stem connected to said electrodes, and supporting said chamber from said stem, said vessel containing a gas luminescent under electrical discharge so that substantially all the visible glow thereof shall be confined to the interior of said chamber, and substantially all of the anode dark space shall be confined to the exterior thereof.

2. A concentrated glow lamp structure including an opaque chamber formed of a mass of heat-resistant material of greater thermal capacity than glass and having at least one opening therefrom, an electrode having one dimension of its exposed area no greater than the thickness of the walls of said insulating chamber situate within said chamber, another electrode situate without said chamber and substantially embracing at least a portion of the exterior surface thereof, conductors from said electrodes to a source of suitable electrical current supply, all of said structures positioned within and substantially parallel to the longitudinal axis of an outer chamber containing gas of such nature and at such pressure that it shall glow under the current supplied to said electrodes and that the visible glow shall be confined substantially to the interior of said opaque chamber, and be visible through the opening thereof.

3. A television illuminating lamp of the glow type comprising a glass bulb having a re-entrant press containing two conductors, a tubular mass of insulating material of high thermal capacity and resistance, having an interior bore of substantially uniform diameter and directly supported by a said press, a single cathode element supported in said bore by the walls thereof at some distance from the outer end and connected to one conductor, an anode band embracing and reinforcing the outer end of said tubular mass and electrically connected to the other conductor, and means for sealing the conductors between the press and the tubular mass.

4. A glow discharge lamp containing an ionizable gas at reduced pressure and having but two electrodes, said electrodes being of substantially

different exposed superficial areas, the smaller electrode being enclosed within a chamber formed of material having high thermal resistance and capacity, said chamber providing a discharge path of cross section substantially equal to the exposed area of said smaller electrode, the walls of said chamber being at least equal in thickness to one dimension of the exposed area of said smaller electrode, and said larger electrode substantially embracing the exterior of the wall of said chamber.

5. A gaseous glow lamp comprising an outer chamber transparent at least in part, a separately formed mass of refractory material of substantially higher thermal conductivity and capacity than glass, forming an insulating cylinder having an end adjacent to one end of said outer chamber, an internal electrode positioned within said insulating cylinder by the inner wall thereof and in close thermal contact with said inner wall, said internal electrode having an electrical connection dependent therefrom and having an active discharge area substantially equal to the interior diameter of said cylinder at its open end, an external electrode situated without said insulating chamber but substantially embracing the external surface of said chamber in close thermal contact therewith for at least substantially the complete portion of said cylinder which is electrically active, and electrically communicating with said internal electrode solely by a gaseous conduction path, all of said structures being supported within said outer chamber and said outer chamber being filled with a gas luminescent under electrical discharges.

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