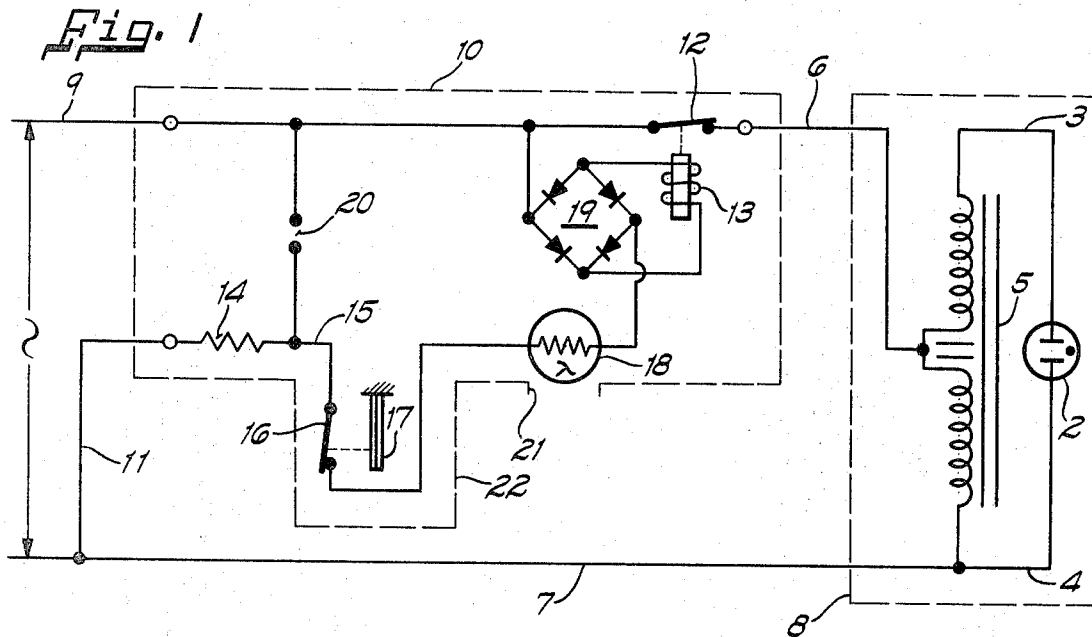
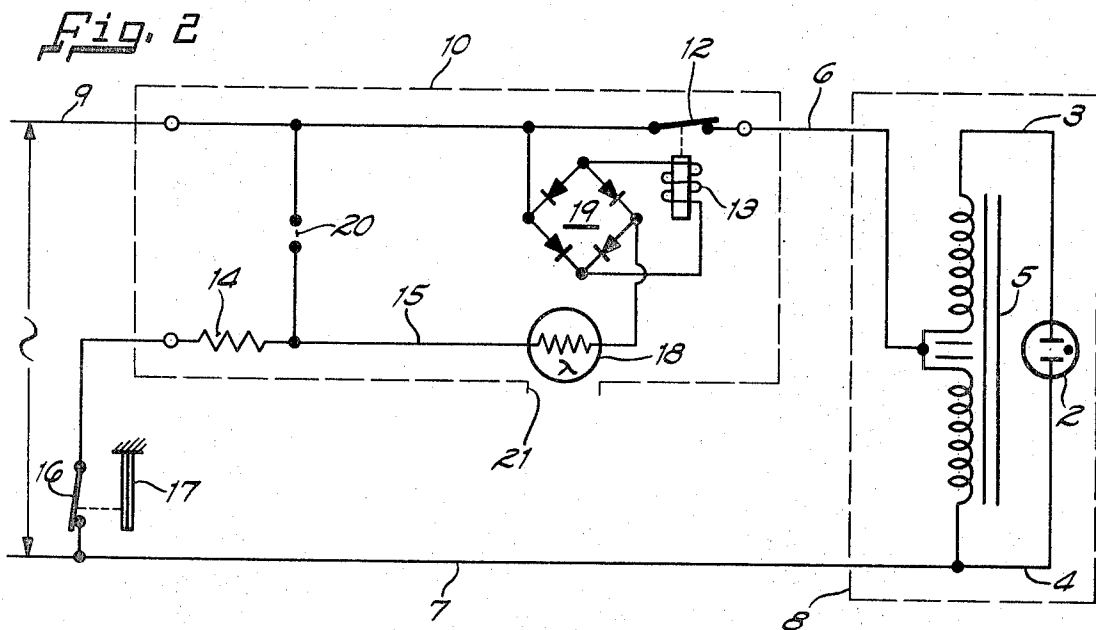


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 CONTROL FOR LUMINAIRES EMPLOYING GASEOUS DISCHARGE
 LAMPS AT LOW AMBIENT TEMPERATURES
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CONTROL FOR LUMINAIRES EMPLOYING GASEOUS DISCHARGE LAMPS AT LOW AMBIENT TEMPERATURES

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10 Claims

ABSTRACT OF THE DISCLOSURE

A light sensitive control device for gaseous discharge lamps having normally closed switch means for controlling the power into the gaseous discharge lamps, light sensitive circuit means for opening the normally closed switch means when the ambient light level reaches a preselected level, and temperature responsive means for disabling the light sensitive circuit means when the ambient temperature goes below a preselected level.

BACKGROUND OF THE INVENTION

The invention pertains to the field photosensitive devices for the control of lighting equipment and, more particularly, to the control of gaseous discharge lighting devices at low temperatures.

The starting voltage required to initiate an electrical discharge through a gaseous discharge lamp increases as the ambient temperature decreases. In the case of mercury and fluorescent lamps, industry standards give starting voltage requirements at temperature as low as -20° F., but not below this temperature. In discharge lamps utilizing mercury vapor as the conducting medium, starting of such lamps at temperatures below the freezing point of mercury (-38.83° F.) is extremely difficult.

In areas where the temperature is likely to fall to very low temperatures and where it is desired to utilize gaseous discharge lamps as light sources, this has sometimes been accomplished by energizing the luminaires in the fall of the year before the temperature gets extremely low and keeping them energized until late in the winter when the temperature at the usual starting time of the day has risen to temperatures warmer than -20° F.

Where outdoor lighting circuits are controlled by a manual switch, the above procedure is reasonably feasible. However, where an outdoor lighting circuit or individual luminaires are controlled by photoelectric controls which turn on and turn off the electrical power at predetermined light levels, it has been necessary in the past for the contacts of these photoelectric controls to be bypassed or the controls hooded when it is desired to keep the lights energized continuously during extremely cold weather.

SUMMARY OF THE INVENTION

The invention as hereinafter described overcomes the aforescribed difficulties by disabling the photoelectric control whenever the ambient temperature falls below a predetermined level. This is accomplished by inserting a thermostatic switch in the control circuit to interrupt the power to the photoelectric control when the ambient temperature drops below the preselected value. The photoelectric control is thereby disabled from opening normally closed contacts which carry power to the luminaire. After the ambient temperature rises to a value at which the gaseous discharge lamp can be started by its associated ballast, or in other words, a temperature value at which the output voltage of the ballast is sufficient to start the discharge device, the contacts of the thermostatic device

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close to energize the photoelectric control which then takes over the normal turn-on and turn-off functions.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 schematically illustrates an electrical circuit for a gaseous discharge type lighting device which circuit includes control means incorporating the present invention; and

FIG. 2 illustrates a modification of the circuit shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, there is shown a control circuit for a gaseous discharge type lighting device such as a mercury vapor lamp 2. Many of the elements shown in FIG. 2 are identical and perform identical functions. Such elements are given the same identifying numbers as those shown in FIG. 1.

Mercury vapor lamp 2 receives its power from conductors 3 and 4 which carry the output from a ballast 5 which is preferably illustrated as a high reactance autotransformer. The principles of operation of lighting devices, such as mercury vapor lamp 2 and its associated ballast 5, are well known to those skilled in the art, and details of construction thereof form no part of the instant invention.

Ballast 5 receives its input from a conductor 6 and a conductor 7.

Mercury vapor lamp 2 and ballast 5 may be housed within a luminaire housing indicated by the dashed line enclosure 8.

Alternating current power is placed across conductor 7 and a conductor 9. The flow of power from conductor 9 to conductor 6 is controlled by a photoelectric and temperature sensing circuit housed within a housing 10 indicated in dashed lines. The photocell housing may be of a plug-in variety mounted on luminaire housing 8.

The control circuit power is obtained through a circuit completed to conductor 7 through a conductor 11. The power to ballast 5 is conducted from conductor 9 to conductor 6 through normally closed contacts 12 of a relay 13. The current required for the energization of the operating coil of relay 13 is obtained through a circuit comprising conductor 11, a current limiting resistor 14, a conductor 15, contact 16 of a thermostatic switch 17, a photocell 8 and a rectifying bridge 19. The other input terminal of rectifier bridge 19 is connected to conductor 9. A spark gap device 20 is connected between conductor 9 and conductor 15 for suppression of high voltage transients and protection of the control circuit.

The photocell 18 is mounted within housing 10 adjacent to an ambient light admitting opening 21.

The thermostatic device 17 is mounted within an extension 22 of housing 10 to thermally isolate thermostatic device 17 from the other elements of the control circuit and thereby give a more accurate reading of ambient temperature.

In order to better thermally isolate thermostat 17, it may be placed outside of housing 10 and mounted remotely from housing 10 and housing 8 as shown in FIG. 2. In that construction, contact 16 of thermostat 17 is placed between conductor 7 and resistor 14, and conductor 15 is connected directly to photocell 18.

If we assume that the ambient temperature is sufficiently high to maintain contact 16 closed, the photosensitive control circuit will operate in a normal manner in response to ambient light levels. When the ambient light level is low, contact 12 will remain closed to supply power to ballast 5. When the ambient light level rises to a preselected level, photocell 18 becomes sufficiently conductive that the D.C. current from bridge 19 energizes

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relay 13 to open contact 12 and thereby turn off lamp 2.

As previously explained, when the ambient temperature drops to extremely low levels, difficulties in starting lamp 2 may be experienced and it is then desirable to keep lamp 2 on continuously until the ambient temperature rises to a level where the output voltage of ballast 5 is sufficient to start lamp 2. When the ambient temperature decreases to such a level, thermostat 17 opens contact 16 to de-energize the photoelectric control circuit. Contact 12 will then remain closed to maintain lamp 2 energized.

Since contact 16 is inserted in the control circuit only and does not carry the power used to energize lamp 2, contacts 16 may have a relatively small power rating and thermostat 17 may be of a relatively inexpensive variety. An economy in the construction of the control is thereby effected.

While the heretofore described embodiments of the invention are effective to accomplish the objects of the invention, it is not intended that the invention be confined to the illustrated embodiments, since they are adapted to modification without departing from the scope of the appended claims.

I claim:

1. In a control system for outdoor lighting apparatus: electroresponsive means for turning power on and off to lamp means, said electroresponsive means having a normal condition in which power is turned on to said lamp means, and said electroresponsive means being energizable to turn said power off;

light responsive control means sensitive to the ambient light intensity level in the area of said lighting apparatus for energizing said electroresponsive means to turn off said lamp means when said light intensity is above a preset level;

power source means for supplying the electrical power to said light responsive control means; and

temperature responsive control means connected in a circuit in parallel with said power source means and sensitive to the ambient temperature in the area of said lighting apparatus for interrupting said electrical power to said light responsive control means when said ambient temperature falls below a preselected temperature;

whereby said lamp means remains energized when said ambient temperature falls below said preselected temperature.

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2. The invention as defined in claim 1 in which said lamp means comprises a gaseous discharge lamp.

3. The invention as defined in claim 1 in which said lamp comprises a mercury vapor lamp.

4. The invention as defined in claim 1 together with: a housing for said light responsive control means; and an extension from said housing for housing said temperature responsive control means.

5. The invention as defined in claim 1 together with a housing for said light responsive control means, said temperature responsive control means being mounted exteriorly to said housing.

6. The invention as defined in claim 1 in which said electroresponsive means comprises a relay with normal contact means for carrying power to said lamp means.

7. The invention as defined in claim 5 in which said temperature responsive control means is mounted remotely from said housing and said lamp means.

8. Outdoor lighting apparatus including a power source, switch contacts, ballast and a lamp in a primary circuit, the improvement being a second circuit in parallel with said power source and comprising in series:

a relay coil for activating said switch contacts in said primary circuit;

a light control for activating said relay coil; and

a thermostatic device for activating said primary circuit into continuous operation when the ambient temperature drops below a predetermined level.

9. The invention as defined in claim 8 in which said switch contacts are normally closed.

10. The invention as defined in claim 8 in which said light control is a photocell that is responsive to the ambient light intensity.

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JAMES W. LAWRENCE, Primary Examiner

C. R. CAMPBELL, Assistant Examiner

U.S. Cl. X.R.

315—159; 282

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,539,861

November 10, 1

Wallace F. Blackford

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 15, before "contact" insert -- closed --

Signed and sealed this 6th day of April 1971.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

WILLIAM E. SCHUYLER
Commissioner of Patents