Feb. 4, 1958 J. Y. RABETTE 2,822,508

REMOTE LIGHTING SYSTEM

Filed Aug. 1, 1955

FIG. 1

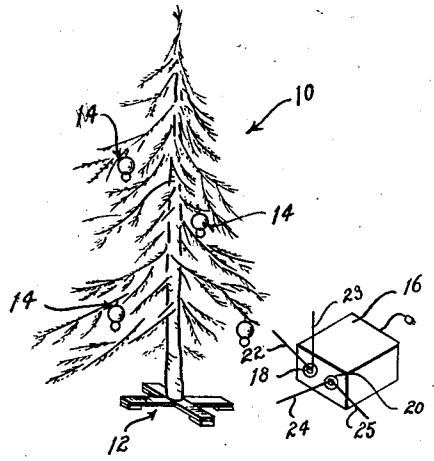


FIG. 2

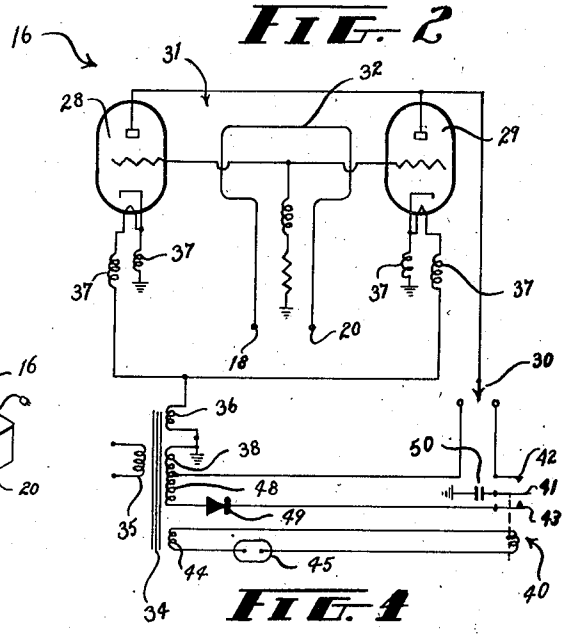


FIG. 3

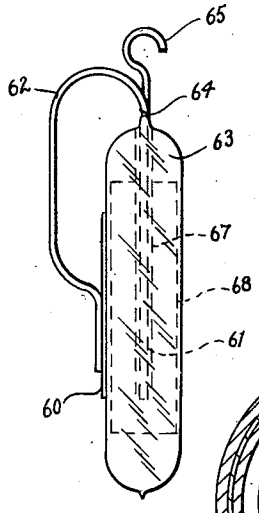


FIG. 4

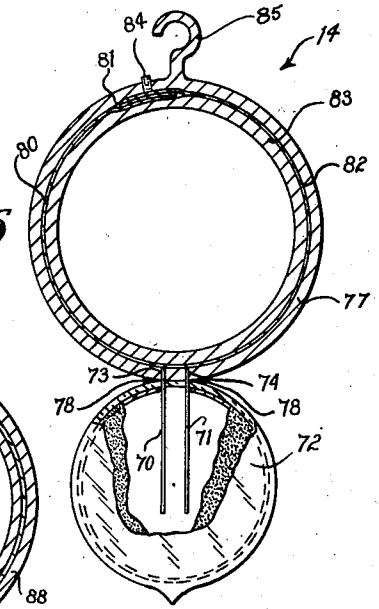
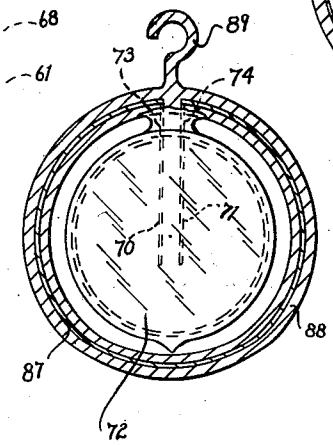


FIG. 5



INVENTOR

JEAN Y. RABETTE

BY HIS ATTORNEYS

HARRIS, KIECH, FOSTER, & HARRIS

United States Patent Office 2,822,508 Patented Feb. 4, 1958

2,822,508

REMOTE LIGHTING SYSTEM

Jean Y. Rabette, Bellflower, Calif., assignor of two-thirds to Homer C. Compton and R. A. Schaumloffel, Los Angeles, Calif.

Application August 1, 1955, Serial No. 525,489

6 Claims. (Cl. 315—248)

This application is a continuation-in-part of my application entitled "Electrical Discharge System," Serial No. 463,008, filed October 18, 1954.

This invention relates to remote lighting and, in particular, to a system in which illumination is provided by lamps which may be supported by any means and which are excited by an energy source located remote from the lamps.

It is an object of the invention to provide a remote lighting system in which the light sources produce very little heat and in which there are no electric current conductors connected to or positioned adjacent the lamps, thereby reducing the hazards due to fire and shock to a minimum.

It is another object of the invention to provide a remote lighting system in which lamps producing various colors of light may be employed in ornamental and decorative manners without requiring unsightly wiring connections thereto.

Another object of the invention is to provide such ornamental remote lighting in which the various lamps can be illuminated and extinguished independently of each other and in which the lamps may have a flickering effect simulating candlelight or the like.

It is an object of the invention to provide a remote lighting system having high efficiency lamps employing a pair of electrodes interconnected by an electrically conducting loop which maximizes the effect of the energy intercepted by the lamp. Another object of the invention is to provide a remote lighting system especially adapted for use in illuminating Christmas trees or the like in which the remotely positioned source of energy employs particularly shaped radiators to concentrate the energy in the zone of the tree.

The invention also comprises novel details of construction and novel combinations and arrangements of parts which will more fully appear in the course of the following description. The drawing merely shows and the description merely describes preferred embodiments of the present invention as applied to a remote lighting system for a Christmas tree, which are given by way of illustration or example.

In the drawing:

Fig. 1 is a diagrammatic representation of a Christmas tree illuminated by a preferred embodiment of the invention;

Fig. 2 is a schematic diagram of an electrical oscillator and associated control circuitry for use with the embodiment of Fig. 1;

Fig. 3 is a view of a lamp for use with the embodiment of Fig. 1;

Fig. 4 is a view shown partly in section of an alternative embodiment of a lamp; and

Fig. 5 is a view shown partially in section of another alternative embodiment of a lamp.

Referring now to Fig. 1, a Christmas tree **10** mounted on a base **12** has a plurality of lamps **14** hanging from the branches thereof. A source of oscillating electrical

energy **16** is located a distance from the tree **10** and approximately at the level of the base **12**. The output of the source **16** is connected to a pair of antenna terminals **18, 20** to which a suitable antenna structure is attached. The type of antenna utilized will be dependent upon the application being made of the remote lighting system. With the embodiment of Fig. 1 it is desirable that the majority of the energy from the source be concentrated in the zone occupied by the tree, the antenna structure shown therein being uniquely adapted to this function. Conductors **22** and **23** are connected to the terminal **18**, the conductors being perpendicular to each other with the conductor **23** extending vertically upward from the terminal **18**. Conductors **24** and **25** are connected to the terminal **20**, the conductors **24** and **25** being perpendicular to each other. The conductors **22, 24** and **25** all lie in a horizontal plane with the conductors **22** and **25** in line with each other and the conductor **24** directed in the direction of the tree **10**. This novel antenna construction provides a small apparatus which may be placed unobstrusively in some remote corner and yet which will concentrate a maximum amount of energy around the lamps **14** on the tree **10**.

The oscillating energy source **16** may include a pair of triode vacuum tubes **28, 29** (Fig. 2) connected in a conventional oscillator circuit, plate voltage being supplied to the tubes through a switch **30**. High frequency energy is coupled from a tank circuit **31** of the oscillator to the antenna terminals **18, 20** by a coupling loop **32**. Power for operation of the oscillator is supplied by a transformer **34** having a primary winding **35** connected to a commercial power source, such as a 60-cycle line. A secondary winding **36** provides filament power to the tubes **28, 29** through radio frequency chokes **37**. With the switch **30** in position 1 power is supplied to the plates of the tubes through a secondary winding **38** and the oscillator operates continuously.

A relay **40** having a moving contact **41** and fixed contacts **42** and **43** is coupled to a secondary winding **44** of the transformer **34** through a thermal switch **45**. The high voltage terminal of a secondary winding **48** is connected to the fixed contact **43** through a rectifier **49**, the rectifier **49** being oriented so that a capacitor **50** connected to the moving contact **41** is positively charged when the contact **41** engages a contact **43**. Subsequently when the contact **41** engages the contact **42** the capacitor **50** is discharged through the oscillator circuit producing a short pulse of high frequency output which reduces gradually in magnitude. The switch **45** may comprise a bimetallic element which closes the circuit between the secondary winding **44** and the relay **40** when it is cool, but which heats with the existence of current therein and opens said circuit, thereby moving the contact **41** alternately between the contacts **42** and **43**. The novel application of this control circuit to the remote lighting system of the invention will be described in greater detail subsequently.

The lamp of Fig. 3 includes a pair of electrodes **60, 61**, an electrical conducting loop **62** interconnecting the electrodes and an envelope **63** of nonconducting material such as glass or the like. The electrode **61** is centrally positioned within the envelope **63** with an end **64** of the electrode extending through the envelope **63**, the interior of the envelope **63** being sealed off from the surrounding atmosphere. In the embodiment illustrated in Fig. 3, the end **64** of the electrode **61** is made sufficiently long so that it may be formed into the electrical conducting loop **62** and attached to the electrode **60**, the latter electrode being mounted on the exterior surface of the envelope **63** substantially aligned with the inner electrode **61**. A hook **65** which may be sealed into the end of

the envelope 63 is provided for hanging the lamp on a branch of the tree or the like.

The electrode 61 is coated with an electron emitting substance 67, such as barium oxide, cesium oxide or the like. The inner surface of the envelope 63 is coated with a phosphorescent material 68 such as barium, strontium, or cesium phosphors. Prior to sealing, the envelope 63 may be evacuated and then a small amount of a gas such as an argon and mercury vapor mixture injected therein. When an electrical potential is developed between the electrodes 60 and 61 electrons are emitted from the electrode 61. These emitted electrons excite the gas or gases within the envelope which in turn excite the coating material 68 producing a fluorescent type of illumination.

When the lamp of Fig. 3 is placed in a radiation field such as that produced by the antenna structure of Fig. 1, a potential will be created between the electrodes 60 and 61. The electrical conducting loop 62 which connects the electrodes 60 and 61 is shaped so that the potential between the electrodes is a maximum for a particular frequency of radiated energy. This maximizing effect occurs because the two electrodes and the conducting loop comprise a resonant circuit which is tuned to this frequency. When energy of a frequency other than that particular frequency is being radiated, the potential between the electrodes will be effectively zero and hence no illumination will be produced. Because of the maximizing effect of the resonant structure, the amount of radiated energy necessary to produce a given amount of illumination is much less with the invention disclosed herein than with previously known designs.

A novel decorative effect may be produced by utilizing several groups of lamps such as those shown in Fig. 3, each group of lamps being constructed to provide illumination at a different frequency. A plurality of sources of oscillating electrical energy may be employed or a single source having a variable frequency output may be used. As the plurality of the sources are alternately energized, the group of lamps operable at each particular frequency will be illuminated with all other lamps extinguished. The same effect will be produced when the frequency of the single source is varied. The location and the coloring of the various groups of lamps can be arranged to give unique and desirable lighting effects.

Another novel effect can be produced by operating the oscillator of Fig. 2 with the switch 30 in position 2. Under these conditions the lamps will be brightly lit when the moving contact 41 initially engages the contact 42, with the magnitude of illumination decreasing thereafter until the energy stored in capacitor 50 is exhausted or until the contact 41 moves from the contact 42 to the contact 43. When the relay is in the latter condition the lamps will not be illuminated. When the operating cycle of the relay 40 is rapid, a unique flickering effect is produced by the lamps which more resembles that of candlelight than does the conventional on-off type of operation.

The alternative embodiment of the lamp shown in Fig. 4 includes a pair of electrodes 70, 71 centrally positioned within a nonconducting envelope 72, the electrodes being spaced from each other and approximately parallel to each other. The electrodes 70, 71 may be coated with an electron-emitting substance as was the electrode 61 of Fig. 3. The envelope 72 is evacuated, coated, filled with gas and sealed in a manner similar to the envelope 63 of Fig. 3, ends 73, 74 of the electrodes 70, 71, respectively, extending through the envelope to the exterior thereof. The envelope 72 is attached to a cylindrical ring 77 of nonconducting material by suitable means, such as cement at the point 78. The ends 73, 74 of the electrodes 70, 71 extend through the ring 77 and connect with an electrical conducting loop disposed within the ring 77, the loop consisting of an arcuate conductor 80 which may be a thin strip of metal foil, a dielectric block 81 which may be a thin piece of mica and a second arcuate conductor 82 which may also be a thin strip of metal foil. A second cylindrical ring 83 is positioned within the ring 77, the elements of the electrical conducting loop being held in place between the two rings. Portions of the conductors 80 and 82 overlap, these overlapping portions being separated by the dielectric block 81. A setscrew 84 is mounted in a threaded opening in the ring 77 and positioned to exert a force on the overlapping portion of the arcuate conductor 82 urging said portion toward the overlapping portion of the arcuate conductor 80. A suspension hook 85 is attached to the outer ring 77 by suitable means such as cementing.

When the lamp of Fig. 4 is positioned in a suitable field of electromagnetic energy, a potential is created between the electrodes 70, 71 and electron flow will exist therebetween. This electron flow excites the gases within the envelope 72 which in turn excite the internal coating of the envelope and light is produced in a manner similar to that in the embodiment of Fig. 3. The two arcuate conductors 80, 82 and the dielectric block 81 which, in conjunction with the overlapping portions of the conductors functions as a capacitor, provide the resonant electrical conducting loop which creates the greatly increased potential between the electrodes 70, 71 when the radiation field is of a particular frequency. In the construction of the embodiment disclosed in Fig. 4, the frequency at which the lamp will be illuminated may be adjusted by varying the pressure exerted by the setscrew 84.

In the embodiment of Fig. 5, the envelope and the electrodes are similar to those of Fig. 4. The ends 73, 74 of the electrodes 70, 71 are connected by a single conductor 87 which encircles the envelope 72, the ends 73, 74 and the conductor 87 being encased in a unitary molded plastic ring 88. A hook 89 is molded integrally with the ring 88 providing a means for suspending the lamp. The operation of the lamp of Fig. 5 is similar to that of the lamp of Fig. 4.

The electrical conducting loops of embodiments shown in Figs. 4 and 5 could be constructed of rigid conductors and the supporting nonconducting material, such as the rings 77 and 83 and the molded plastic 88 could be omitted. However, the structure illustrated is preferred in that a more rugged lamp is produced and also the nonconducting material may be made of colored plastics or the like increasing the ornamental effect of the lamps.

Although several exemplary embodiments of the invention have been disclosed and discussed, it will be understood that other applications of the invention are possible and that the embodiments disclosed may be subjected to various changes, modifications and substitutions without necessarily departing from the spirit of the invention. The invention may be used in the construction of advertising and window displays wherein objects may be illuminated from a remote source with no physical connections being made to the objects. The invention is also of advantage in the illumination of closed areas in which fire hazards exist and in which the presence of electrical conductors or high temperature illumination devices is prohibited. The oscillator which supplies the radiated electrical energy may be operated from battery power supplies and the invention may be utilized to provide temporary illumination and/or signalling systems at locations where commercial power is not available, the batteries having extremely long life because of the high efficiency of light production of the invention.

I claim as my invention:

1. A gaseous glow lamp comprising: a nonconducting sealed envelope; a pair of electrodes centrally positioned within said envelope, said electrodes being spaced from each other, each of said electrodes having an end extending from said envelope; and an electrically conducting loop positioned outside said envelope and electrically interconnecting said extending ends of said electrodes.

2. A gaseous glow lamp comprising: a nonconducting sealed envelope; a pair of electrodes centrally positioned within said envelope, said electrodes being spaced from each other, each of said electrodes having an end extending from said envelope; a first conductor connected to one of said ends; a second conductor connected to the other of said ends, a portion of said first conductor overlapping a portion of said second conductor; and a dielectric positioned between said overlapping portions.

3. A gaseous glow lamp comprising: a nonconducting sealed envelope; a pair of electrodes centrally positioned within said envelope, said electrodes being spaced from each other, each of said electrodes having an end extending from said envelope; a first arcuate conductor connected to one of said ends; a second arcuate conductor connected to the other of said ends, a portion of said first arcuate conductor overlapping a portion of said second arcuate conductor, said conductors beind disposed relative to each other so as to form a ring; and a dielectric positioned between said overlapping portions.

4. A gaseous glow lamp comprising: a nonconducting sealed envelope; a pair of electrodes centrally positioned within said envelope, said electrodes being spaced from each other, each of said electrodes having an end extending from said envelope; a first arcuate conductor connected to one of said ends; a second arcuate conductor connected to the other of said ends, a portion of said first arcuate conductor overlapping a portion of said second arcuate conductor, said conductors being disposed relative to each other so as to form a ring; a dielectric positioned between said overlapping portions; and adjustment means for urging said first overlapping portion toward said second overlapping portion.

5. A gaseous glow lamp comprising: a first nonconducting ring; a second nonconducting ring disposed concentric with said first ring; a nonconducting sealed envelope dependent from said first ring; a pair of electrodes centrally positioned within said envelope, said electrodes being spaced from and substantially parallel to each other, each of said electrodes having an end extending from said envelope and through said first ring; and an electrical conducting loop mounted between said concentric rings, said loop interconnecting said ends of said electrodes.

6. A gaseous glow lamp comprising: a nonconducting sealed envelope approximately spherical in shape; a pair of electrodes centrally positioned within said envelope, said electrodes being spaced from and substantially parallel to each other, each of said electrodes having an end extending from said envelope; and a nonconducting ring enclosing said envelope, said ends of said electrodes being mounted in said ring, said ring including an electrical conducting loop interconnecting said ends.

References Cited in the file of this patent

UNITED STATES PATENTS

2,117,544	Coustal	May 17, 1938
2,121,460	Waters	June 21, 1938
2,181,889	Hanson	Dec. 5, 1939
2,268,870	Greenlee	Jan. 6, 1942
2,525,624	Stahl et al.	Oct. 10, 1950