Aug. 9, 1960 J. M. ROPER 2,948,073

ILLUMINATED INSTRUMENT PANEL

Filed Sept. 2, 1954

FIG. 1.

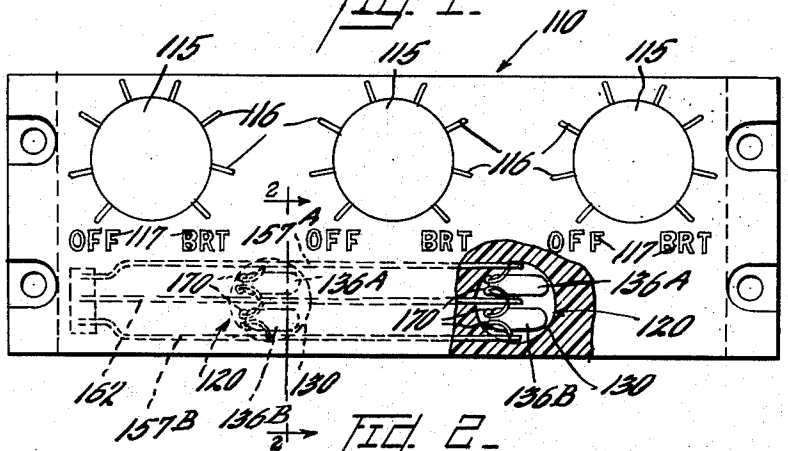


FIG. 2.

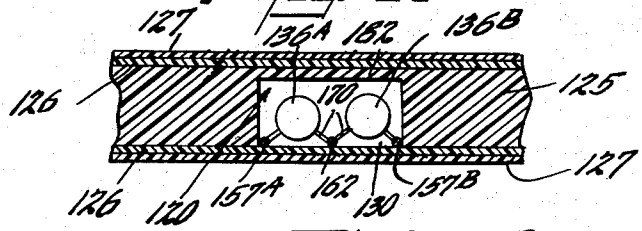


FIG. 3.

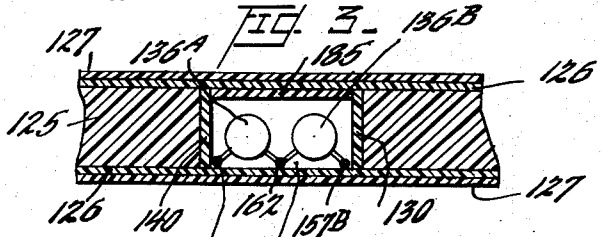


FIG. 4.

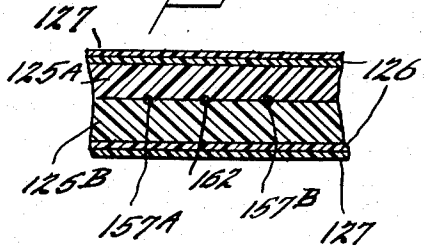
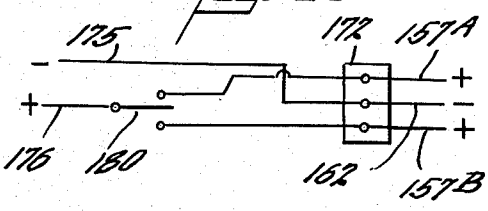


FIG. 5.



INVENTOR

John M. Roper

BY Watson, Cole, Grindle, Watson

ATTORNEYS

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ILLUMINATED INSTRUMENT PANEL

John M. Roper, Washington, D.C., assignor to Grimes Manufacturing Company, Urbana, Ohio, a corporation of Ohio

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3 Claims. (Cl. 40—130)

This invention relates to instrument panels or dials and to means for illuminating them so that the indicia or legends carried thereon may be read at night or under other circumstances involving the absence of natural lighting.

More particularly, the invention has reference to the illumination of the indicia applied to or incorporated in the panels by light transmitted through the material of which the panel is composel, and from a light source carried by the panel and located substantially in the plane thereof, whereby the rays of light are transmitted edgewise of the body of the panel.

This application is a continuation-in-part of my copending application Ser. No. 439,796, filed June 28, 1954. since matured into Patent No. 2,824,954.

The general object of the invention is to provide a novel and improved system of illumination of the class described, which will enhance the efficiency of the panel lighting, increase the compactness of the instrument assembly, widen the versatility of location of the light sources, and generally improve the provisions for illumination of the dials, instrument and console panels, and other indicia bearing surfaces, such as those to be found in the cockpits of aircraft, on shipboard, or elsewhere.

Although the edge illumination of plastic panel lighting systems has been in use for some time, difficulty and inconvenience have been experienced in the matter of the awkward rearward projection from the panel of parts of the lighting installation and the interfernce of such projecting parts with the instruments or instrument casings disposed behind the panels.

It is well known that space in the cockpit of an aircraft is at a premium and the various instruments, housings, and panels must be crowded as close together as possible, and the various fastenings, electrical connections and accessories must occupy a minimum of space and not interfere with the compact assemblage of the controls. Heretofore, the manufacturers of control instruments for aircraft had to take into consideration in the planning of the instruments and their housings and casings, to accommodate the rearwardly projecting parts of the superimposed instrument or console panel, and the instrument boxes and the panels had to be designed to interfit and accommodate irregularities of construction of this nature. The present invention enables the manufacture of the console equipment and the manufacture of the plastic plate panel and the locating of the lighting fixtures therein to be planned independently, the one without reference to any possibility of conflict with the other.

According to one embodiment of the invention there is afforded a further advantage which resides in the elimination of any metallic or other opaque parts surrounding the lamp within the confines of the boundary surfaces of the plastic light transmitting panel plate.

An alternative feature to the one described in the immediately preceding paragraph involves the provision of more complete sealing of the panel for the purpose of

making it completely water-tight. This involves covering the inner end of the opening with facing layers comprising an extension of these layers from the plate which comprises the main body portion of the panel.

In one illustrative embodiment of the invention, the lighting fixtures are completely contained between the planes of the front and rear surfaces of the panel with no forward or rearward projecting parts whatsoever.

Other objects and features of novelty, including the installation and arrangement of circuit leads to the lighting fixtures, again avoiding projection from the rear face of the panel, will be apparent from the following specification when read in connection with the accompanying drawings in which certain embodiments of the invention are illustrated by way of example.

In the drawings:

Figure 1 is a view in front elevation of an illuminated instrument or console panel in which the lighting fixtures are completely contained between the planes of the front and rear walls of the panel, and standby means are provided in case of failure of a fixture;

Figure 2 is a fragmentary cross-sectional view taken substantially on line 2—2 of Figure 1;

Figure 3 is a similar view showing a modification involving the use of a screen;

Figure 4 is a similar fragmentary sectional view showing a further modification in which the panel plate is made in two layers with the conductors sandwiched between them; and

Figure 5 is a schematic arrangement of the wiring illustrating the standby provisions.

Referring now to the drawings in which Figures 1–5 depict illustrative examples of this invention:

A panel section is indicated generally by the reference numeral 110 and is provided with suitable mounting apertures for the application of standard fastening elements which serve to attach the panel to the underlying support plate, not shown. The particular panel used is provided with three control knobs 115 with their associated markers or indicator lines 116 and printed legends or indicia 117. The markings 116 and the legends 117 are illuminated by lamps located within panel 10, which panel is made of translucent material which may be selected from well-known plastics or other materials having the property of conducting or transmitting light. The portion of the surface of the panel where markings or legends do not occur is coated with an opaque material preferably having a black surface.

Openings 130 are provided at strategic locations to afford the maximum of light transmission to the insignia and within each of these openings are inserted the lighting fixtures 120, which in these embodiments include two lamps 136A and 136B. These lamps preferably comprise minute bulbs from which the lead wires project without benefit of socket or other terminals, although any suitable arrangement of electrical connection may be employed. The lamps 136A and 136B are so small and light that they are readily supported by being placed within the opening and connected by the lead wires 170 to the mains 157A, 157B, and 162. Conductor 162 may be the negative ground wire and conductors 157A and 157B alternatively usuable positive connections, the switching arrangement (shown in Figure 5) being such as to provide one lamp as a standby in case of failure of the other one. For this purpose the wires are brought to a terminal point 172, the negative wire 162 being permanently connected to the negative lead 175 from the source of current, and the positive wires 157A and 157B being alternatively connectable with the positive current lead 176 by means of the switch 180.

Preferably in the embodiments now being described, the conductors 157A, 157B, and 162 are embedded in the

rear surface of the panel plate **125** and allowed to emerge at the openings **130** sufficiently to connect the lamp wires **170** thereto. The advantage of placing the wires substantially in the plane of the rear surface of the plate will be readily apparent; in this way the wires may be laid in straight lines without any circuitous routing to avoid points where the indicia or insignia **117** occur on the front face of the panel.

As shown in Figure 4 of the drawings, the conductors **157A**, **157B** and **162** may be sandwiched between two separate layers of plate material **125A** and **125B**. In such case, the conductors **162** might have to be provided with a certain amount of slack, or broken and respliced at points where it traverses a light fixture opening **130**.

In Figure 2 of the drawings the opening **130** is shown as terminating short of the front surface of the panel plate **125** whereby a bridging web **182** is provided which lends reinforcement to the covering layers **126** and **127** on the front face of the panel. Alternatively, if desired, this reinforcing web could be provided at the rear face of the panel. Layers **126** act as a waterproof covering of the panel plate **125** and the associated electrical circuitry in addition to performing their light transmitting function.

It is presumed that if colored insignia illumination is desired—and this is generally the case—the lamps **136A** and **136B** themselves may be colored. However, if white lamp sources are used, the arrangement may be provided as shown in Figure 3 of the drawings, wherein a tubular translucent colored screen **140** is provided as a liner for the opening **130** surrounding the light fixtures. In order to provide front or rear reinforcement, a disc **185** may be cemented in the end of the tubular screen member **140** to reinforce the covering layers **126** and **127**.

It will be seen that by the provisions of this invention all projections from the rear face of the panel **110** have been eliminated and thus the panel may be applied against the instrument casings without the necessity of indenting the casings or designing them to avoid the contacts which might project from the panel. There are also no metal portions of the lighting fixture projecting into the plastic plate **125** to interfere with the light distribution.

Various changes and modifications may be made in the embodiments illustrated and described herein without departing from the scope of the invention as defined by the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. An instrument console panel installation comprising, in combination, a panel plate composed of light transmitting material, and having a rear surface adapted to come into close proximity to instruments or mechanism to be controlled, and a front surface bearing indica adapted to serve as reference media for controlling devices movable adjacent said panel, said indicia adapted to be illuminated by light transmitted edgewise through the panel plate, the illuminated insignia on the front surface of the plate being produced by at least one thin covering layer of material applied to said surface, and at least one similar covering layer applied to the rear surface of said plate, a light fixture, an opening in said plate spaced from the edges thereof which receives said fixture, which opening passes substantially through the plate proper but not through the front and rear covering layers; the entire lighting fixture disposed within said opening and between said covering layers, conductors leading to said lighting fixture and also disposed substantially within the confines of the planes of said front and rear covering layers, and connections between said fixture and said conductors made within said opening wherein said panel defines a water-tight seal for said fixture and said connections.

2. An instrument console panel installation comprising, in combination, a panel plate composed of light transmitting material, and having a rear surface adapted to come into close proximity to instruments or mechanism to be controlled, and a front surface bearing indicia adapted to serve as reference media for controlling devices movable adjacent said panel, said indicia adapted to be illuminated by light transmitted edgewise through the panel plate; a lighting fixture and conductors leading thereto from a suitable source of current, said lighting fixture and said conductors being carried by said panel plate, the entire fixture being positioned within said panel, the connections between said fixture and said conductors being made within said panel and a thin covering layer of material applied to each surface of said panel wherein said panel plate defines a water-tight enclosure for said fixture and the connections between the conductors and the fixture.

3. An instrument console panel installation comprising, in combination, a panel plate composed of light transmitting material and having a rear surface adapted to come into close proximity to instruments or mechanism to be controlled and a front surface bearing indicia adapted to serve as reference media for controlling devices movable adjacent said panel, said indicia adapted to be illuminiated by light transmitted edgewise through the panel plate; a light fixture and conductors leading thereto from a suitable source of current, the entire lighting fixture being disposed within a recess in said panel plate, said recess being spaced from the edges of said plate, said conductors being disposed within said plate, said conductors being connected to said fixture within said recess and a thin layer of material on said plate enclosing said recess wherein said plate and said thin layer of material define a watertight enclosure for said fixture.

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