Sept. 5, 1961 J. KAY 2,999,148

VARIABLE INTENSITY DIAL ILLUMINATOR

Filed Aug. 21, 1958

Fig. 1

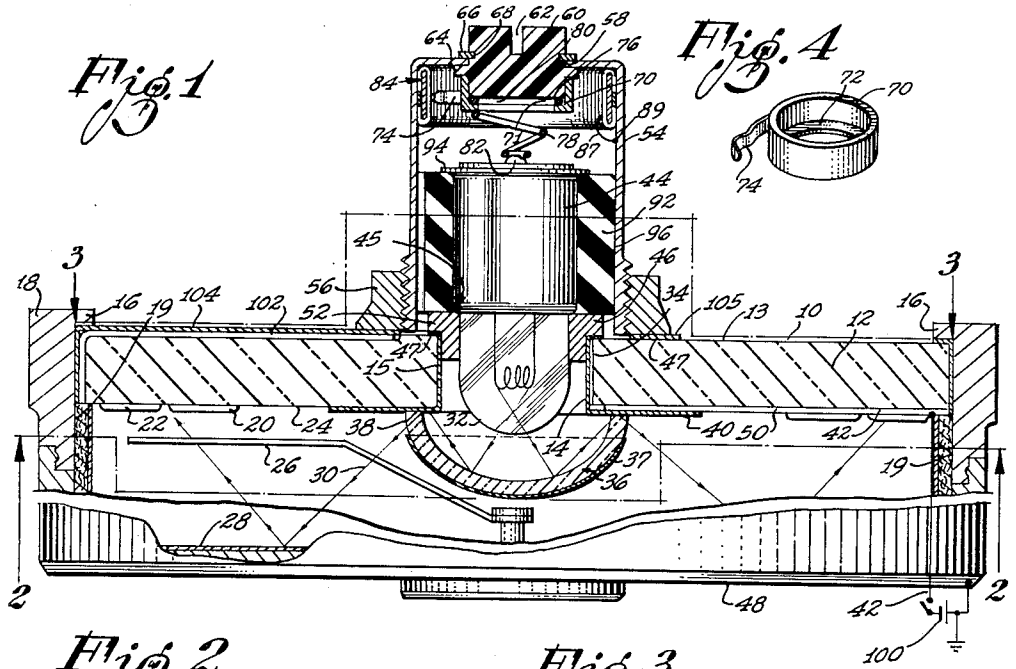


Fig. 4

Fig. 2

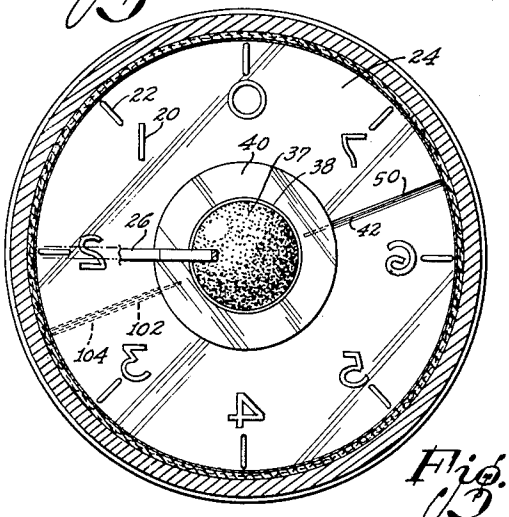


Fig. 3

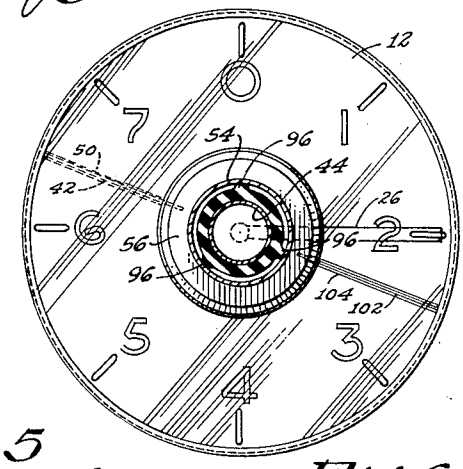


Fig. 5

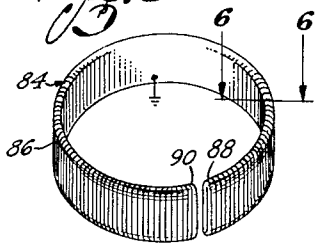


Fig. 6

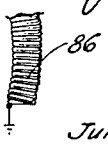
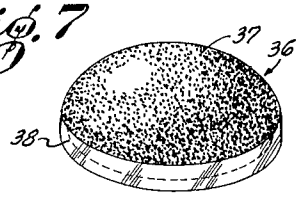


Fig. 7



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VARIABLE INTENSITY DIAL ILLUMINATOR

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6 Claims. (Cl. 240—2.1)

This invention relates to light-bulb mountings which are particularly adapted for use in illuminating the dials of instruments, such as are employed on panels in aircraft cockpits.

It has been found that, despite the fact that light bulbs having identically rated characteristics are inserted in aircraft instrument dials which are similarly constructed, not infrequently one dial will be found to be illuminated more intensely than other dials on the same panel. In a dark cockpit, such non-uniformity of illumination is considered undesirable for the reason that the presence of a more brightly lighted dial causes the pilot's pupils to contract, and hence renders more difficult the reading of other instruments on the same panel, or elsewhere in the cockpit. It is thus desirable to provide means for permitting individual adjustment of each dial light in order to enable the pilot to obtain uniform lighting of all of his instrument dials.

To accomplish such adjustability of individual dial lights, it has been proposed heretofore to provide separate rheostats in series with the current leads for each panel light, but this expedient has not been considered practical. For one reason, many of the leads are printed onto or into the dials, and the addition of a separate rheostat to each instrument on the panel would undesirably increase the complexity of the panel and its dials, and the expense of its fabrication. Also it was found that the increased length of the additional leads or conductors necessary to connect the separate rheostats into the lamp circuits complicated the adjustment of the intensity of the illumination of the various instruments.

The present invention improves panel instrument lighting arrangements heretofore employed, by providing a mounting for each lamp, which mounting contains within itself a variable resistance element disposed in series with the light bulb, thereby to afford its own means for varying the intensity of the illumination of the bulb contained in the mounting.

In the preferred embodiment of the invention, the bulb mounting means includes a housing element which projects forwardly from instrument panel and houses a variable resistance element through which current is led to one contact of the bulb base. This housing element carries means accessible from the front of the panel for manually adjusting the variable resistance element.

The mounting is further constructed and affixed to the panel in such a manner that the housing element may be easily removed to permit replacement of the bulb; or should the variable resistance element become defective, to permit replacement of the housing element itself.

The foregoing and other features of the invention may be more readily understood by reference to the accompanying drawing in which:

FIGURE 1 is a side elevation, partly in section illustrating the preferred embodiment of the invention;

FIGURE 2 is a view, partly in section, of the back of the instrument fact, taken on the line 2—2;

FIGURE 3 is a view, also partly in section, of the front face of the instrument as seen on the line 3—3;

FIGURE 4 is a perspective of the variable resistance contact member;

FIGURE 5 is a perspective of the variable resistance coil;

FIGURE 6 is a section of the coil taken on the line 6—6 of FIGURE 5; and

FIGURE 7 is a perspective view of the bulb housing cap.

The illustrated embodiment of the present invention, referring now to FIGURE 1, is shown in connection with an instrument dial, designated generally by the reference numeral 10. In this illustrative use of the invention, the dial 10 is constituted of a circular glass or transparent plastic face plate 12 which is apertured centrally at 14 and is seated within the annular flanged rim 16 of the cylindrical, preferably metallic, housing 18. Opaque or light absorptive numerals or other indicia 20 and scale markings 22 are embossed or bonded on the back face 24 of the plate 12 in an appropriate reversed pattern, as shown in FIGURE 2, so that they are visible through the glass or plastic to provide conventional readings as shown in FIGURE 3. An indicator 26 is actuated by the instrument mechanism (not shown) to sweep about the dial 10 in the operation of the instrument.

Illumination of the numerals and scale markings is accomplished by providing a reflective surface 28 at the rear of the back face 24 of the plate 12 and on the internal side wall 19 of the cylindrical housing 18, and directing the light rays 30 from a bulb 32, extending into the aperture 14, onto the reflective surface 28.

Where desired, to prevent transillumination through edge light absorption of the glass about the aperture 14, the walls defining the latter may be coated with an opaque substance 34.

Proper direction of the light rays may be effected by providing a dome-shaped cap 36 of light transmitting material over the back end of the aperture 14 and bonded to seal hermetically against the back face 24 of the plate 12. This cap 36 is coated with an opaque substance 37 except for an annular area 38 located circumferentially about the base of the cap dome through which light is permitted to pass.

The area 40 of the back face 24 of the plate 12 immediately surrounding the aperture 14 and the wall 15 defining the aperture is tinned or platinized to permit the rim of the cap to be bonded with a suitable adhesive directly to the back face of the plate on such area. Such platinization 40 also serves to conduct current from one of the voltage source leads 42 to the bulb base 44, via a flanged metal annular member or ferrule 46, which is inserted into the aperture 14 from the front side 13 of the plate 12 and secured thereon by an adhesive 47. The bulb base 44 is the usual base ferrule that forms the peripheral contact of the light bulb. The lead 42 is brought through the back end 48 of the housing 18, and insulated therefrom, and along the wall 19 to the radially outermost extremity of a groove 50 in the back face 24 of the plate 12. The lead 42 from this point on is uninsulated and may be embedded and bonded in the groove 50 to extend under, and in contact with the platinized area 40.

The ferrule 46 is provided with a flange 52 which seats upon the edge of the front face 13 of the plate 12 defining the aperture 14, where the flange may be bonded by adhesive 47 as previously stated. Such bonding, however, may be dispensed with, without adversely affecting the installation of the bulb 32, but it is important that the ferrule 46 fit snugly in the aperture 14 to make a good electrical contact with the platinized surface 40 lining the wall 15 of the aperture 14.

The actual mounting for the light bulb in the embodiment illustrated consists of a cylindrical shell or housing element 54, open at one end, which shell is externally threaded at its open end to screw into an internally threaded conductive metal ferrule 56. The latter is se-

cured by adhesive to the glass face 13, coaxially with the aperture 14 and ferrule 46. The closed end of the shell 54 is bored at 58 to receive rotatably a cylindrical guide element 60, which is slotted at 62 to permit the insertion of a screw-driver bit for turning the element 60. The element 60 is formed of a non-conductive plastic or other dielectric material, and is journalled for rotation coaxially within the shell 54 by a pair of annular bearing surfaces 64, 66, one of which may be formed integrally with the element 60 as an annular bead or shoulder, and the other surface 66, being a washer which is slipped over the slotted head of the element 60 and seated in a groove 68 in the periphery of the outer cylindrical wall. It is apparent that the element 60 serves as a portion of the wall of the shell and, in effect, is a rotary wall portion of the shell.

A collar 70, having a radially inwardly extending flange 72 is bonded to the lower side wall of the element 60 so as to rotate therewith, with the flange 72 spaced slightly from the lower transverse wall of the element 60. A tangentially extending spring metal wiper 74 is soldered or welded to the outer side of the collar 70, as best shown in FIGURE 4. The base end 76 of a conical helical spring contact member 78 is inserted in the space 71 between the lower transverse wall 80 of the element 60 and the flange 72, so that the other of the end spring 70 winds in a conical surface towards the common axis of the shell 54 and element 60 to contact the axial bulb terminal 82.

A resistance element 84 is disposed on the inside of the wall of the shell 54 at its closed end. Such resistance element may be in any form which permits the resistance to be varied by rotating the wiper 74 about the shell axis. In the embodiment shown in the drawings, the resistance element 74 is constituted of a wire 86 which is wound from one point 88 about a non-magnetic core which is disposed in a plane normal to the shell axis and extends coaxially almost 360° within the shell 54 to point 90, as shown in FIGURE 5.

The wire 86 is well insulated so as to prevent shorting between each turn and to the grounded shell 54, but the inside of each turn is bared and polished to allow the wiper 74 to make good electrical contact. One extremity 87 of the coil 84 is grounded to shell at 89, and the other extremity of the coil is dead-ended.

The bulb 32 itself is properly positioned within the shell 54, and its base is insulated therefrom by a rubber sleeve 92, the inside diameter of which coincides with the outside diameter of the bulb base below its flanged extremity 94. To facilitate removal of the bulb and sleeve from the shell 54, the outside diameter of the sleeve 92 does not quite equal the inside diameter of the shell, but formed integrally with the sleeve 92 are at least three axially extending beads 96 equidistantly disposed about the periphery of the sleeve 92. These beads 96 serve to position the sleeve and bulb coaxially within the shell 54.

The shell 54 is connected to the ground terminal of the voltage source 100, through the metal ferrule 56 which, in turn, is connected to the metal instrument housing 18 by a lead 102, which is embedded in a groove 104 in the front face 13 of the dial and extends radially from an annular platinized area 105 provided on the face 13 to the periphery of the glass plate and in contact with the housing 18. The area 105 is at least as large as the abutting face of the ferrule 56 and serves to make a good electrical contact between the ferrule 56 and the lead 102.

In use, the rubber sleeve 92 is slipped over the bulb 32 and onto its base 44. This sub-assembly is then inserted into the shell 54 and pressed down therein until contact between the spring 78 and the axial bulb terminal 82 is assured. The shell 54 is then screwed into the threaded ferrule 56 which is bonded to the dial glass face 13, thereby bringing the shoulder 45 of the bulb base 44 into abutment, and hence contact, with the ferrule 46. When the current for the bulb is applied, it will be found that desired control over the intensity of the illumination may be obtained by inserting a screw-driver in the slot 62 and turning the element 60. This turning causes the wiper 74 to change the point of contact of the coil in reference to the grounded end 87, and hence varies the resistance which is placed in series with the bulb 32.

It will be readily appreciated that usually only a very slight change of resistance is necessary to effect the desired variation in intensity of illumination of a particular dial to match it with other illuminated dials on the same panel. The present invention accomplishes this without the necessity of adding additional control devices to the usual already crowded aircraft instrument panel, or encumbering the dials themselves to affect their readability.

The structure of the invention will also be found to present no impediment to the replacement of the bulb in the event it burns out. Replacement is accomplished simply by unscrewing the shell 54 from ferrule 56, changing the bulb in the sleeve 92, and rescrewing the shell unit into the ferrule 56.

I claim:

1. Means for mounting a lamp bulb having an axial contact and a peripheral contact in an aperture of a light transmitting panel for energization of the lamp bulb by a pair of conductors on the panel, said means comprising: a cylindrical metal shell having a closed outer end and an open inner end; means to removably mount said shell on said panel at said aperture with the outer end of the shell extending outward from the panel and with the inner end of the shell in electrical communication with one of said conductors; an arcuate resistor member fixedly mounted in the outer end of said shell; a manually operable rotary member journaled in the outer end of said shell to control the brightness of the lamp bulb; a wiper member carried by said rotary member in sliding contact with said resistor member; an annular member of conducting material inside said cylindrical shell and electrically isolated therefrom to seat said peripheral contact of the lamp bulb and to electrically connect the peripheral contact with the other of said conductors; and a spring member carried by said rotary member in electrical communication with said wiper member, said spring member extending from the rotary member against said axial contact of the lamp bulb thereby to press said peripheral contact against said annular member.

2. Means for mounting a lamp bulb having an axial contact and a peripheral ferrule contact in an aperture of a light transmitting panel for energization of the lamp bulb by a pair of conductors on the panel, said means comprising: a cylindrical metal shell having a closed outer end and an open inner end; means to removably mount said shell on said panel at said aperture with the outer end of the shell extending outward from the panel and with the inner end of the shell in electrical communication with one of said conductors; an arcuate resistor member fixedly mounted in the outer end of said shell; a manually operable rotary member journaled in the outer end of said shell to control the brightness of the lamp bulb; a wiper member carried by said rotary member in sliding contact with said resistor member; an annular member of conducting material inside said cylindrical shell and electrically isolated therefrom to seat said peripheral contact of the lamp bulb and to electrically connect the peripheral contact with the other of said conductors; a rubber sleeve to embrace said peripheral ferrule contact to center the light bulb in said shell with the peripheral ferrule contact of the lamp bulb aligned with said annular member; and a spring member carried by said rotary member in electrical communication with said wiper member, said spring member extending from the rotary member against said axial contact of the lamp bulb thereby to press said peripheral contact against said annular member.

3. Means for mounting a lamp bulb having an axial

contact and a peripheral contact in an aperture of a light transmitting panel for energization of the lamp bulb by a pair of conductors on the panel, said means comprising: a cylindrical metal shell having a closed outer end and an open inner end; an arcuate resistor member fixedly mounted in the outer end of said shell; means to removably mount said shell on said panel at said aperture with the outer end of the shell extending outward from the panel and with the inner end of the shell in electrical communication with one of said conductors; a circular body of non-conducting material journaled in the outer end of said shell and extending into the plane of said resistor member; a wiper member extending outward from said circular body in sliding contact with said resistor member; an annular member of conducting material inside said cylindrical shell and electrically isolated therefrom to seat said peripheral contact of the lamp bulb and to electrically connect the peripheral contact with the other of said conductors; and a spring member carried by said circular body in electrical communication with said wiper member, said spring member extending from the circular body against said axial contact of the lamp bulb thereby to press said peripheral contact against said annular member.

4. A combination as set forth in claim 3 in which said circular body has a diametrical slot in its outer end for manual rotation of the circular body by a screw driver.

5. Means for mounting a lamp bulb having an axial contact and a peripheral ferrule contact in an aperture of a light transmitting panel for energization of the lamp bulb by a pair of conductors on the panel, said means comprising: a cylindrical metal shell having a closed outer end and an open inner end; means to removably mount said shell on said panel at said aperture with the outer end of the shell extending outward from the panel

and with the inner end of the shell in electrical communication with one of said conductors; an arcuate resistor member fixedly mounted in the outer end of said shell; a circular body of non-conducting material journaled in the outer end of said shell and extending into the plane of said resistor member; a collar of conducting material embracing said circular body for rotation thereof; a wiper member mounted on said collar and extending outward therefrom in contact with said resistor member; an annular member of conducting material inside said cylindrical shell and electrically isolated therefrom to seat said peripheral contact of the lamp bulb and to electrically connect the peripheral contact with the other of said conductors; a sleeve of rubber-like material to embrace said peripheral ferrule contact of the lamp to center the light bulb in said shell with the peripheral ferrule contact of the lamp bulb aligned with said annular member; and a spiral spring extending from said collar against said axial contact of the lamp bulb thereby to press said peripheral contact against said annular member.

6. A combination as set forth in claim 5 in which said collar is cup-shaped with a central opening; in which an end turn of said spring is clamped between the collar and the circular body; and in which the spring extends through said central opening.

References Cited in the file of this patent

UNITED STATES PATENTS

2,696,550	Neugass	Dec. 7, 1954
2,784,304	Dircksen et al.	Mar. 5, 1957
2,806,132	Swanson et al.	Sept. 10, 1957
2,821,800	Hardesty	Feb. 4, 1958
2,846,970	Dupree	Aug. 12, 1958
2,847,654	Peak et al.	Aug. 12, 1958
2,874,269	Greenlee	Feb. 17, 1959