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ANGLE INDICATOR FOR AIRCRAFT

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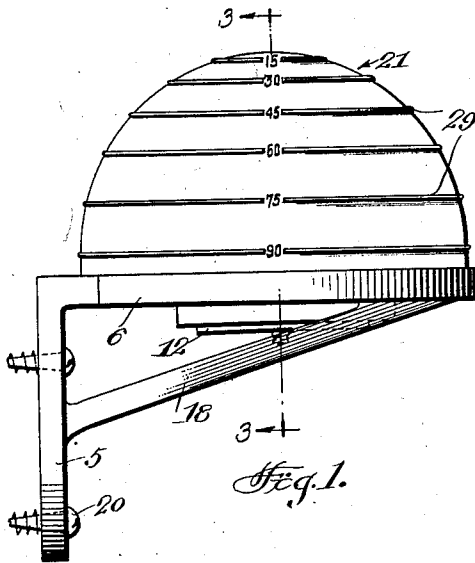


Fig. 1.

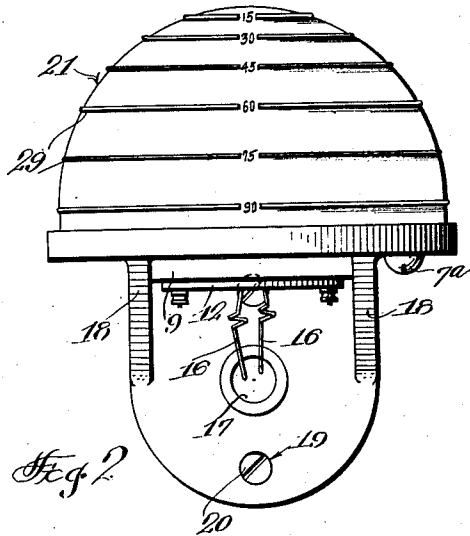


Fig. 2.

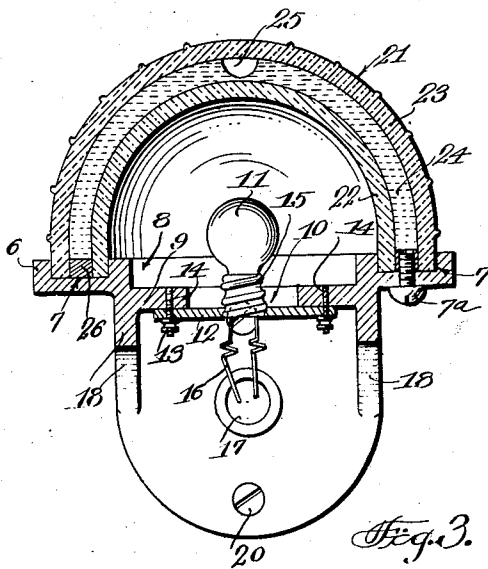


Fig. 3.

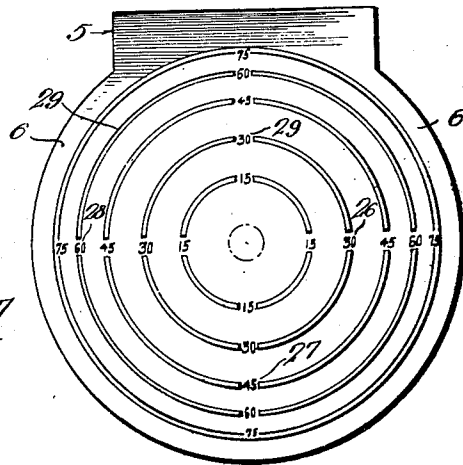


Fig. 4.

WITNESS

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ANGLE INDICATOR FOR AIRCRAFT

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This invention relates to an instrument for use on aircraft to visually indicate the angle of inclination of the aircraft from the horizontal plane both with respect to its longitudinal and transverse axes, and one visually denoting such angles at all times including conditions of darkness, fog and storm.

The invention consists in the constructions, arrangements and combinations of parts as described in the detailed specification following and as pointed out in the appended claims.

Briefly stated, the invention in its preferable form comprises a support mounting a hollow double walled approximately hemispherical spirit level with a transparent outer wall calibrated on the lines of said longitudinal and transverse axis in terms of angles of inclination and peripherally ringed in the zones of calibration to provide quadrants divided by the lines of said axes and ringed in zones of angles. The interior of the hollow hemispherical body is illuminated and its inner wall is preferably translucent.

A preferred embodiment of the invention is shown in the accompanying drawings forming part hereof and in which:

Figure 1 is a view in side elevation of the device as horizontally mounted upon a suitable support, in, for example, the cockpit of an airplane.

Figure 2 is a front elevation of the device as shown in Figure 1.

Figure 3 is a transverse vertical section taken on the line 3—3 of Figure 1.

Figure 4 is a top plan view.

The device as shown comprises a support in the form of an angled bracket having a vertical attaching back plate 5 depending from the rear edge of a substantially circular horizontal base plate 6. The upper face of the base plate, as shown in Figure 3, is formed with an annular channel 7 around its outer edge and with a central depression 8 inwardly of said channel. The base 9 of the depression 8 is formed with a central opening 10 therethrough for the insertion of an electric bulb 11 therethrough.

The opening 10 is closed by a plate 12 detachably clamped to the base 9 by nuts 13 threading on studs 14 depending from the base 9 and mounted centrally thereof is a threaded socket 15 of conventional form receiving the threaded base of the lamp bulb 11. Wires 16 conduct the lighting current to the socket 15 and lead out through an opening 17 in the back plate 5 to a source of current supply. The rear end of the base plate 6 is joined to the back or bracket plate 5 by diagonal brace bars 18 which may and preferably are formed integral therewith. The back plate is formed with a plurality of holes to receive attaching screws 20 or other fastening devices, and is intended for support in a vertical plane as by attachment to the vertical face of a suitable support, such for example as the instrument board in the pilot's cockpit of an airplane.

Snugly fitting in the annular channel 7 of the base plate is the lower edge of a substantially hemispherical hollow doubled walled spirit level generically indicated by 21. The inner wall 22 of the hemispherical body is of translucent matter, such as ground glass, to permit the light from the bulb 11 to penetrate therethrough and is concentric with and spaced from the outer wall 23 which is preferably of transparent glass. The space between the walls is filled with alcohol 24, preferably colored, except for the usual bubble of air 25 as in all spirit levels. The space between the inner and outer walls 22 and 23 at their bases within the channel 7 is closed by suitable leak proof packing 26 in the form of a cement not affected by the alcohol and effective to seal the base of the hemispherical body in the channel 7. A filling opening may be provided in the channel 7 and packing 26, to receive a suitable sealing closure plug such as the screw 7a whose head will effectively seal the opening.

The outer face of the transparent outer wall 23 is calibrated in terms of angles of inclination by concentric lines formed by peripheral ridges 29 and arranged in quadrants spaced by lanes representing the longitudinal and transverse axes of the aircraft, the lanes designated 27, Fig. 4 representing

the longitudinal axes and lanes 28, representing the transverse axis. As shown, the numerals designating the angles defined by the concentric ridges 29 are placed in these
 5 lanes and bridge the concentric angle line of similar value spaced by the lanes thereby facilitating visual angle determination.

With the aircraft on level or absolute horizontal keel, or in other words, with the
 10 lines of both its longitudinal and transverse axes in the horizontal plane, the bubble 25 will appear at the top center of the hemisphere as shown in Figure 3. If the nose of the aircraft is depressed and the longitudinal axis moved from the horizontal, the
 15 bubble will move rearwardly and lie in the ring zone 27 denoting the angle of downward inclination. If the downward inclination is accompanied by lateral inclination
 20 to the left, for example, the backwardly moving bubble will also move toward the right to the ring zone in the line 28 of angle numerals denoting the angle of inclination of its transverse axis with the quadrant
 25 formation of the indicating periphery of the outer wall 23 enabling the pilot closely to approximate by visual indication, the angular extent of lateral inclination.

Since the hemispherical spirit level is internally illuminated by the bulb 11, and the colored spirit of the level offers a contrasting back ground for the white air bubble, the movement of the bubble and its indicating position will be easy to follow with the
 35 eye.

The bracket mount for the hemispherical level body may be and preferably is cast as an integral unit of metal such as aluminum and the socket plate 12, being removable, permits ready replacement of a bulb
 40 which burns out.

While the specific construction disclosed represents the preferred form of the invention, it is intended as illustrative rather
 45 than restrictive, and structural changes adapting the invention to different conditions of manufacture and use are contemplated in consonance with the spirit of the invention and the scope of the appended
 50 claims.

What I claim, therefore, and desire to secure by Letters Patent is:

1. An angle indicator for aircraft comprising a flat supporting base for mounting
 55 in a horizontal plane having an annular channel in its upper face, a substantially hemispherical double walled hollow spirit level seated by its edges in said channel with said edges in the horizontal and parallel to
 60 the horizontal diameter of the hemispherical level, the inner wall of said level being of light transmitting material and the outer wall of substantially transparent material, said outer wall being visually divided by concentric lines grouped in quadrants by bi-

secting lines at right angles denoting the longitudinal and transverse axes of the aircraft with said concentric lines calibrated to denote angles of inclination from the horizontal planes of said longitudinal and transverse axes, and a level illuminating
 70 light radiating element mounted on said supporting base and positioned within the interior of the hollow hemispherical level.

2. An angle indicator for aircraft comprising a flat base support arranged for mounting to lie in a horizontal plane and having an annular channel in its upper face and an opening therethrough within said channel, a plate detachably secured to the
 80 under side of said base support having a bulb socket thereon alined with said central opening and current conductors connected thereto, an electric light bulb detachably seating in said socket and extending upwardly from the face of said base support, and a hollow substantially hemispherical double wall spirit level superposed on said
 85 base support with the edges of its walls seating in said annular channel and in the horizontal plane of support of the base and parallel to the horizontal diameter of its hemisphere, the space between said walls being closed by the base of said channels, the inner wall of said hemispherical level
 90 being of translucent material and its outer wall being of substantially transparent material said outer wall being visually divided by concentric lines arranged in quadrants spaced by bisecting lines at right angles denoting the longitudinal and transverse axes
 95 of the aircraft, said lines being calibrated to denote angles of inclination from the horizontal planes of said longitudinal and transverse axes.

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