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INSTRUMENT ILLUMINATION ARRANGEMENT

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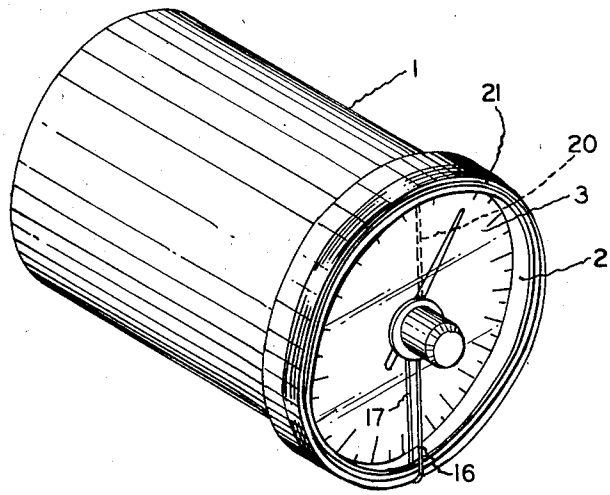


Fig.1

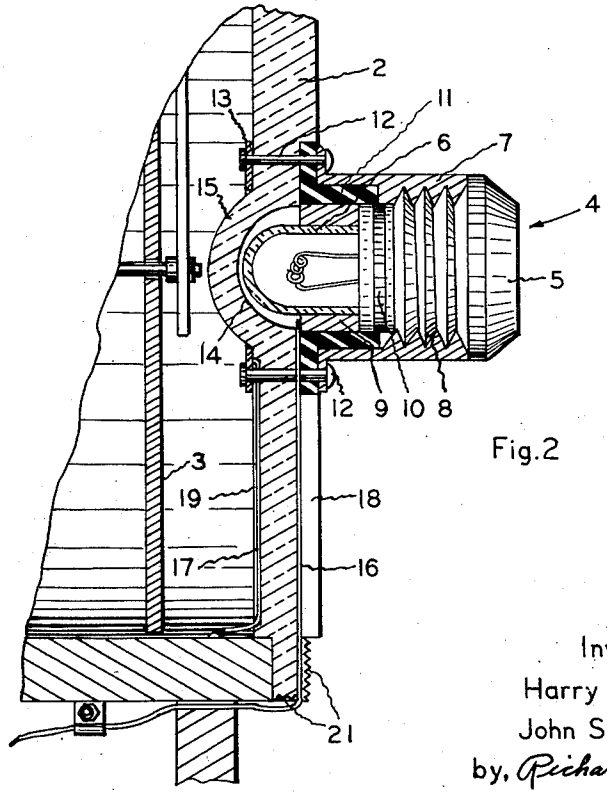


Fig.2

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INSTRUMENT ILLUMINATION ARRANGEMENT

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2 Claims. (Cl. 240—2.1)

This invention relates to illuminated devices and in particular to an illumination arrangement for the dial or face portion of a hermetically sealed instrument for use in aircraft and similar applications.

The development of more complex aircraft in recent years has emphasized the need for a greater number of instruments and consequently more compact instrument cases so that the necessary number of instruments can be located in the available space. In addition, the increased severity of operating conditions has necessitated that such instruments be hermetically sealed. These requirements have created a corresponding need for an improved illumination arrangement for such instruments which will allow a more compact casing design and which will permit uniform illumination of the dial indicia of a hermetically sealed instrument while at the same time allowing ready accessibility for purposes of maintenance and replacement of parts.

Accordingly, it is an object of this invention to provide an improved illumination arrangement for an illuminated device which provides a substantially uniform and symmetrical illumination over the area to be illuminated while occupying a minimum of casing space, and which at the same time is readily accessible for purposes of maintenance and replacement of parts.

It is another object of this invention to provide an improved illumination arrangement for a hermetically sealed instrument, in which the light source is positioned in the central portion of the dial to provide a substantially uniform and symmetrical illumination of the dial indicia while occupying a minimum of casing space and in which the light bulb which provides the illumination is readily accessible from the front of the instrument for replacement purposes.

It is a further object of this invention to provide an improved illumination arrangement of the above-mentioned type in which means are provided for evenly directing and distributing the light over the area to be illuminated.

It is still a further object of this invention to provide an illumination arrangement for a hermetically sealed instrument which can be manufactured at a low cost with a minimum of assembly procedures.

Briefly stated, in accordance with one aspect of this invention, an electric lamp is mounted on the outside of the transparent dial cover of a hermetically sealed instrument over the central portion of the dial area so that the dial indicia or markings are unobstructed. A mounting structure is provided on the exterior side of the transparent dial cover for supporting and positioning the lamp over the central portion of the dial area. The mounting structure includes a pair of contact surfaces insulated from each other and positioned to engage the contact surfaces on the lamp. The dial cover is provided with a lens portion and a corresponding recess adapted to receive at least a portion of the bulb of the lamp so that the light may be directed and dispersed outwardly over

the dial area. Electrically conducting means, which are later described in detail, are provided for connecting the lamp to a power source.

The lamp is readily accessible from the front of the instrument so that it can easily be replaced without disturbing the instrument assembly, a feature which is particularly advantageous for a hermetically sealed instrument. With the aforementioned arrangement, the space occupied by the casing can be minimized so that a greater number of instruments can be positioned on a given panel area. In addition a substantially uniform and symmetrical illumination is provided over the indicating portion of the dial by means of a relatively inexpensive and uncomplicated arrangement.

This invention will be better understood and other objects and advantages will be apparent from the following description taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

Referring to the drawing, Fig. 1 is a perspective view of an instrument embodying this invention; while Fig. 2 is a fragmentary view, partly in cross section, illustrating the arrangement of Fig. 1 in more detail.

The instrument illustrated in Fig. 1 and embodying this invention is a hermetically sealed instrument enclosed by a casing **1** and a transparent dial cover or window **2** affixed and sealed to the front of the casing and extending in front of a dial member **3**. The front side or dial area of the dial member **3** is illuminated by means of an electric lamp **4** formed in the usual manner of a base portion **5** and a bulb **6**. The lamp is positioned on the exterior of the cover **2** over the central portion of the dial area so that the indicia or markings on the dial are unobstructed.

Referring to Fig. 2, the lamp is supported and positioned in a mounting assembly which comprises a tubular mounting member **7** provided with a threaded socket portion **8** adapted to receive and make contact with the base **5** of the lamp. A contact member **9** is concentrically positioned within the mounting member **7** so as to engage a contact ring **10** on the lamp. The base **5** and the contact ring **10** are internally connected to the filament of the lamp.

The mounting member **7** and the contact member **9** are insulated from each other by means of an insulating bushing **11** and the entire assembly is attached to the exterior side of the cover **2** by means of rivets **12** which extend through the cover and engage a washer **13** on the interior surface of the cover. The washer **13** prevents the heads of the rivets **12** from directly engaging and possibly chipping or cracking the dial cover. As can be seen from the drawing, the mounting structure for the lamp is positioned on the central portion of the cover with the socket portion **8** aligned with the central portion of the dial area. It will be apparent that the mounting structure for the lamp may be modified in various ways and may be rearranged to accommodate other types of electric lamps having configurations different than the one shown. Further, the lamp mounting structure may be attached to the cover **2** in other ways such as by means of a suitable adhesive.

A recess **14** is provided in the dial cover **2** and aligned with the socket **8** to receive the bulb **6** of the lamp. This arrangement permits the bulb portion of the lamp to protrude from the mounting structure so that light may be emitted in the radial direction and further be dispersed and diffused by the cover **2**. Outward dispersal of the light toward the indicia on the dial is facilitated by means of a lens portion **15** formed in the dial cover directly behind the recess **14**. Light emitted from the lamp and entering the lens portion **15** is deflected

outwardly over the dial area. Thus, although the illumination intensity will decrease slightly with radius across the dial area, this arrangement provides a substantially constant illumination intensity at any given radius around the dial area. The net result is a symmetrical illumination pattern which is particularly desirable when the dial indicia or markings are located at a constant or nearly uniform radius around the dial, such as in the manner illustrated in Fig. 1.

Electrical contact with the lamp is established by means of a pair of leads **16** and **17** which are respectively connected to the contact member **9** and the mounting member **7** with the lead **17** making contact with the member **7** through the rivets **12** as indicated in Fig. 2. The leads may be connected to an electrical power source in any suitable manner. In the arrangement illustrated, the leads **16** and **17** are fused respectively into a pair of channels or grooves **18** and **19**. The grooves may be aligned with each other as shown in Fig. 1 or located diametrically opposite each other with one of the grooves occupying the position indicated by the dotted lines **20** in Fig. 1. In the arrangement illustrated, it has been found advantageous to ground the lead **19** to the casing **1** within the hermetically sealed instrument so that only one lead need be externally connected. This arrangement may be varied, of course, to suit the particular configuration employed.

A serrated portion **21** is provided around the outer edge and a portion of the front of the dial cover **2** and is coated with a suitable reflecting material such as white paint to cause internal reflection of light around the periphery of the dial area so as to more efficiently utilize the light emitted from the lamp. The reflecting material is in turn covered with an outer layer of non-glare material such as black paint to provide a masking area around the periphery of the dial to prevent glare.

Shielding means are provided for masking the light emitting portion of the lamp from view from the front of the instrument to minimize direct glare from the lamp. In the embodiment illustrated, the lamp is shielded by means of the lamp base **5** and the mounting member **7** which together form a mask over the light emitting portion of the lamp. The shielding arrangement illustrated may of course be modified to suit other configurations of the lamp mounting structure.

It can be seen that this invention provides an illumination arrangement that is exterior to the sealed enclosure formed by the casing **1** and the dial cover **2** so that it is readily accessible without disturbing the instrument seal. The lamp itself is accessible from the front of the instrument so that it can easily be replaced without removing the instrument from the mounting panel. In addition, the physical size of the casing can be minimized since it is unnecessary to provide space in the casing for an illumination system. Therefore, a greater number of instruments can be located in a given panel area.

It will be apparent from the foregoing that this invention is not limited to the particular embodiment set forth herein and that various changes, substitutions or modifications may be employed in accordance with these teachings without departing in spirit or in scope from this invention in its broader aspects.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An illumination arrangement for an enclosed hermetically sealed instrument having a transparent dial cover extending over a visible dial area comprising an electric lamp having a pair of contact surfaces thereon, mounting means affixed to said dial cover on the exterior side thereof and exterior of the sealed enclosure of said instrument, said mounting means including a socket portion aligned with the central portion of said dial area and adapted to receive the base of said lamp, a pair of contact surfaces in said mounting means electrically insulated from each other and positioned to engage the contact surfaces on said lamp, a lenticular recess in said dial cover extending in from the exterior surface thereof exterior of said enclosure, said recess being aligned with the socket portion of said mounting means over the central portion of said dial area, said lamp being mounted in said mounting means with the base of said lamp positioned in said socket portion so that at least a portion of the bulb of said lamp extends into said lenticular recess over the central portion of said dial area, shielding means including the base of said lamp and at least a portion of said mounting means for masking the light emitting portion of said lamp from view from the front of said instrument to minimize glare from said lamp, and electrical conducting means connected to the contact surfaces of said mounting means and connectible to a power source for energizing said lamp.

2. An illumination arrangement for an enclosed hermetically sealed instrument having a transparent dial cover extending over a visible dial area comprising an electric lamp having a pair of contact surfaces thereon, mounting means affixed to said dial cover on the exterior side thereof and exterior of the sealed enclosure of said instrument, said mounting means including a socket portion aligned with the central portion of said dial area and adapted to receive the base of said lamp, a pair of contact surfaces in said mounting means electrically insulated from each other and positioned to engage the contact surfaces on said lamp, a recess in said dial cover extending in from the exterior surface thereof exterior of said enclosure, said recess being aligned with the socket portion of said mounting means over the central portion of said dial area, said lamp being mounted in said mounting means with the base of said lamp positioned in said socket portion so that at least a portion of the bulb of said lamp extends into said recess over the central portion of said dial area, a lens portion formed in said dial cover and aligned with said recess to disperse light emitted from said lamp outwardly over said dial area, shielding means including the base of said lamp and at least a portion of said mounting means for masking the light emitting portion of said lamp from view from the front of said instrument to minimize glare from said lamp, and electrical conducting means connected to the contact surfaces of said mounting means and connectible to a power source for energizing said lamp.

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