

[54] **LIGHTING SYSTEM**

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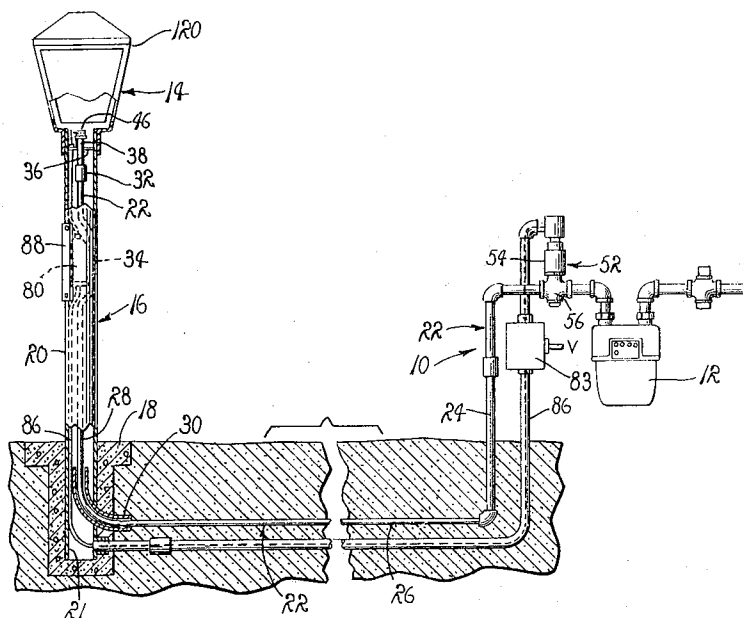
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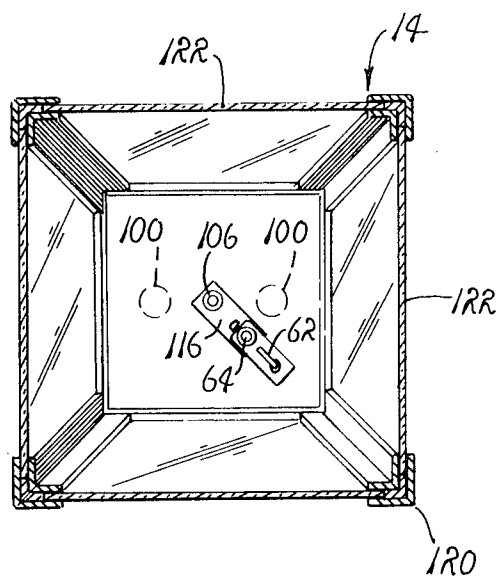
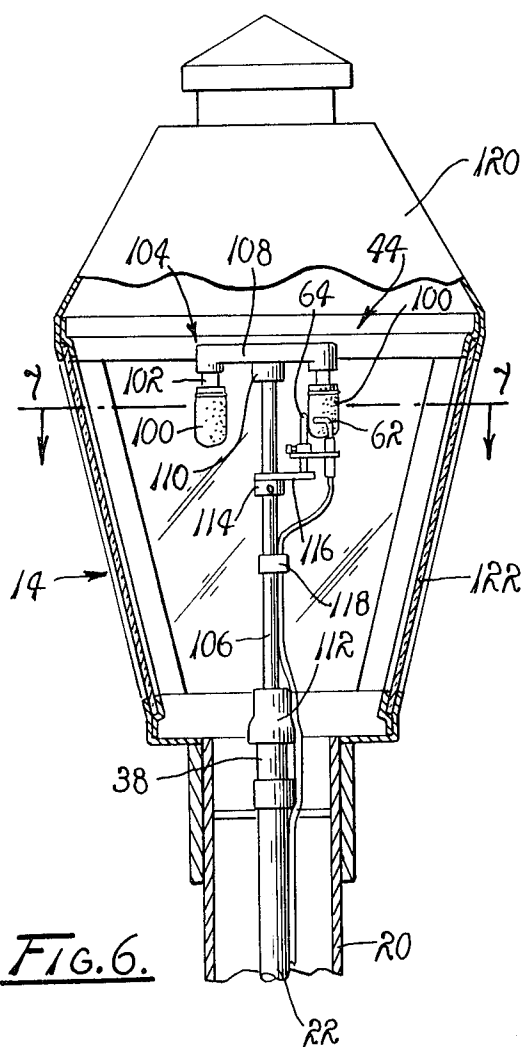
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[57] **ABSTRACT**

A selectively operable lighting system including a lamp for providing a flame of gas particularly suited for use in illuminating outdoor areas, such as patios, terraces and the like. The system is characterized by a tubular pillar supported by a rigid pedestal embedded beneath the surface of an area being illuminated, and surmounted by a burner connected with a source of gas and encased within a protective and ornamental head. A selectively operable, electrically energizable igniter capable of responding to an absence of an illuminating flame is provided for igniting combustible gas delivered to the burner, whereby a substantially continuous illuminating flame selectively is provided.

4 Claims, 7 Drawing Figures





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LIGHTING SYSTEM

BACKGROUND OF THE INVENTION

The invention relates to lighting systems and more particularly to a system including a gas lamp for illuminating outdoor areas such as patios, terraces and the like.

The prior art is replete with various types of gas lamps too numerous to enumerate. Various automatic ignition devices also heretofore have been employed in lighting the gas lamps whereby an illuminating flame is provided. Such ignition devices commonly employ gas jets which burn continuously so that control over the operation of the lamps is achieved simply by controlling the flow of gas to the lamps. This, of course, requires a pilot flame of a character which cannot be readily extinguished in response to a changing environment. Such a flame tends to introduce numerous undesirable consequences, including unsightly burning and continuous maintenance.

Since the advent of electrical lighting systems, gas lamps have experienced a substantial disuse. One apparent reason for an abandonment of gas lamps as a source of light is their inherent inefficiency, when compared to electrical systems similarly employed. To some degree, the inefficiency of gas lighting systems heretofore employed resulted from the difficulties encountered in igniting the gas at appropriate intervals, as well as in maintaining a continuous flame for meeting safety standards, particularly in systems exposed to continuously changing climatic conditions.

Of course, the esthetic qualities of gas lamps continues to be appreciated. Therefore, steps are currently being taken to improve and adapt gas lamps for use in lighting systems employed for both protective and decorative uses.

Therefore, it can be appreciated that there currently exists a need for a practical gas lighting system including a lamp including an igniter capable of responding to remotely generated and selectively applied electrical signals for igniting a flow of gas delivered to the lamp, whereby an illuminating flame of gas suitable for decorative, as well as protective uses, is responsively and selectively provided.

OBJECTS AND SUMMARY OF THE INVENTION

It is therefore an object of the instant invention to provide in an improved lighting system a burner for providing a flame of gas for use in illuminating outdoor areas.

Another object is to provide a gas lighting system having increased efficiency for use in protectively illuminating selected areas.

It is another object to provide a gas lighting system including a gas lamp suited for use in providing illumination having selected esthetic qualities.

It is another object to provide in a gas lighting system a control circuit for imposing selected modes of operation on the system in accordance with electrical signals delivered thereto from an external source.

It is another object to provide an improved gas lighting system including a tubular pillar and a radiation generating burner surmounting the pillar for producing a substantially continuous flame of burning fuel in response to a passage of a predetermined interval of time.

It is another object to provide in an improved lighting system having a gas burner for providing a flame of gas as a source of illuminating radiation and an electrically energizable igniter for generating a gas-ignition arc in response to a termination of the flame.

It is another object to provide an improved gas lighting system having a lamp including an array of gas delivery jets for producing an illuminating flame.

It is another object to provide an improved gas lighting system having a mantle for producing an illuminating flame.

These and other objects and advantages of the instant invention are achieved by a gas lighting system including a tubular pillar supported by a substantially rigid pedestal embedded in the surface of a selected area to be illuminated and surmounted by an electrically controlled gas lamp including an electrically energizable igniter for igniting gas delivered to the lamp, and an electrical control circuit for imposing a bistable condition on the system, whereby the system is automatically and reliably rendered operative for efficiently illuminating the selected area.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of a system which embodies the principles of the instant invention, including a source of gas, a control circuit, an igniter, and a burner for producing a flame within a protective head.

FIG. 2 is a fragmentary, sectional view of a burner employed in the instant invention.

FIG. 3 is a sectional plan view of the burner, taken generally along line 3—3 of FIG. 2.

FIG. 4 is a partially sectional fragmentary view taken generally along lines 4—4 of FIG. 3.

FIG. 5 is a schematic diagram, partially in block form, of a control circuit employed in controlling the system of the instant invention.

FIG. 6 is a fragmentary elevational view of an alternate form of a burner which may be employed with a system embodying the instant invention.

FIG. 7 is a sectional view, taken generally along lines 7—7 of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein like reference characters designate like or corresponding parts throughout the several views there is illustrated in FIG. 1 a lighting system, generally designated 10, embodying the principles of the instant invention.

Preferably the system 10 is employed in illuminating patios, terraces, swimming pools, and similar facilities commonly situated near dwellings, public facilities and the like. Accordingly, the system 10 is, in practice, coupled with an outlet of a convenient gas meter 12, as is normally available in the vicinity of an area to be illuminated. Through the meter 12 natural gas is delivered to the system 10. Since the meter 12 forms no part of the instant invention, it suffices to understand that the meter 12 is coupled with an existing service and is employed as a source of gas for the system 10. Of course, it should be apparent that while the system 10 is depicted associated with a natural gas service, it is entirely feasible to couple the system with a "bottled" gas system, such as a butane system and the like. For pur-

poses of describing the instant invention, however, it is to be assumed that the system 10 preferably is coupled with a meter 12 of a natural gas domestic service.

The system 10 further includes a gas lamp, generally designated 14, supported by a tubular pillar, generally designated 16. The pillar is formed from thin-wall tubular steel stock of a suitable dimension. In practice, the pillar is supported by a pedestal 18 formed of concrete and buried beneath the surface of an area to be illuminated. As illustrated, the pedestal 18 is buried in soil, however, it is to be understood that the pedestal 18 can be seated in a concrete slab of a type often employed near swimming pools and the like.

The pillar 16 includes a tubular body 20 vertically projected from a base portion 21 seated in the pedestal 18. Of course, the particular manner in which the pedestal 18 and the tubular body 20 are mated is a matter of convenience. However, the pedestal 18 can, if desired, be poured in situ about the base portion 21 of the body 20 in a manner consistent with known construction practices.

The gas lamp 14 surmounts the pillar 16 and is coupled with the meter 12 through a gas conduit system 22. The system 22 is fabricated from any convenient material and of dimensions dictated by use and local codes.

In practice, the conduit system 22 includes a base segment 24 fabricated from galvanized pipe which is coupled together employing suitable pipe fittings including nipples, reducers, sleeves, elbows, and the like. The base segment 24 of the conduit system 22 terminates in a central segment 26 buried beneath the surface of the area to be illuminated. This segment is disposed between the first segment 24 and the pedestal 18. As a practical matter, the central segment 26 preferably is formed of an acrylic plastic in localities having a local code providing for its use. The central segment 26, of the conduit system 22, in turn, terminates in a distal segment 28 which forms a riser substantially concentrically related to the tubular pillar 16. In practice, the distal segment 28 is fabricated from copper tubing of an appropriate dimension, however, other suitable materials can be employed equally as well.

It is, of course, to be understood that the central segment 26 is coupled with the base segment 24 and the distal segment 28 of the conduit system 22 employing convenient and commercially available fittings of suitable sizes and configurations. Since such fittings are well known, a detailed description is omitted in the interest of brevity. It is to be understood, however, that the central segment 26 is extended to the vicinity of the pillar 16 and coupled with the distal segment 28 of the conduit system 22, and extended through a protective sheath 30 protectively extended from the internal portion of the pillar to the external surfaces of the pedestal 18.

The distal segment 28 extends axially through the tubular body 20 and terminates at a sleeve 32, FIG. 2, which couples the conduit system 22 with the gas lamp 14. As a practical matter, the distal segment 28 also includes an off-set segment 34, the purpose of which will hereinafter become more readily apparent.

As best illustrated in FIGS. 2 and 3, there is provided within the uppermost portion of the tubular pillar 16 a

diametrically extended support bar 36 coupled with the internal surfaces of the pillar through the use of a plurality of tack-welds and the like, not designated. The support bar 36 has formed therein an aperture, concentrically related to the tubular body 20, through which is extended a nipple 38. The nipple 38 is coupled with the distal segment 28 of the conduit system 22 at the sleeve 32 and preferably is united with the support bar 36 by an annular weld 40. Of course, the suitable threaded pipe fittings, spacers and the like can be employed in lieu of the weld.

The distal or upper portion of the nipple 38 terminates in an externally screw-threaded portion 42 near the plane of the upper end of the tubular body 20. The externally threaded distal portion of the nipple 38 is employed for coupling thereto a burner, generally designated 44.

As illustrated in FIG. 2, the burner 44 includes an internally threaded cap 46 having a plurality of radially extended ports 48. In order to increase operating efficiency, the cap 46 is coupled with the distal end of the nipple 38 by a suitable reducer 50 which facilitates the use of a cap having an internal diameter greater than the outside diameter of the nipple. It is to be understood, of course, that the cap 46 is of a size dictated by system parameters including gas pressure available at the cap. Consequently, the reducer 50 preferably includes both externally and internally screw-threaded portions of differing diameters for coupling a cap 46 with the nipple 38.

The number and dimensions of the ports 48 also are varied as is found practical for given systems. In any event, the ports 48 extend through the cap 46 and terminate in communication with the conduit system 22 so that gas, in operation, is delivered from the meter 12 through the ports 48 which, in effect, serve to establish an annular array of flame producing posts.

Control over the flow of gas from the meter 12 to the cap 46 is established through a use of a solenoid-controlled valve 52, FIG. 1. The valve 52 includes an electrically responsive actuator unit 54 coupled with a gate, not shown, seated in a valve housing 56 provided for the valve 52. Since such valves are well within the skill of the art, a detailed description of the valve 52 and the actuator 54 is omitted in the interest of brevity. The actuator unit 54, however, preferably includes an electrically energizable winding and an armature, not shown, while within the housing 56 there is provided a spring-loaded gate, also not shown, which continuously is biased into a "closed" disposition under the influence of a spring so that the valve 52 is a normally-closed valve which is opened only in response to an electrical signal applied to the actuator 54.

Immediately adjacent the burner 44 there is mounted an igniter, generally designated 60. The igniter 60 serves to initiate combustion of gas discharged through the ports 48 and includes a first electrode 62 and a second electrode 64 spaced apart a predetermined distance for establishing an air gap therebetween.

In practice, the electrode 64 comprises a vertically oriented steel rod welded to the support bar 36. Since the steel rod 64 is welded to the support bar 36, which, in turn, is welded to the body 20, the electrode 64 is maintained at ground potential. As best illustrated in FIG. 3, the electrode 64 is offset with respect to the

center line of the support bar 36 in order to accommodate a mounting of the electrode 62 on the support bar. A bracket 66 including a collar 68 of an internal diameter substantially equal to the external diameter of the electrode 64 is employed in coupling the electrode 62 to the support bar 36. The collar 68 is received by the electrode 64 and a setscrew 70 is provided for fixing the collar in a vertical position on the electrode 64. Extended horizontally from the collar 68 there is a bar 72 having an aperture, not designated, formed in the distal end thereof through which is vertically extended a porcelain sheath 74 for the electrode 62. The external surface of the sheath 74 is provided with an annular shoulder against which is seated the surface of the bar 72 and a snap-ring coupling 76, of a suitable design, is employed in a manner consistent with known fabrication techniques for locking the sheath 74 in place in the aperture formed in the bar 72. Consequently, it should readily be apparent that the electrode 62 of the igniter 60 is supported by the bracket 66, in a cantilevered fashion, and at an elevation suitable for accommodating an initiation of combustion of gas delivered from the ports 48.

The spacing between the electrodes 62 and 64 must, of course, be adjusted in a suitable manner to accommodate an arc in the air gap established therebetween. Once ignition of the gas is achieved, the igniter 60 has fulfilled its function until such time as ignition again is required. The igniter 60 is therefore so designed as to cease functioning, once ignition is experienced, and to again function in the absence of a flame for establishing a gas-igniting arc between the electrodes 62 and 64.

While the igniter 60 is of any suitable design which responsively terminates the arc in the presence of a flame of ignited gas, a pilot re-lighter, designated Y-83 available from the BASO Products Division of PENN Controls, Inc. serves quite satisfactorily for this purpose. The Y-83 pilot re-lighter includes an electrical circuit 80 connected with the electrode 62 through a suitable lead 82 suspended from the porcelain sheath 74. Appropriate stand-offs, not shown, preferably are employed in supporting the lead 82. The circuit 80 is coupled with a voltage source designated V, FIG. 5, through a pair of switching circuits 84 and a plurality of leads 86. As a practical matter, the circuit 80 is supported within a suitable housing disposed within the body 20 by any suitable means including a transverse support bar, an illustration of which is omitted in the interest of simplicity. Access to the circuit 80 is afforded through an opening, not designated, closed by a door-like closure member 88 mounted externally of the body 20.

While a Y-83 pilot re-lighter has been found to be particularly useful as an igniter, it is to be understood that the igniter 60 can, where desired, include a high-voltage, high-frequency pulser coupled with the electrode 62 through a suitable circuit including a thermocouple unit which responds to temperature changes in the vicinity of the burner 44 for achieving completion and interruption of the electrical circuit between the coil and the electrode.

In any event, it is important to appreciate that the igniter 60 is responsive to ignition, as well as termination of ignition, of gas delivered from the ports 48 for establishing and terminating the establishment of an

electrical arc between the electrodes 62 and 64 in order to function as a pilot re-lighter, so long as the igniter is connected with the voltage source V.

As illustrated in FIG. 5, a control circuit 83 including a pair of switching circuits 84, coupled in electrical parallel, is provided for simultaneously controlling the operation of the circuit 80 and the actuator 54. As shown, the circuits include a time clock circuit of any suitable design, which, when set, closes an electrical circuit to the voltage source V for a predetermined interval. Since time clock circuits are notoriously old, a detailed description of the time clock employed in the switching circuit 84 is omitted in the interest of brevity.

Similarly, there is provided within the circuit 83 a photo-cell circuit which, in response to changes in ambient light, effects an opening and a closing of an electrical circuit between the leads 86 and the voltage source V. Again, since photo-cell switching devices are notoriously old, a detailed description of the photo-cell employed as switching circuit 84 is omitted in the interest of brevity.

However, it is to be understood that the time clock circuit and the photo-cell circuit are employable separately, alternatively, or, where desired, in electrical series.

Preferably, the actuator 54 is connected in circuit parallel with the circuit 80 of the igniter 60 and in series with the control circuit 83, so that once one of the circuits 84 is activated voltage simultaneously is applied to the actuator 54 and the coil 80, whereupon an arc is established between electrodes 62 and 64 slightly in advance of a discharge of gas from the ports 48 of the cap 46. Similarly, once the control circuit 83 is opened a flow of gas from the ports 48 is terminated and the establishment of an arc precluded.

Turning now to FIGS. 6 and 7, it is important to appreciate that the burner 44 is of a variable construction and is varied in a manner consistent with the techniques employed in designing gas lights of known construction.

As shown in FIG. 6, where desired, the burner 44 consists of a pair of mantles 100 suspended from a pair of delivery nipples 102 coupled with the nipple 38 through a T-fitting 104. The T-fitting 104 includes a vertical body 106 and a cross arm 108 united with a screw-threaded portion 110. The T-fitting 104, in turn, is coupled to the screw-threaded distal portion 42, not shown in FIG. 6, of the nipple 38 through the use of a suitable reducer 112.

When employing a burner including mantles 100, the electrodes 62 and 64 necessarily are supported at an appropriate location, preferably in the vicinity of one of the mantles, so that upon ignition of gas in the vicinity of the one mantle, the gas in the vicinity of the other mantle of the pair is ignited.

As a practical matter, a collar 114 having a laterally extended support bar 116 extended therefrom is received by the body 106 of the T-fitting 104, through a suitable setscrew, not shown, for supporting the electrodes 62 and 64 in a manner and for the purposes hereinbefore described. Where desired, the lead 82 is supported in a stand-off relationship with the body 106 and the nipple 38 employing suitable brackets 118.

As shown in both FIGS. 1 and 6, the gas lamp 14 is provided with a protective head having both esthetic

and protective characteristics for protecting the flame established by the burner 44. One type of head 120 found quite practical includes a frame having a plurality of transparent windows 122. Since the particular head employed forms no part of the instant invention, a detailed description thereof is omitted in the interest of brevity.

OPERATION

It is believed that in view of the foregoing description, the operation of the device will be readily understood and it will be briefly reviewed at this point.

With the system 10 assembled in the manner hereinbefore described, it is prepared for total, automated operation. Where a time clock circuit is employed in the circuit 83, the system is switched to an operative mode at the termination of a selected time interval, and similarly switched to an inactivating mode at the expiration of a predetermined time interval.

In instances where the closing of the circuit 83 is controlled through a photo-cell circuit, the system 10 is switched to an operative mode in response to a depletion of ambient light to a predetermined level and similarly switched to a quiescent mode when ambient light attains a value above the predetermined level.

Once the circuit 83 has been activated to switch the system 10 to an activated mode, voltage simultaneously is applied to the actuator 54 coupled with the solenoid valve 52 and to the igniter 60 so that an arc is established between the electrodes 62 and 64 in the vicinity of the burner 44. As gas is emitted in the vicinity of the arc established between the electrodes, combustion occurs. As a flame of light thus is established, the established arc is terminated so that the adjacent area is illuminated in response to the flame emanating from the cap 46, or mantles 100, depending upon the particular type of burner 44 employed in the system 10. Should the flame be extinguished while the system 10 is in an actuated mode, the igniter 60 responsively establishes an arc in the vicinity of the burner 44 for re-igniting the burner. Such re-ignition will be repeated as often as required so long as a flow of gas is maintained from the source to the burner 44.

Of course, in the event the circuit 83 is activated for interrupting a flow of gas from the source to the burner 44, applied voltage simultaneously is removed from the igniter 60.

Accordingly, it should readily be apparent that the lighting system of the instant invention provides a practical solution to employing gas lamps in outdoor areas

where efficiency of operation and preservation of esthetic qualities are desired.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the illustrative details disclosed.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A gas lighting system comprising:

A. a lamp including a tubular pillar having a substantially uninterrupted external surface supported in a substantially vertical disposition by a rigid pedestal embedded in the surface of an area to be illuminated and surmounted by a gas burner including a gas delivery jet; gas delivery means including a normally closed gate valve remote from said pillar and coupled with a source of combustible gas, and a gas conduit extended from said valve axially through said pillar and coupled with said burner for delivering an uninterrupted flow of combustible gas from the valve to the burner when said valve is opened, whereby a flow of gas is delivered from the jet in response to an opening of the valve; and igniter means disposed adjacent to said jet energizable in response to an electrical signal applied thereto for igniting gas delivered from the jet, said igniter means being de-energizable in response to an adjacent flame of ignited gas; and

B. a control circuit including means coupled with said valve and responsive to an electrical signal applied thereto for opening the valve, whereby a flow of gas is conducted through the valve and discharged to said conduit in response to an applied electrical signal; a switching circuit including a photosensitive device electrically coupled with said valve and with said igniter responsive to selected changes in the level of ambient light for selectively applying an electrical signal to said valve and to said igniter, whereby ignition of gas delivered through said jet is achieved in response to selected changes in the level of ambient light.

2. The system of claim 1 wherein said burner further comprises a mantle.

3. The system of claim 2 further comprising an ornamental head encasing said burner.

4. The system of claim 2 further comprising an electrical timer electrically coupled with said control circuit.

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