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Oct. 19, 1948. A. E. FEINBERG 2,452,026

GASEOUS DISCHARGE LAMP CIRCUIT

Filed June 11, 1947

Fig. 1.

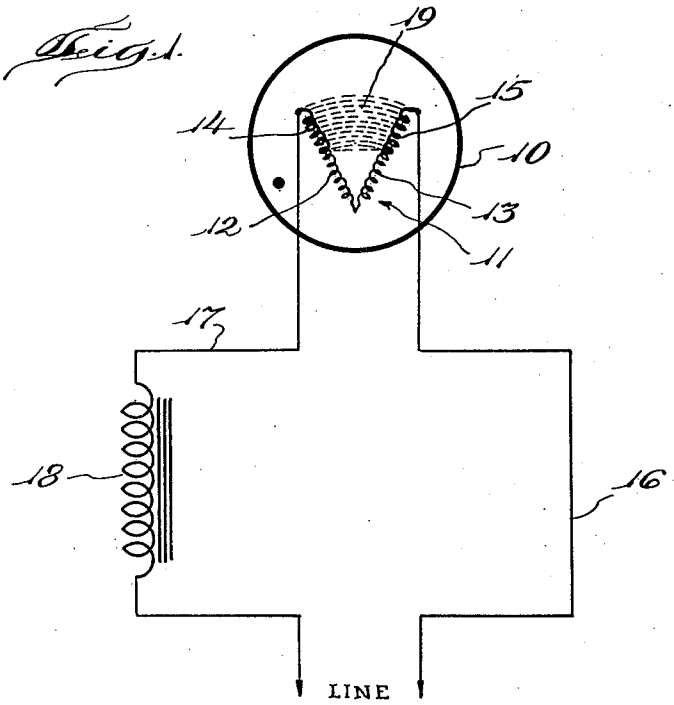
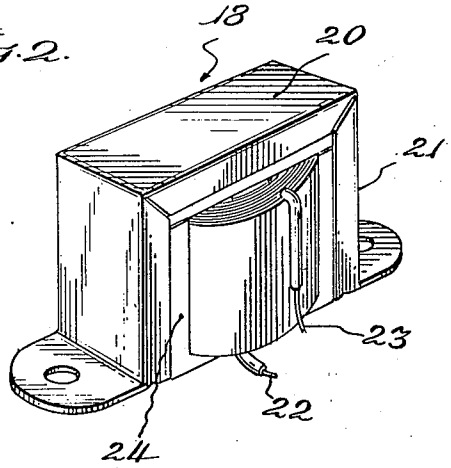


Fig. 2.



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Patented Oct. 19, 1948

2,452,026

UNITED STATES PATENT OFFICE

2,452,026

GASEOUS DISCHARGE LAMP CIRCUIT

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Application June 11, 1947, Serial No. 753,951

4 Claims. (Cl. 315—283)

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This invention relates to circuits for gaseous discharge lamps and more particularly to a circuit for use in connection with small mercury vapor lamps in which the vapor is caused to ionize producing ultra-violet radiation whereby the lamp may be used to sterilize the surrounding air.

The primary object of this invention is to provide a circuit in which the regulation of the voltage is very good and the reactive component of the circuit is extremely simple and economical in construction.

Another object of the invention is to eliminate the necessity of using multiple lead components such as transformers in such circuits whereby the circuit is easily connected with no possibility of error.

Another object is to provide a circuit in which the reactive component is small and compact.

Other objects and advantages of the invention will be apparent from the following description of the circuit and component hereinafter fully described and illustrated in the accompanying drawings and pointed out with particularity in the claims, it being obvious that minor changes can be made without departing from the spirit of the invention.

A preferred embodiment is illustrated in the accompanying drawings in which:

Fig. 1 is a diagrammatic view of the circuit of my invention.

Fig. 2 is a perspective view of the reactive component of my new circuit.

I am aware of the fact that reactive components of the general character described herein have been used for the same or similar purposes. It should be pointed out however that the specific solution of the specific problem is new, and to my knowledge has never heretofore been described.

The lamp with which my circuit is used is an envelope 10 filled with an ionizable gas, such as mercury vapor as indicated by the symbolic dot within the lamp. An inverted V-shaped filament 11 is supported within the envelope 10 having two branches 12 and 13. These are formed of coiled filaments of any suitable substance such as for example tungsten. The top ends of each of the branches 12 and 13 are coated with a highly emissive substance as shown at 14 and 15 whereby when same is heated large clouds of electrons are emitted.

It is intended by the use of such lamp to ionize the mercury vapor therein and produce ultra-violet radiations. The nature of the material

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from which the envelope is constructed is such that the radiation is readily transmitted and thereby enabled to react with bacteria in the immediate affected atmosphere.

The lamp 10 operates as follows:

Initially a voltage is applied to the ends of the filament 11 which is approximately equal to the break-down or ionization voltage of the gas within the envelope. This is of the order of 24 volts. The filament branches 12 and 13 glow due to passage of current heating up the highly emissive coating on the portions 14 and 15 and causing same to produce clouds of electrons. Since the entire 24 volts appears across the ends of the filament 11 the presence of electron cloud promotes arcing at the points 14 and 15 as indicated at 19, thereby causing ionization of the vapor within the envelope. The voltage at the arc now drops to 12 volts and the flow of current is increased. The bottom of the V is now short circuited, the entire flow of current being through the arc 19. The current flow during this period increases from .25 ampere during starting to about .35 ampere during discharge or ionization.

In order to operate this lamp from the ordinary line which varies from 110 to 125 volts it has heretofore been the practise to utilize transformers to decrease the voltage, and in order to provide for the necessary regulation such transformers were built with very large leakage factors. Thus, when the secondary current is suddenly increased by the striking of the arc, the secondary voltage is automatically lowered. Such technique was employed in constructing auto-transformers to be used with such lamps.

In the use of transformers there are four electrical leads which must be connected in order that the circuit operate properly. These leads must be identified and because of this it is not practical to permit unskilled workmen to connect same. In addition to the above the production of transformers is expensive and requires much more complicated apparatus than necessary to produce simple single winding strokes. The regulation required was never thought possible with a simple choke until my invention thereof. Conventional calculations indicate the need in such a circuit for a choke the size of which is so large as to make same impractical to use, and too expensive to manufacture in comparison with the transformers above referred to.

I have found that by using a simple choke, with certain slight modifications I can obtain the required regulation for operating this lamp. By this means I have produced a circuit so simple that it

requires no special knowledge to set up, the components do not have to be identified or carefully connected, and the entire apparatus is rendered simple and fool-proof.

One side of the filament is connected by the lead 16 to the line, and the other side is connected by the lead 17 through my reactance 18 to the other side of the line. The reactance comprises a single winding choke which may be constructed using the ordinary manufacturing methods. For example, I have shown a shell 20, carrying the core and winding 24 between its arms 21 crimped in position, and having only two leads 22, and 23, the connection of which into the circuit is not critical insofar as polarity is concerned.

The choke 18 for the purposes of the circuit is characterized by a high reactance engendered by a flux density (B max) of approximately 75,000 lines per square inch. I obtain this characteristic by utilizing an appropriate combination of laminations and wire with a small gap in the magnetic circuit. For example, in the case of the lamp described above, I have had success with a three quarters inch stack of three quarters inch E I laminations wound with 1100 turns of No. 29 wire and having a .020 inch gap. Variations are permissible within usual limits of conventional manufacturing practise for any given component.

It is obvious from the above that not only have I simplified the manufacture of the component needed to provide proper regulation for the lamp in question, but I have as well simplified the installation of the lamp and made same more economical than heretofore possible.

It is believed that the invention as set forth and all of its disadvantages should be readily understood without further explanation and description and it is to be understood that the reactance component illustrated is only an example and not intended to limit the invention since same may be made in any desired form within the purview of the invention as defined in the appended claims.

What it is claimed and desired to secure by Letters Patent of the United States is:

1. In a circuit for providing proper regulation for a gaseous discharge lamp in which the voltage is dropped from about 24 to 12 upon the striking of the arc within the lamp, a reactive component connected in series with the lamp and a conventional 110 volt alternating current line and comprising a single winding choke coil characterized by a high leakage reactance at a low flux density.

2. In a circuit for operating a lamp having a gas therein adapted to ionize at approximately 24 volts to produce radiation and including a conventional 110 volt alternating current line, a reactive component adapted to be connected in series with said lamp and said line, said component comprising a single winding choke mounted on a laminated core and having a flux density of approximately 75,000 lines per square inch and adapted to drop the voltage of the lamp to approximately 12 volts when the arc has been struck.

3. In a circuit for operating a lamp having a gas therein adapted to ionize at approximately 24 volts to produce radiation and including a conventional 110 volt alternating current line, a reactive component adapted to be connected in series with said lamp and said line, said component comprising a single winding choke mounted on a laminated core and having a flux density of approximately 75,000 lines per square inch and adapted to drop the voltage of the lamp to approximately 12 volts when the arc has been struck, said core having a .020 inch gap.

4. In a circuit for a lamp having a gas therein adapted to be ionized to produce radiation at a voltage substantially half of the arc-striking voltage, means for operating said lamp directly from a source of alternating current of a voltage substantially five times the arc-striking voltage and comprising a reactive component adapted to be connected in series with said lamp and said source of alternating current, said reactive component being a single winding cored choke characterized by a relatively low flux density and high leakage reactance and a small air gap.

ALBERT E. FEINBERG.

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Certificate of Correction

Patent No. 2,452,026. October 19, 1948.

ALBERT E. FEINBERG

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 2, line 44, for the word "strokes" read *chokes*;

and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of January, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.