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A. L. MENDENHALL, JR., ET AL

2,695,375

CIRCUIT FOR GAS DISCHARGE LAMPS

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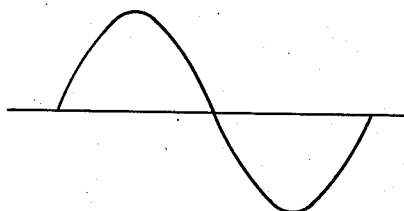


Fig. 1

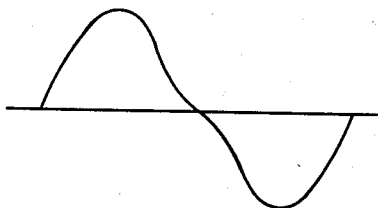


Fig. 2

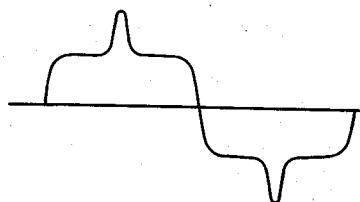


Fig. 3

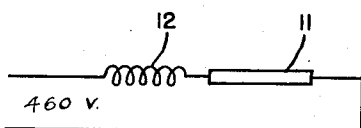


Fig. 4

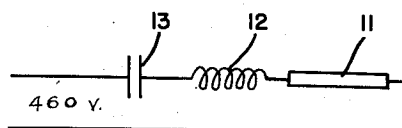


Fig. 5

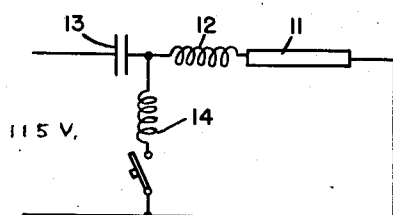


Fig. 6

INVENTOR
ALFRED L. MENDENHALL JR
CHARLES S. FEDERLE
By *Louis W. Mackay*
ATTORNEY

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CIRCUIT FOR GAS DISCHARGE LAMPS

Alfred L. Mendenhall, Jr., and Charles S. Federle,
Dayton, Ohio

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3 Claims. (Cl. 315-244)

Our invention consists in the circuit shown in Fig. 5 and the combination of elements making up our circuit and equivalent elements which produce the circuit characteristics as described herein more fully. Our invention relates to an improved electrical network or circuit for producing electrical values and characteristics most suitable for operation of fluorescent lamps. The features of our invention and discovery is the prolonged use of such lamps on our circuits far beyond their commercially rated life, and a decrease in the amount of copper required to supply fluorescent lamps under certain conditions of voltage and frequency. Another object is to furnish an electrical circuit to energize fluorescent lamps without a starting transformer. It has been found that electrical wave forms affect the life of such lamps and that the most desirable wave form is a sinusoidal form as illustrated in Fig. 1 of the drawing made part of this specification and in which:

Fig. 1 illustrates a sine wave.

Fig. 2 illustrates substantially the current wave form of our ballast.

Fig. 3 illustrates an undesirable wave form.

Fig. 4 illustrates a lagging power factor ballast.

Fig. 5 illustrates the basic circuit of our invention.

Fig. 6 illustrates a method of using the basic circuit on lower voltages.

In our invention has been noted the ability to supply nearly constant current, to a lamp of fixed current requirements, even under changing conditions of lamp elements, depreciation and lamp voltage variations. A larger lamp life is thereby obtained.

In Fig. 5 our electrical network suitable for a sixty cycle 460 volt supply is illustrated, consisting of fluorescent lamp 11, choke 12 and capacitor 13, connected in series. We have determined that with a forty watt lamp for example, the values of 1.5 microfarads for capacitor 13, and 1.8 henries for choke 12 will produce the normal current flow of .41 ampere through lamp 11 with a wave form essentially as illustrated in Fig. 2 and a power factor of substantially 30%, leading. This circuit is applicable to lamps of other sizes by selection of chokes and capacitors of suitable sizes, for example a 100 watt lamp would require a 3 mfd. capacitor and .6 henry choke.

The current wave form produced by our ballast by suitable choice of components as illustrated in Fig. 2 is superior to wave form illustrated in Fig. 3 produced by unsuitable choice of components in prolonging the life of the lamp.

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Our ballast in Fig. 5 is useful in correcting the lagging power factor commonly found in motor circuits, however, if the leading power factor is not desired, a sufficient number of ballasts using circuit shown in Fig. 4 may be included to adjust the power factor to any desired value.

The use of 460 volt 3 phase supply is practical and advantageous in that the additional transformation to 110 volts is eliminated and the light output is nearly constant with wide fluctuations in voltage. This is an important feature for economy in operation. Fig. 6 shows our circuit made suitable for operation on lower voltages by the inclusion of a coil 14, resonant to line frequency with capacitor 13, the voltage developed across coil 14 being sufficient to initiate the discharge through the lamp. Coil 14 may subsequently be disconnected from the circuit.

Although there are many combinations of capacitors and chokes that will pass a desired amount of current, we discovered that there is an optimum combination of capacitor and choke that will produce the desired amount of current and also produce the wave form as illustrated in Fig. 2, this combination is as shown and described herein.

Having set forth the nature, objects and arrangements of elements embodying our invention, we claim the following:

1. An electrical network comprising in series combination with a 460 volt 60 cycle alternating current supply, a 40 watt fluorescent lamp, means to regulate the wave form of currents energizing said lamp, said means being a choke coil having a value of 1.8 henry and a capacitor having a value of 1.5 microfarads, in series connections in said network.

2. In combination, a choke coil having a value of 1.8 henry and a capacitor having a value of 1.5 microfarads, series connected with a 40 watt fluorescent lamp, said coil and said capacitor producing in said series connection a substantially sinusoidal electrical wave form in current adapted to energize said lamp, said combination energized by a 460 volt 60 cycle alternating current electromotive force.

3. In combination with an electric source of the order of substantially 460 volts and 60 cycles frequency and a gas discharge type of lamp of 100 watts, means to energize said lamp with current from said source wherein said current has a wave form substantially sinusoidal in shape, said means consisting of a choke coil element having a value of 6 henries in series with a capacitor element having a value of 3 microfarads, said means electrically adapted to produce a current wave form substantially sinusoidal in shape.

References Cited in the file of this patent

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