Dec. 28, 1943. W. W. GARSTANG 2,337,746

LAMP AND CONTROL CIRCUIT THEREFOR

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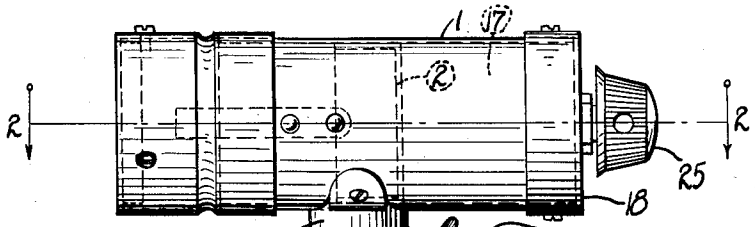


Fig. 1.

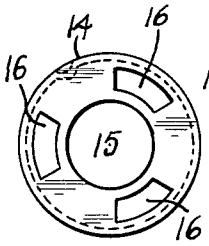


Fig. 3.

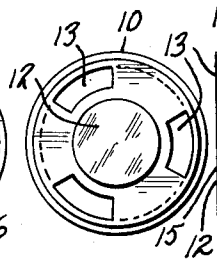


Fig. 4.

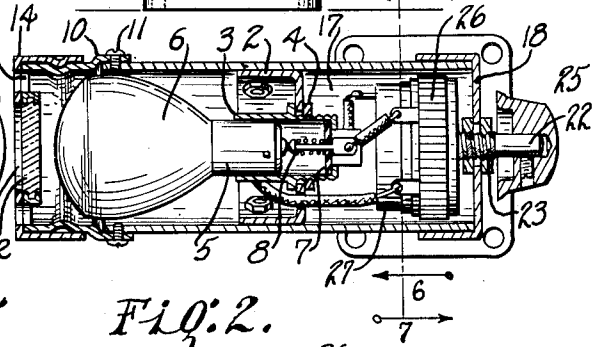


Fig. 2.

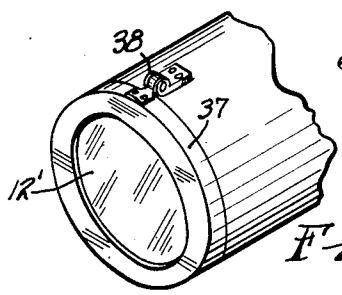


Fig. 5.

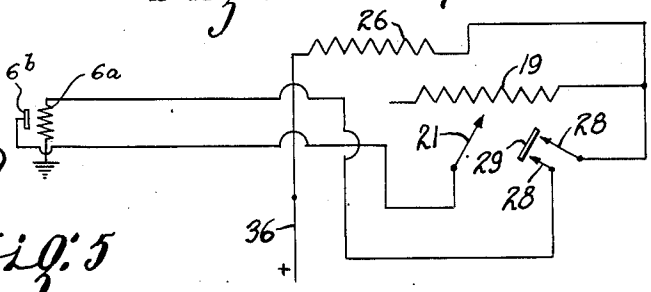


Fig. 8.

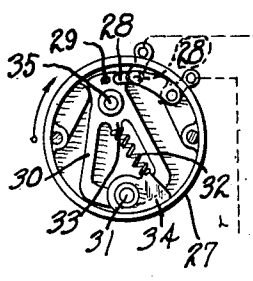


Fig. 6.

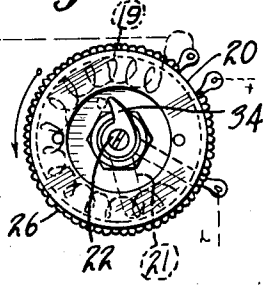


Fig. 7.

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LAMP AND CONTROL CIRCUIT THEREFOR

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6 Claims. (Cl. 315—102)

The present invention relates to improvements in lamps and particularly to lamps for illuminating the instrument dials, etc., in the cockpits of airplanes.

There has recently been developed, in the commercial art, the so-called black light, which is adapted for the illumination of instrument dials in airplanes and in other places where it is desired to have certain elements illuminated without the use of visible light rays. In this type of illumination, the parts to be illuminated are generally coated with a fluorescent material adapted to be energized by ultra-violet or near ultra-violet rays, and there is provided a lamp of the fluorescent type, which lamp is adapted to regenerate the ultra-violet rays developed therein into visible and near ultra-violet rays. Screens are provided for preventing the passage of the visible rays while permitting the passage of the ultra-violet rays which, when directed on the fluorescent material, will cause this material to glow under the influence of these near ultra-violet rays.

My present invention relates to improvements in lamps of this type. For the purpose of disclosing the invention, I have illustrated an embodiment thereof in the accompanying drawing, in which:

Fig. 1 is a side elevation of a lamp embodying my invention;

Fig. 2 is a sectional view on the line 2, 2 of Fig. 1, but showing a modification of the light control shutter;

Figs. 3 and 4 are front elevations of the control shutter for the lamp structure;

Fig. 5 is a perspective view of a modification of the control structure;

Fig. 6 is a sectional view on the line 6, 6 of Fig. 2;

Fig. 7 is a sectional view on the line 7, 7 of Fig. 2; and

Fig. 8 is a diagrammatic view of the circuit connections for the lamp.

In the embodiment illustrated, I preferably provide a cylindrical casing 1 which is formed of material impervious to the passage of light rays of any character from the lamp located therein and, for lightness sake, may be formed of aluminum. Within the casing 1 intermediate of the ends thereof, I mount a cup member 2 which provides a support for a lamp socket 3 adapted to be passed through a center opening in the cup 2 and be secured in position by clamping nuts 4 threaded on the shell 3. This shell or lamp support is provided with suitable bayonet slots adapted to receive pins on the base 5 of the lamp 6. Mounted within the shell 3 is an insulating base 7 carrying spring-pressed contacts 8 for making contact with the contacts on the lamp base 5. The lamp 6 supported within the casing 1 is of the direct current fluorescent type and may, if desired, have the greater portion of its bulb coated with material impervious to the passage of any light rays and having its end only permitting the passage of visible and near ultra-violet rays. This type of lamp includes a heater element 6a, a cathode 6b and a suitable ionizing material contained within the lamp bulb.

The rays emitted by the lamp 6 are controlled by a suitable screen which may be formed of glass capable of passage only of the near-ultra-violet rays. To this end, the tube or casing 1 is provided with a cup-shaped cap 10 adapted to telescope the end of the casing and be held in position by suitable fastening screws 11. This cap is provided with a glass screen 12, mounted in the center thereof, which permits the passage only of the near ultra-violet rays and surrounding the glass screen are a series of openings 13 which will permit the passage of visible light rays given out by the lamp bulb 6. A rotatable shutter 14 covers the cap 10 which shutter is provided with a center opening 15 adapted to coincide with the screen 12 and with slots 16 adapted, when the shutter is rotated, to coincide with the openings 13 in the cap 10. Thus, if it be desired that visible rays be permitted to escape from the lamp, the shutter may be rotated until the openings 16 and 13 are aligned. When it is desired to shut out the visible rays, the shutter 14 may be rotated until the openings 16 and 13 are out of alignment.

The lamp controlling switch for controlling not only the starting of the lamp but also the intensity of the illumination developed thereby is mounted within a compartment 17 formed between the rear cap 18 of the casing 1 and the cup 2. This switch includes a controlling rheostat comprising a resistance coil 19 arranged within a cup-like casing 20. Mounted within this casing is a switch arm 21 adapted to sweep over the helical coils of the resistance 19 and cut in or out the resistance as desired. This switch arm 21 is mounted on a shaft 22 extending through a threaded stem 23 which is clamped to the closure cap 18 by means of clamping nuts 24 threaded on the stem 23. The stem 23 extends through the closure cap 18 as does the shaft 22 and the shaft 22 on its rear end carries an operating knob 25 by which the shaft 22 may be ro-

tated. In addition to the rheostat winding 19, I provide an additional resistance which is permanently in the circuit of the lamp. This resistance is in the form of a resistance coil 26 wound around the casing of the rheostat 19 and covered with suitable insulating material.

In addition to the above-described rheostat, I provide a starting switch which is carried by the casing of the rheostat 19 and comprises a supplemental casing 27 having stationarily mounted therein a pair of spaced apart contacts 28. These contacts are adapted to be bridged, for the purpose of closing the circuit, by a contact pin 29 carried by and extending through an insulating arm 30, pivotally mounted on a pivot pin 31 within the casing and biased in an off direction by a spring 32 interposed between an abutment 33 on the arm 30 and the stationary abutment 34 secured to the casing. The switch arm 30 is moved to closed position against the bias of spring 32 by means of a crank arm 34 carried on the shaft 22 and adapted, when the shaft is rotated in one direction, to engage a contact pin 35 on the switch arm. Arrangement of the parts is such that when the shaft 22 is rotated in a clockwise direction the arm 34 engaging the pin 35 will close the starting switch with the rheostat arm 21 in a position with no resistance in the lamp circuit. Due to the fact, however, that the spring 32 biases the switch arm in a counterclockwise direction, as soon as the knob 25 is released the starting switch will be opened, the lamp having been started and caused to operate in the meantime. If it be desired now to control the intensity of the lamp by rotating the knob 25 in a counterclockwise direction, the rheostat arm 21 will be caused to sweep over the resistance wires 19 cutting the desired number of coils into the circuit of the lamp.

The starting switch as well as the rheostat are provided with suitable terminals to which the wires from the line may be attached and to which the wires to the lamp may be attached. In Fig. 7 I have illustrated diagrammatical circuit arrangement of the lamp and the starting switch. In this diagrammatic view the line 36 is connected to the resistance 26 which, in turn, is connected to the rheostat winding 19 and to the stationary contact 28. The rheostat arm 21 is connected to one terminal of the lamp. One of the contacts 28 is connected to the line and the opposite of the contacts 28 is connected to a terminal of the lamp. The opposite terminal of the lamp is grounded. Therefore, as will be observed, when the contact 29 of the starting switch is moved in a clockwise direction the two contacts 28 will be bridged closing the starting circuit through the lamp. However, when the shaft 22 is moved to the left the rheostat arm 21 may be moved over the resistance 19 to cut in or out as much resistance as desired.

With this circuit arrangement, when the starting switch is closed, the circuit, including the ballast resistance 26 is closed through the heater element of the lamp. This circuit does not, however, include the regulating resistance 19. The heater element thus heats the ionizing material of the lamp, establishing, when this material is heated, a circuit through the ionized material the cathode and heater acting as an anode, which circuit includes the regulating resistance 19. With the arm 21 in its full open position, the cathode circuit is closed but no regulating resistance is included in this circuit. However, by the movement of the arm 21 to the left, looking at Fig. 1, and with the starting switch 29 opened, as heretofore described, more or less of the regulating resistance may be included in the circuit, thus regulating the intensity of the light given by the lamp. With the arm 21 moved to its full left, looking at Fig. 8, position, the entire circuit will again be opened and the lamp in condition for starting.

In Fig. 5, I have illustrated a modification of the lamp closing cap. In this structure, I provide a closure cap 37 provided with a screen 12' similar to the screen 12. This cap is hinged as at 38 to the casing 1 and when the cap is in its closed position, only near ultra-violet rays will be permitted to pass through the screen 12'. However, if it is desired to have the lamp give out visible rays, the closure cap 37 may be raised on the hinge 38.

For supporting the structure above-described, I provide a base 39 provided with a threaded stem 40. This base has a fin 41 upon which are pivoted a pair of clamping arms 42 enlarged at 43 to form a socket for receiving a stud 44 secured on the casing. The arms may be clamped together by a bolt 45 provided with a wing nut 46. By this arrangement it is obvious that the lamp may be swung on a pivot transverse to its axis and also may be inclined upwardly or downwardly relatively to the base 39.

I claim as my invention:

1. A lamp control comprising in combination, a lamp of the direct current fluorescent type, a rheostat for said lamp including a cup-like casing having a controlling resistance coil mounted therein, a shaft extending through said resistance casing and a controlling arm mounted on said shaft and adapted to contact said resistance coil, a ballast resistance included in the lamp circuit comprising a resistance coil wound upon the exterior of said resistance coil casing and an insulating material covering said second resistance coil, a starting switch for said lamp biased in its off position and a one-way driving connection between said starting switch and said shaft.

2. A lamp control comprising, in combination, a lamp of the direct current fluorescent type, a combined resistance rheostat and starting switch including a cup-like casing having a resistance coil mounted therein, a shaft extending through said resistance casing and a controlling arm on said shaft and adapted to contact said resistance coil, a second resistance included in the lamp circuit comprising a resistance coil wound upon the exterior of said resistance coil casing, an insulating material covering said second resistance coil, a starting switch for said lamp biased in its off position and a one-way driving connection between said starting switch and said shaft.

3. A controllable lamp circuit comprising, a lamp of the direct current type having a heater and a cathode and contacts respectively connected thereto, a circuit for said lamp including a ballast resistance connected to the heater contact of said lamp and a light controlling resistance, a starting switch in said circuit movable to close the circuit from the source of power to said ballast resistance and a rheostat arm connected with said cathode contact and having a contact engaging said controlling resistance and movable in one direction to cut out said controlling resistance and close said starting switch and in an opposite direction to cause said starting switch to open and insert said controlling resistance and ballast resistance in said cathode heater circuit.

4. In combination, a lamp of the direct current type which includes a heater and a cathode, a circuit for said lamp including a ballast resistance and a controlling resistance, a starting switch in said circuit movable to close the circuit from the source of power through said ballast resistance and said heater and a rheostat arm normally in off position, said starting switch being normally in off position, said rheostat arm being movable in one direction to close the starting switch with no controlling resistance in circuit and movable in the opposite direction for causing an opening of the starting switch and the insertion of said controlling resistance in circuit, said rheostat arm, when moved to full off position, opening the lamp circuit including the controlling resistance.

5. In combination, a lamp of the direct current type which includes a heater and a cathode, a circuit for said lamp including a ballast resistance and a controlling resistance, a starting switch in said circuit movable to close the circuit from the source of power through said ballast resistance, a rheostat arm controlling said controlling resistance movable in one direction to move the starting switch into closed position and movable in the opposite direction to cause the opening of the starting switch and, when continued in said operating direction, inserting said controlling resistance in circuit the continued movement of said rheostat arm in the opposite direction inserting all of the controlling resistance in circuit and reducing the amount of controlling resistance in the circuit and ultimately opening the controlling resistance circuit.

6. A controllable lamp circuit comprising a lamp including a heater and a cathode and a contact for each, a starting switch having contacts one of which is connected to the heater contact of said lamp, a ballast resistance connected between said lamp and one of said contacts, a light controlling rheostat including a resistance connected to another contact of said switch and connectable to said lamp, a rheostat arm connected to said cathode contact and controlling said light control resistance, said starting switch biased in an off position, said arm and said switch being interconnected to move said starting switch to its off position when said arm is moved in one direction and opening said starting switch when said arm is moved in the opposite direction to insert said light control resistance in the circuit.

WILLIAM W. GARSTANG.