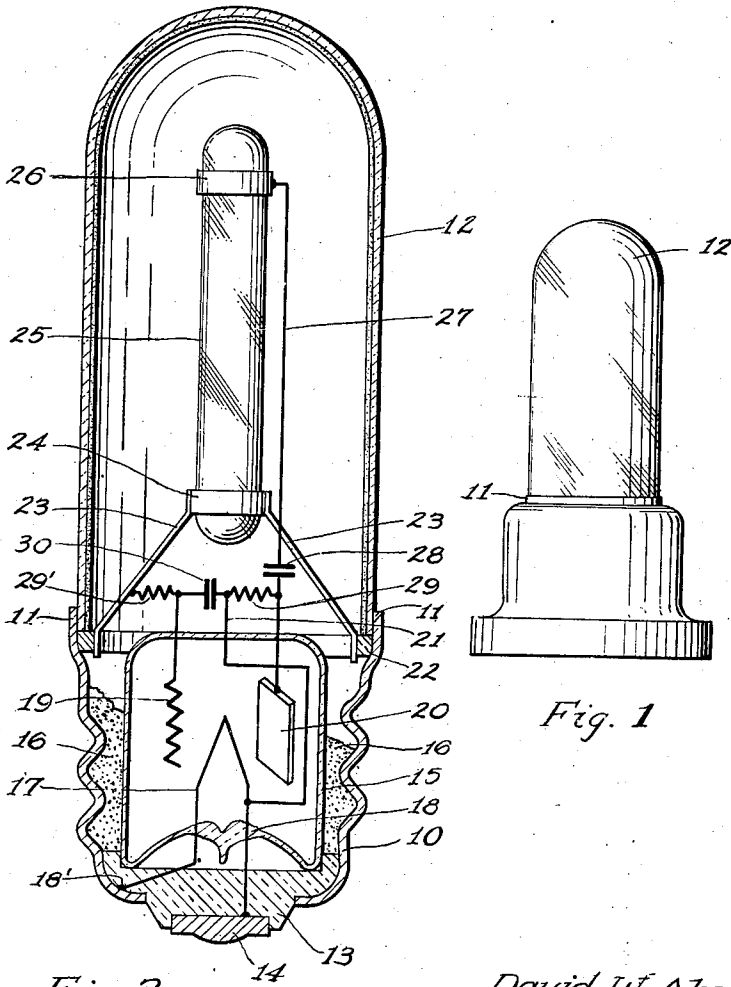


Feb. 20, 1945.

D. W. ABERNATHY
GASEOUS DISCHARGE DEVICE
Filed Jan. 22, 1942

2,369,767



David W. Abernathy
INVENTOR.

BY *Maurice S. Gayne*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,369,767

GASEOUS DISCHARGE DEVICE

David W. Abernathy, Chicago, Ill., assignor to Products Development, Inc., Chicago, Ill., a corporation of Illinois

Application January 22, 1942, Serial No. 427,695

8 Claims. (Cl. 315-36)

This invention relates to gaseous discharge devices and more particularly to the construction of a gaseous discharge tube adapted to be mounted in an ordinary household outlet. The invention is also directed to the circuit for operating said gaseous discharge tube.

The object of this invention is to provide a novel gaseous discharge device which is efficient and compact and which may be used in the ordinary household outlet.

Another object of the invention is to provide a gaseous discharge device which will eliminate the stroboscopic effects of conventional commercial devices of this type.

A further object of the invention is to provide a gaseous discharge device which may be used for either lighting or for violet or other ray treatment of the body and which is capable of production in large quantities at a minimum of cost.

A further object of the invention lies in the provision of a gaseous discharge device of the character described which will provide for the energization of a discharge tube by means of high frequency oscillations.

Other objects of the invention lie in the construction and arrangement of the parts and circuit of the device whereby much of the conventional apparatus and parts required for devices of this type is eliminated.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention consists of certain novel features of construction, arrangement and combination of parts hereinafter fully described, illustrated in the accompanying drawing, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportion, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

For the purpose of facilitating an understanding of my invention, I have illustrated in the accompanying drawing a preferred embodiment thereof, from an inspection of which, when considered in connection with the following description, my invention, its mode of construction, assembly and operation, and many of its advantages should be readily understood and appreciated.

Referring to the drawing in which the same characters of reference are employed to indicate corresponding or similar parts throughout the several figures of the drawing:

Fig. 1 is an elevational view of a device em-

bodying my invention associated with a conventional socket base.

Fig. 2 is a somewhat diagrammatic median sectional view taken through the device, with portions thereof being shown in elevation.

The reference character 10 designates a conventional shell of metal adapted to be screwed into the ordinary 115 volt A. C. circuit. The upper edge of the shell 10 is formed as an upstanding flange as shown at 11 and is adapted to accommodate the envelope 12 which is, in the embodiment shown, of lead glass coated upon its interior with a fluorescent substance. The bottom of the shell 10 is stopped off by means of a porcelain block 13 which is provided with the metal contact button 14. An inner glass envelope 15 is mounted upon the porcelain block 13 and it is sealed in place by reason of the cement 16 which fills the space between the inner face of the shell wall and the envelope 15.

The glass envelope 15 is provided with electrodes constituting same a triode. The filament 17 is fixed within the bottom plug 18 of the envelope 15 and is adapted to be operated by 115 volts A. C. One lead thereof is connected to the button 14 while the other lead is soldered to the shell 10 at 18' as shown.

The triode is provided with the usual grid 19, and plate 20, both of which may be provided with leads extending from the top of the envelope 15. The cathode lead 21 is also shown extending from the top of the envelope 15 for convenience.

About the inner face of the shell 10 I provide a narrow metal strip 22 which may be soldered, welded or screwed into place. The band 22 is provided with a pair of upstanding support members 23 both electrically and mechanically connected thereto. These members 23 meet an annular electrode 24 at their upper ends and electrically connect said electrode with the shell. The annular electrode 24 supports the bottom end of a short sealed tube 25 filled with some gas, such as neon, krypton, argon, etc., and a drop or so of mercury. Any ionizable material may be used for this purpose.

The upper end of the discharge tube is also provided with an external annular electrode 26 which is connected by means of the lead 27 through the condenser 28 to the plate 20. The condenser 28 together with the discharge tube 25 serves as the lead for the output of the triode. The condenser 28 also serves as a current limiting device for the tube 25.

Between the cathode lead 21 and the plate 20 I provide a plate load resistor 29. The grid is

biased by means of the grid leak 29' which is connected to the shell 10. The grid feed-back condenser 30 assures an out of phase voltage being impressed across the grid and also aids in fixing the bias.

It will be seen from the above description that there is provided an oscillating circuit, the frequency of which is controlled by the inter-electrode capacitances and the capacity of the condensers 28 and 30, and also by the lead inductances.

An extremely high frequency voltage is consequently set up across the electrodes 24 and 26, which frequency is not affected by the frequency of the line which feeds the filament 17. The high frequency should be of the order of 60 megacycles and the circuit constants may be so chosen. At this frequency the discharge device will operate due to a complete ionization of the gas or metal within same.

The ionization of the material within the tube 25 causes rays of the ultra-violet and visible spectrum to be evolved in all directions. These rays are caught by the outer envelope 12 and converted into visible light by the fluorescent material with which said envelope 12 is coated. The device may thus be used for illumination.

If desired, the envelope 12 may be a selective filter so that rays emanated from the tube 25 may be used for treatment of various parts of the body. The envelope 12 may even be omitted entirely in some cases.

It will be seen that where my new device is utilized for illumination, the light produced will be steady and uniform in character instead of flickering as is the case with fluorescent illuminating devices whose illumination depends directly upon alternating current lines of low frequency. The stroboscopic effect so deleterious to the vision is by this means eliminated.

The device as described herein can be constructed cheaply and compactly and marketed as a unit. Multiple contacts, complicated switches, ballast reactances, and sensitive thermostats, relays, and the like are eliminated.

It is seen also that complicated attachment fixtures, and the like are eliminated since the entire device may be screwed into an ordinary lighting socket and operated therefrom. Obviously the base may be of the plug-in type by slight modification.

It is believed that my invention, its mode of construction and assembly, and many of its advantages should be readily understood from the foregoing without further description, and it should also be manifest that while a preferred embodiment of the invention has been shown and described for illustrative purposes, the structural details are nevertheless capable of wide variation within the purview of my invention as defined in the appended claims.

What I claim and desire to secure by Letters Patent of the United States is:

1. In combination in an electric discharge device, a hollow base structure comprising a shell for connection with an electrical outlet and line, a triode disposed substantially completely within said shell and connected to be energized by said line through said outlet, means connected between the plate and grid of the triode and constituting same an oscillator, a gaseous discharge tube, a pair of spaced electrodes surrounding opposite ends of said tube and electronically associated with said tube, and means connecting the

discharge tube and the electrodes in fixed relation within said base structure adjacent to said triode.

2. In an electric discharge device, a lamp socket comprising a shell for connection with an electrical outlet and line, a triode fixed substantially completely within said shell and connected to be energized by the line feeding said electrical outlet, means including a plate resistor, a grid leak and a grid feed-back condenser connected between the plate and grid electrodes of said triode and constituting same an oscillator, a pair of electrodes one of which is mounted upon said shell and both of which are connected in series with the output of said oscillator, and a gaseous discharge tube disposed between said electrodes, said electrodes comprising annular members surrounding said tube and serving to support same.

3. In an electric discharge device, a metal shell for connection with a household outlet, said shell being equipped with an insulating plug in one end thereof having an electrical contact member in the center thereof, a triode disposed upon said plug and substantially completely within said shell, the cathode of said triode being connected between said electrical contact member and the shell for energization of said triode, support members of conducting material attached to said shell and connected with an annular electrode, a gaseous discharge tube having one end thereof surrounded by said electrode and being supported thereby, a second electrode surrounding the opposite end of said tube, elements including a plate resistor, a grid leak and a grid feed-back condenser constituting an oscillating system together with said triode and having the output connected across said electrodes.

4. In an electric discharge device, a metal shell for connection with a household outlet, said shell being equipped with an insulating plug in one end thereof having an electrical contact member in the center thereof, a triode disposed upon said plug and substantially completely within said shell, the cathode of said triode being connected between said electrical contact member and the shell for energization of said triode, support members of conducting material attached to said shell and connected with an annular electrode, a gaseous discharge tube having one end thereof surrounded by said electrode and being supported thereby, a second electrode surrounding the opposite end of said tube, elements including a plate resistor, a grid leak and a grid feed-back condenser constituting an oscillating system together with said triode and having the output connected across said electrodes and an envelope supported by said shell and adapted to convert emanations from said tube into visible light.

5. In an electric discharge device, a lamp socket, an oscillator tube arranged substantially completely within said socket, an elongated gaseous discharge tube supported by said socket, and electrodes on said gaseous discharge tube, said electrodes being connected in series into the output circuit of said oscillator tube, said electrodes being the only means for supplying energy from said oscillator tube to said gaseous discharge tube.

6. In an electric discharge device, a lamp socket comprising a metallic shell for connection with an electric line outlet, an oscillator tube, which comprises within a sealed envelope at least a cathode, a plate and one grid, arranged substantially completely within said socket, an electrical connection between said cathode and said metallic shell, an elongated gaseous discharge

tube supported by said socket, end electrodes on said gaseous discharge tube, said electrodes being connected in series into the output circuit of said oscillator tube, said end electrodes being the only means for supplying energy from said oscillator tube to said gaseous discharge tube.

7. In an electric discharge device, a lamp socket, an oscillator tube arranged substantially completely within said socket, an elongated gaseous discharge tube supported by said socket in a position parallel to the axis of said lamp socket

and above said oscillator tube, end electrodes on said gaseous discharge tube; said electrodes being connected in series into the output circuit of said oscillator tube, said end electrodes being the only means for supplying energy from said oscillator tube to said gaseous discharge tube.

8. A combination as defined in claim 1 which includes a spaced fluorescent envelope mounted on said base structure and enclosing said discharge tube and electrodes.

DAVID W. ABERNATHY.