United States Patent

[11] 3,604,920

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[21] Appl. No. **763,513**
[22] Filed **Sept. 30, 1968**
[45] Patented **Sept. 14, 1971**

[54] **PORTABLE FLUORESCENT LANTERN**
5 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** ..... **240/11.4 R,** 240/11.2 R, 240/10.6 R, 240/51.11 R, 315/100
[51] **Int. Cl.** **F21l 3/00**
[50] **Field of Search** ..... 240/11.2, 11.4, 10.65, 10.6, 51.12, 51.11; 315/100 T

[56] **References Cited**

UNITED STATES PATENTS

2,896,126	7/1959	Hoff, Jr.	307/202 X
2,533,910	12/1950	Barr	240/11.4 X
2,923,856	2/1960	Greene et al.	315/100 T
2,980,889	4/1961	Meissner	240/10.6 X
3,005,130	10/1961	Schwartz	315/100 T
3,331,958	7/1967	Adler	240/51.11 X
3,435,206	3/1969	Swanson	240/51.11 X
3,448,335	6/1969	Gregory et al.	315/100 T

FOREIGN PATENTS

1,088,637	9/1954	France	240/51.12

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ABSTRACT: A portable fluorescent hand lantern with circuitry for energizing the lantern either on AC or DC power. The lantern is fitted with electrical connectors for respective engagement with female and male sockets of a standard electrical power cord. In AC operation, the female socket of the electric cord is inserted into the lantern and the male socket fits into a standard AC outlet. In DC operation, the power cord is reversed with the male socket of the cord inserted into the lantern and the female socket of the cord connected to a battery adapter. To operate the lantern under DC power, the circuitry includes a transistorized DC to AC power inverter.

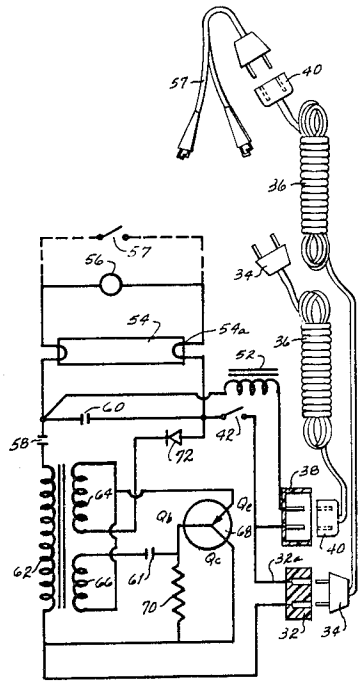


Fig. 1

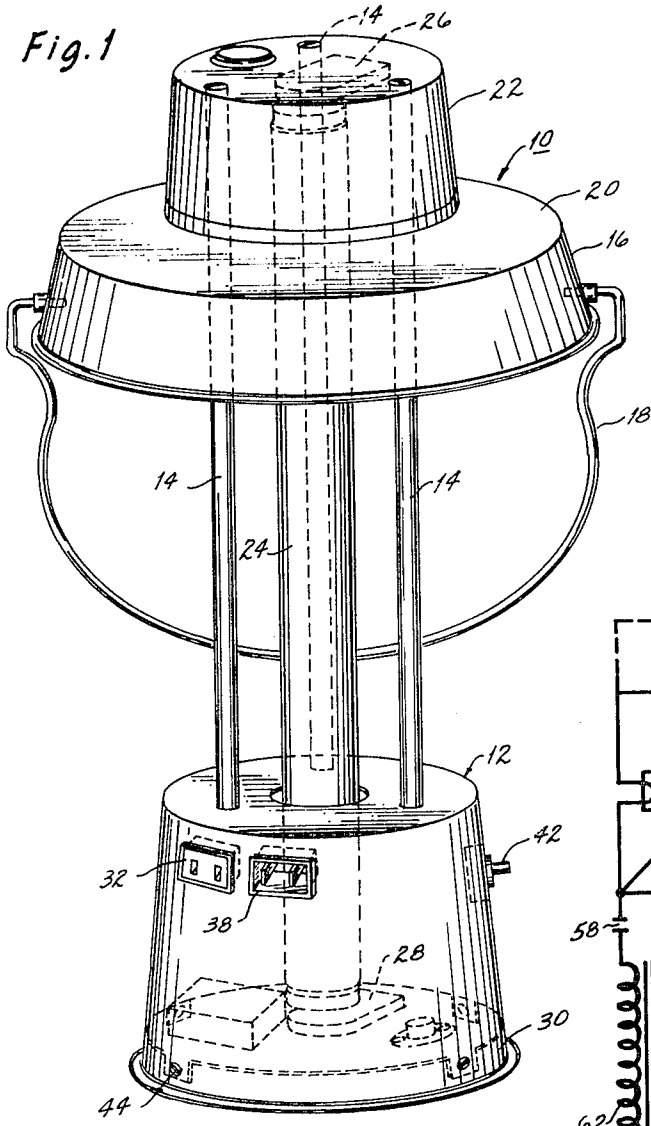


Fig. 2

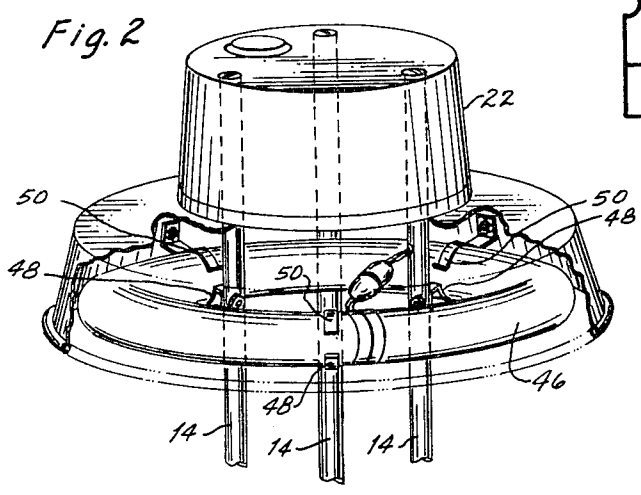
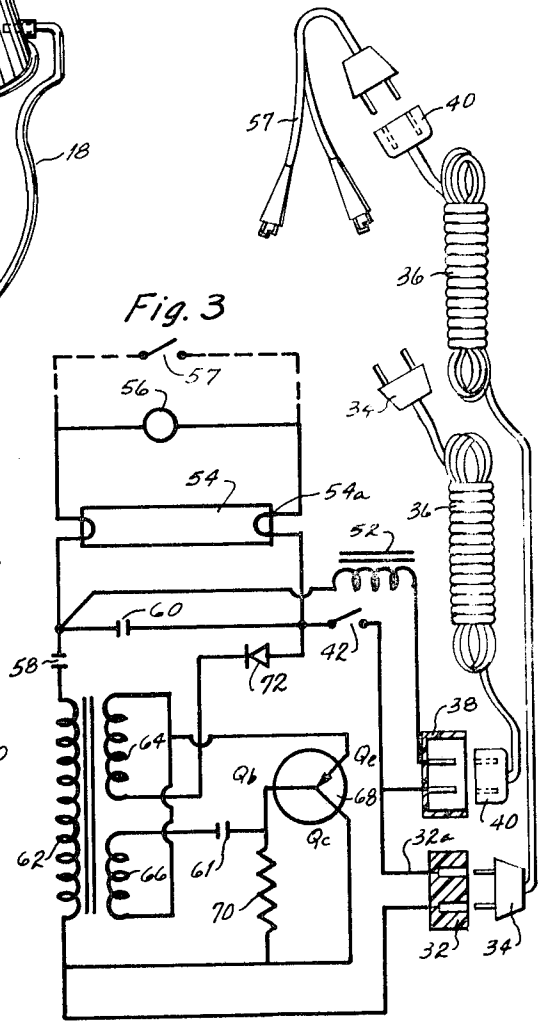


Fig. 3



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PORTABLE FLUORESCENT LANTERN

This invention relates to a novel portable fluorescent hand lantern and circuitry therefore; more particularly, this invention relates to a novel electrical fluorescent hand lantern which may be operated either under AC or DC power by utilizing a conventional electrical power cord.

It is well known that hand lanterns operated on gasoline, kerosene, butane or the like are potentially dangerous owing to the combustible fuel. Moreover, these lanterns are inconvenient in that they must be periodically refilled.

There is a need for a lantern operated on electrical power which is particularly suitable for recreation and emergency use. Electric lanterns having an incandescent lamp have been manufactured for such use but are generally unsatisfactory. These lanterns normally contain a battery for energizing the lamp under DC power. The incandescent lamp requires an excessive amount of current which quickly drains the battery, and furthermore, the batteries are frequently of such size as to make the lantern heavy and objectionable to carry.

Fluorescent lanterns are preferable in that a fluorescent tube requires a minimum amount of current to generate a relatively large quantity of light. Unfortunately however, there is no known fluorescent lantern which is particularly constructed and suitable for recreation and emergency use. Known fluorescent lanterns are not easily carried nor is the light distributed in an advantageous manner for recreational and emergency use. They usually operate on AC power with no provision to operate the lantern on a DC power input when the AC source is not available which is often the situation where the lantern is to be utilized. The manner of changing the lantern from an AC source to a DC source should be simple and expedient by use of conventional means. Moreover, there is no known electrical circuitry having a simple power inverter for changing the DC input to AC for operating a fluorescent tube with a minimum power loss, yet still be constructed of few electrical components.

An object of this invention is to provide a novel fluorescent hand lantern particularly constructed for recreational and emergency use.

Another object is to provide a fluorescent hand lantern which may be operated either under AC or DC power.

Still another object is to provide a fluorescent hand lantern which may be operated under AC or DC power and which may easily be converted form one source to another by utilizing a standard electrical power cord.

A further object is to provide novel electrical circuitry to operate a fluorescent hand lantern or a similar apparatus either under AC or DC current.

Another object is to provide novel electrical circuitry to operate a fluorescent hand lantern or a similar apparatus wherein the circuitry includes simple and relatively few electrical components for inverting a DC input to AC for energizing the latern's fluorescent tube.

Another object is to provide a fluorescent hand lantern which is both practical and economically feasible to manufacture.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

In accordance with these objects, the invention comprises a portable fluorescent lamp in the form of a standard hand lantern. The lantern may be operated under AC or DC power by the provision of a suitable circuitry including a transistorized DC to AC power inverter. Appropriate electrical connectors are provided on the lantern to mate respectively with the male and female sockets of a standard electrical power cord. In AC operation, the male socket of the power cord is inserted into a conventional AC electrical outlet and the female socket is inserted into the lantern. In DC operation, the power cord is reversed with the male socket inserted into the lantern and the female socket of the power cord is connected to battery terminals via a conventional adapter.

The invention accordingly comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be made to the following details description taken in connection with the accompanying drawings in which:

FIG. 1 is a perspective view showing a preferred form of the fluorescent hand lantern.

FIG. 2 is a modification of the hand lantern in FIG. 1 showing the lantern with a circular fluorescent tube.

FIG. 3 is an electrical schematic view of the electrical circuitry for the fluorescent hand lantern shown in FIGS. 1 and 2.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring now to the drawings in detail, particularly FIG. 1, the lantern generally designated as **10** comprises a truncated base **12** as shown. Three vertical support rods **14** extend from base **12** and support a removable shade **16** with an attached pivotable bail **18** for carrying the lantern. The shade includes a lower pan-shaped portion **20** and an integral upper reduced diameter portion **22** for receiving the support rods and a fluorescent tube **24**. The fluorescent tube lies in the plane of the vertical axis of the lantern and is positioned as shown between two fluorescent tube connectors **26**, **28** which are respectively attached to the lower surface of the uppermost portion **22** of shade **16** and to a bottom **30** of base **12**. Affixed to the wall of base **12** is a conventional electrical female socket or connector **32** for receiving a male socket **34** of a standard electrical power cord **36** (FIG. 3). Similarly affixed to this wall is a conventional male socket **38** for receiving a female socket **40** of the power cord. An on and off switch **42** is also attached to the wall where indicated.

Base **12** is hollow and contains necessary electrical circuitry for operating the lantern through electrical connectors **32**, **38**, and switch **42**. Bottom **30** of the base is removably secured by screws **44** to provide maintenance accessibility to the circuitry. The lantern may be fabricated of metal or of a suitable plastic.

Referring now to FIG. **2**, a modification of the lantern is shown where in lieu of a vertical fluorescent tube, a circular fluorescent tube **46** is positioned as show within shade **16**. The tube is supported at its bottom by spring brackets **48** extending from and attached to the upright legs **14**. Spring brackets **50** are attached to shade **16** for supporting tube **46** along its upper surface such that both brackets substantially surround the tube where they contact and clamp it.

The circuitry of the lamp is shown in FIG. **3** and is designed to actuate the fluorescent tube by either an AC or DC power input to the lamp. Considering first the AC circuit, AC power is supplied to the lamp through standard electrical power cord **36** having a male connector **34** for insertion into a standard AC power receptacle, not shown, and a female socket **40** which engages male connector **38** on the lantern. The circuit for transmitting the AC power includes an inductance coil **52**, a fluorescent tube **54** and an associated automatic fluorescent starter **56** which is of the conventional tube type. As well known, the starter provides sufficient energy to commence operation of the fluorescent tube **54**, then becomes inoperative. It should be obvious that a well-known momentary switch **57** could be incorporated into the circuit to start the fluorescent tube in lieu of automatic starter **56**. The circuitry also includes a start/stop switch **42** for energizing the circuitry.

In operation of the lantern under AC power, switch **42** is closed and the current is passed to inductance coil **52**, fluorescent tube **54** and starter **56**. The fluorescent tube is "-fired" by the starter and then continues in operation until switch **42** is opened.

The portion of the circuitry which converts DC power to AC power for operating the fluorescent tube receives direct current from a DC source such as a battery, not shown, by at-

taching to the battery's terminals two leads of an adapter **57** and inserting the other end of the adapter into female socket **40** of the power cord **36**. The male socket **34** of the cord is positioned in the female connector **32** of the lantern. The circuitry includes as shown: a start/stop switch **42**; a fluorescent tube **54** and starter **56** therefore; capacitors **58**, **60** and **61**; a transformer having a secondary winding **62**. a primary winding **64** and a feedback winding **66**; a transistor **68** having a collector Q*c*, a base Q*b* and an emitter Q*e;* a resistor **70** and a diode rectifier **72**.

In operation of the DC to AC system, the adapter leads are connected in proper order to terminals of a 12-volt battery such that the positive DC current flows from the battery through the power cord **36** to terminal **32***a* of socket **32**. Upon switch **42** being closed, a positive charge is placed on fluorescent lamp filament lamp **54***a*, the positive side of capacitor **60**, primary winding **64**, feedback winding **66**, positive side of capacitor **61** and an emitter terminal Q*e* of transistor **68**. The rectifier **72** only passes positive current to the transistor and is so positioned to prevent damage to the transistor should the adapter leads be connected in a wrong order to the battery terminals. A negative charge is placed on the negative side of capacitor **58**, secondary transformer winding **62**, resistor **70** and negative side of capacitor **61** and the base Q*b* and collector Q*c* terminals of transistor **68**.

As a result of these charges, a proper bias voltage is developed at the emitter Q*e*, collector Q*c* and base Q*b* thus causing the transistor to conduct current. As the transistor conducts current, a current is conducted in primary winding **64** which causes feedback winding **66** to be energized. The energization of the feedback winding passes current through capacitor **61** and resistor **70** such that upon reaching the collector terminal Q*c* of transistor **68**, the current is 180° out of phase. Since the current is 180° out of phase at the collector terminal, the transistor shuts off. The cycle heretofore described is then repeated.

As this cycle is continuously repeated, a voltage is developed in primary winding **64** and secondary winding **62** which varies in time. Capacitors **58** and **60** are energized by this voltage and create an impedance matching circuit on both sides of the fluorescent tube **54**.

The voltage generated in the secondary winding produces a current of high oscillating frequencies which is instantly passed through capacitor **58** to the fluorescent tube **54** and associated starter **56**. After tube **54** is fired, starter **56** becomes inoperative and the tube remains lighted until switch **42** is opened.

Thus, as seen from the above description, a novel portable fluorescent hand lantern has been invented where the fluorescent tube may be of the conventional straight or circular type depending upon the type of light desired. Conveniently, the light may be operated on either AC or DC power by an unusually simple arrangement which enables the lantern to be operated off of either source by simply reversing a standard electrical power cord. The lantern's circuitry is unique in that a few simple electrical components enable the lantern to be operated under alternating current or direct current with a minimum power requirement. It should be obvious that the circuitry may also be utilized in other applications where a load such as a fluorescent tube may be energized.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain charges may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.

Now that the invention has been described:

I claim:

1. A fluorescent lantern capable of being operated with an AC or DC power input, said lantern comprising: a base, a fluorescent tube removably connected to said base; a first and second circuit means arranged in cooperative relation to one another to energize said fluorescent tube from a direct or alternating current input respectively, said first circuit means comprising a transistorized power inverter circuit for operating said tube with AC from a DC power input; said first circuit means including a transistor, a transformer having a primary and a secondary winding, switch means for energizing a portion of said transistorized circuit with direct current, biasing means to bias the transistor such that the transistor conducts current when said portion of said circuit is energized with direct current, bias changing means including a feedback winding, a first capacitor coupled to said feedback winding; said transistor including a base electrode, a collector electrode and an emitter electrode, said base coupled to said first capacitor, a resistance coupled to said first capacitor, said collector coupled to said resistance, said emitter coupled to said primary winding: and said feedback winding being energized by said primary winding when current is conducted in the transistor, whereby said feedback winding generates a current through the capacitor and resistance which when reaching said base and said collector is 180° out of phase with the current in said primary winding.

2. A fluorescent lantern as in claim **1** wherein said first circuit comprises: a single transistor coupled to said bias changing means such that said transistor is alternately started and stopped, said transformer being coupled to said transistor such that it is energized when said transistor conducts currents and deenergized when said conduction of current is stopped, said fluorescent tube coupled to said transformer such that said primary and secondary windings are connected to the filament of said tube by impedance matching means including second and third capacitors respectively; whereby said fluorescent tube is operated on alternating type current as said transformer is successively energized and deenergized.

3. A fluorescent lantern as in claim **1** wherein said transistorized circuit further includes a transistorized protection means coupled to said primary winding to prevent damage to said transistor upon said circuit being connected to the wrong terminal of the DC power input.

4. A fluorescent lantern as in claim **3** wherein said protection means comprises a diode rectifier positioned relative to said transistor to allow only positive current to be passed thereto.

5. A fluorescent lantern as in claim **1** wherein said second circuit means includes said fluorescent tube, and inductance means, starter means for starting said fluorescent tube and switch means for energizing said circuit with alternating current whereby the fluorescent tube is fired by the starter and thereafter remains in operation.