

Feb. 6, 1940.

H. C. STUERZL

2,189,535

INSTRUMENT LIGHTING

Filed Dec. 26, 1935

2 Sheets-Sheet 1

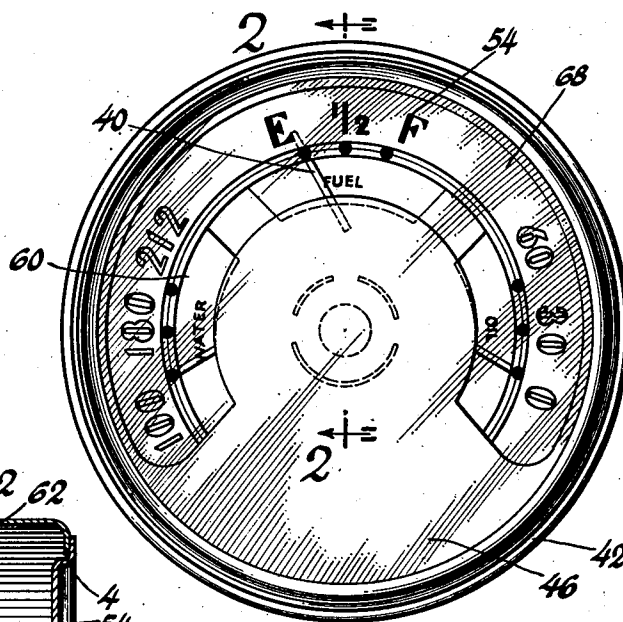


Fig. 1

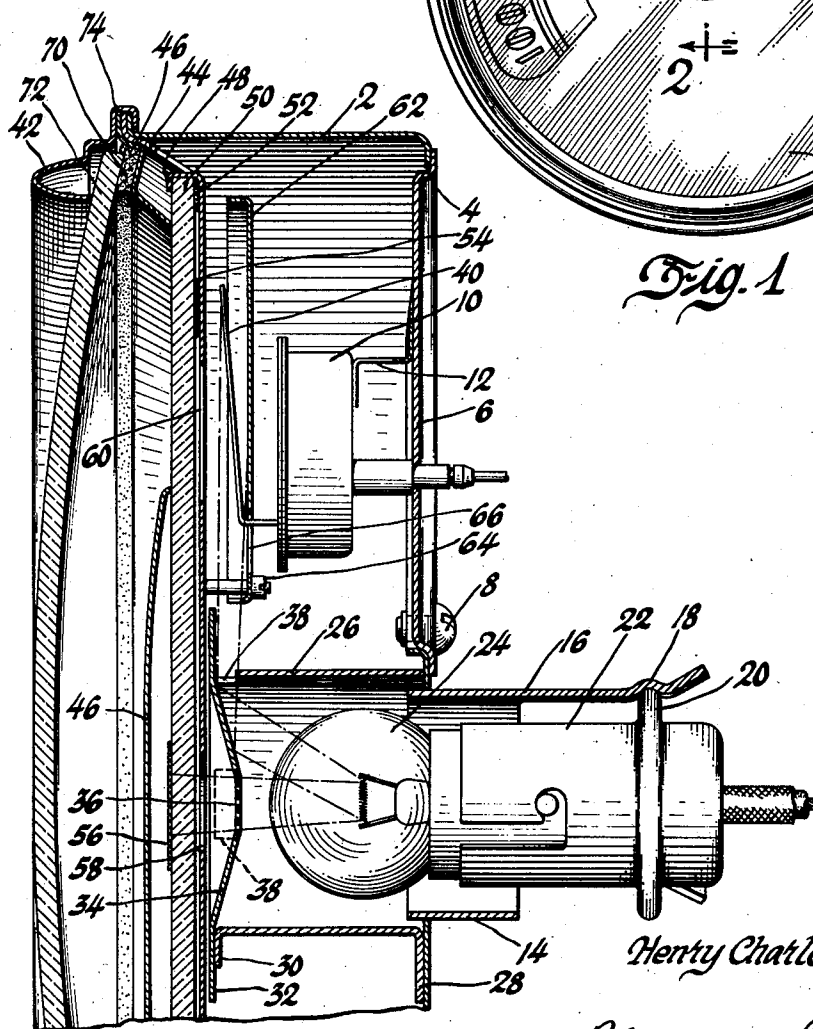


Fig. 2

Inventor
Henry Charles Stuetzel

By *Blackmore, Jones & Thirk*
Attorneys

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2 Sheets-Sheet 2

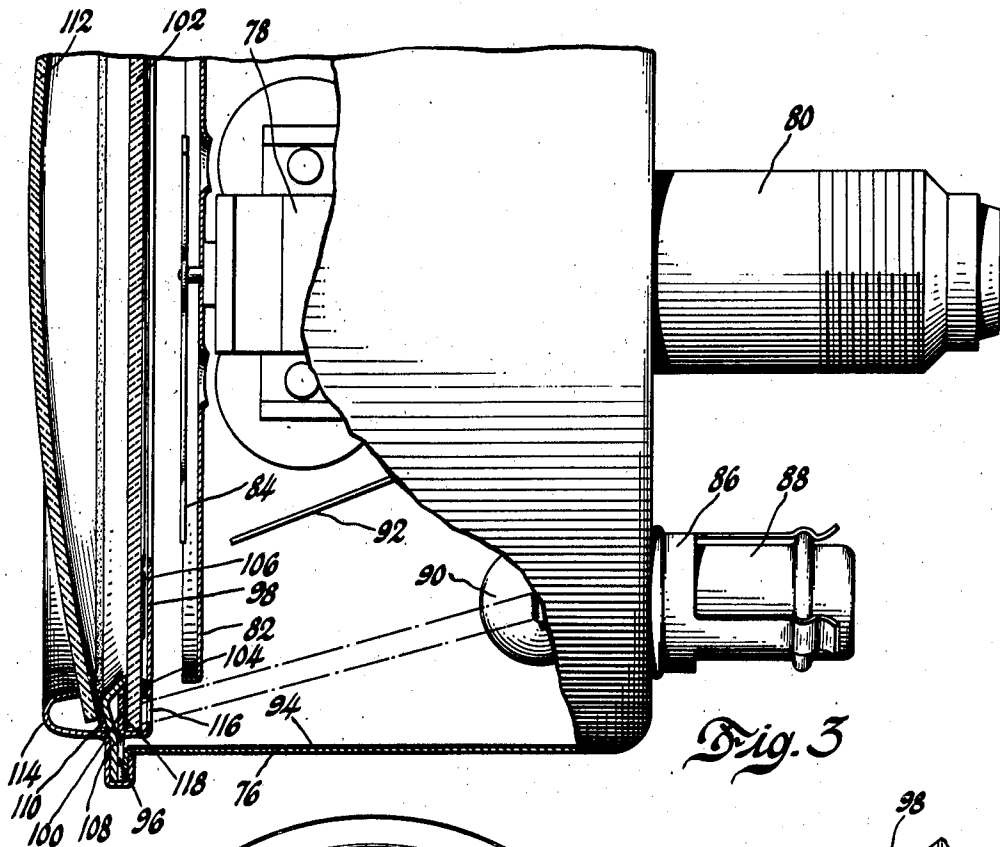


Fig. 3

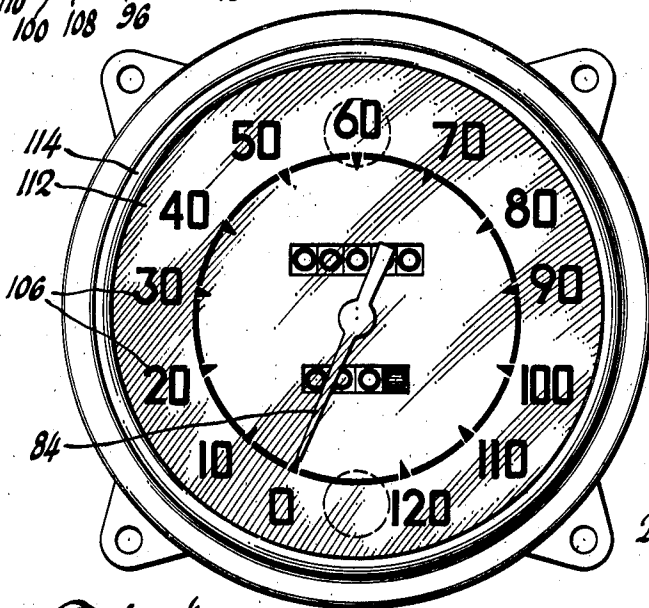


Fig. 4

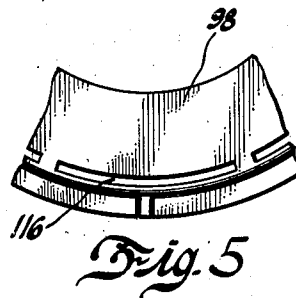


Fig. 5

Inventor
Henry Charles Stuerzl

By *Blackburn, Spencer & Fink*
Attorneys

UNITED STATES PATENT OFFICE

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INSTRUMENT LIGHTING

Henry Charles Stuerzl, Flint, Mich., assignor to
General Motors Corporation, Detroit, Mich., a
corporation of Delaware

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6 Claims. (Cl. 240—2.1)

This invention relates to illuminating means and more specifically to means for illuminating the indicating dials of instruments used to notify the operator or driver of the various conditions incident to the operation of the car.

The instrument panel of motor cars has been the object of much attention in recent years, mainly with two principal thoughts: first, that of giving the panel a pleasing aesthetic appearance and, second, to properly illuminate the various indicating dials at night without causing glare or stray light to be sent into the driver's eyes. Most of the present illuminating systems are based on light reflection from the dial face.

It is an object of my invention to provide an illuminating system for an instrument based upon the refraction and reflection of light for its operation.

It is a further object of my invention to provide a transparent dial for said system having indicia painted thereon and illuminated by the refraction and reflection of light within the dial.

For a better understanding of the nature and objects of this invention, reference is made to the following specification wherein there are described the embodiments of my invention which are illustrated in the accompanying drawings, in which:

Fig. 1 is a front elevation of a compound indicating device embodying my invention.

Fig. 2 is an enlarged sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged partial side elevation of a modified form of my invention, parts being broken away and shown in section.

Fig. 4 is a front elevation of the device shown in Fig. 3.

Fig. 5 is a detail view of a part of the light shielding and supporting ring.

Referring specifically to the form shown in Figs. 1 and 2, the assembly is formed of an instrument casing 2 of cylindrical form having its forward face open. In the rear face there is a series of openings 4 in which the various operating mechanisms for giving different indications are supported, the number of these openings being dependent of course on the number of gauges in the assembly. Within these openings is secured a closure plate 6 by suitable securing means such as screws 8. Operating mechanisms such as 10 are secured to the removable plates 6 by any desired means, such as an angle bracket 12 welded to the parts as shown.

Extending through the center of the rear face and secured thereon is a short hollow cylinder

14 which has a series of integral rearwardly extending spring strips 16 in alignment with the body. These spring strips have an offset portion 18 adjacent the extremity which is adapted to engage and hold a ring 20 on the exterior and rigidly secured to a socket 22 in which a conventional bulb 24 is placed. A short cylindrical wall 26, which is secured to the inner face of the rear wall by flanges 28 welded to the casing, is slightly larger than the cylinder 14 and is coaxial therewith. At its forward end the wall 26 is flanged outwardly as at 30 and secured to a reflector disk 32 of greater diameter than the wall, the central portion 34 of which is conical and has an opening 36 at the center thereof. This opening may be termed a metering opening as the size thereof determines the amount of light admitted to the dial per se. In the periphery of the wall, adjacent the reflecting disk 32, is a series of spaced openings 38 through which light is reflected by the conical portion 34 out at right angles for the various indicating needles 40 of the operating mechanisms 10.

Positioned in the open front of the casing 2 is a series of members, the edges of which are supported between the outwardly flanged edge of the casing 2 and the clamped over edge of a bezel 42. These devices include a large plate 44 whose edge extends up into the clamped edge of the bezel and a circular shrouding disk 46 which is supported in the same way. The plate 44 is substantially circular and is slightly dished so that its main plane lies a short distance within the cylindrical casing 2. Adjacent its edges there are pressed-out lugs 48 which are adapted to be bent over the edge of a circular glass dial 50 at various points throughout its periphery and therefore support the glass dial upon the plate. A circular gasket 52 is provided between the outer rear face of the glass dial 50 and the metal supporting plate 44 to cushion the support of the glass dial and prevent its breaking and to space same from plate 44 so that when the glass is illuminated in the dark, the plate 44 will appear dark no matter what color it is actually painted. Painted on the rear face of the dial 50 at a plurality of points are suitable indicating indicia 54 which of course may be any type called for by the particular operating mechanism.

Also upon the forward face of the glass dial at its approximate center there is an opaque painted area 56 which is substantially in alignment with the center line of the source of light. Also in alignment therewith is an open-

ing 58 in the plate 44 so that light may pass through into the glass dial. A series of openings 60 is also cut in the plate 44 at various positions adjacent the operating mechanism for the indications in order that the indicating needles therefor may be viewed therethrough. Supported upon the plate 44 by bolts 64 and spaced rearwardly therefrom is a series of flanged plates 62, these plates having an opening 66 therein through which the indicating needles project and lie in back of the needles in their operating positions, their purpose being to conceal the operating mechanism from view.

Supported in front of the plate 44 and the dial 50 is a circular shrouding plate 46 which has a semi-circular opening 68 therein through which the various indicating needles and indicia may be viewed, the rest of the disk concealing the remainder of the device. The edge of the disk 46 is angled and supports therein a circular deformable gasket 70 against which the periphery of a conventional glass face 72 is pressed by the end of the bezel 42.

It will further be noted that the angled end 74 of the bezel encircles the projecting ends of the flange of the casing 2 and the outer edge of the plates 44 and 46 and is pressed tightly together to complete the assembly. It will thus be seen that from the source of light 24 rays are projected directly ahead through the metering opening 36 and into the glass dial 50. These rays pass through the dial until they contact the opaque paint 56 upon the open side thereof at which point they are diffused and reflected at an angle greater than the critical angle, then they are reflected back and forth from one face to the other and they gradually move radially through the disk and as they strike the painted indicia 54 on the rear face of the dial they will illuminate the same. In this way the indicia is illuminated by radial travel through the disk, of the light rays, caused by an initial refraction of the rays and following reflections back and forth through the cross section of the dial. Also, a certain amount of light is reflected from the rear face of the conical reflector 34 through the openings 38 at right angles to the main axis of the device, these light rays impinging directly upon the indicating needles 40 to illuminate the same.

In the particular modification, shown in Figs. 3, 4 and 5, the casing 76 houses conventional speed and distance indicating mechanism 78, the operating connection to which is made through a detachable connection 80 which projects through the rear surface of the casing. The forward part of the speed indicating mechanism carries a large circular plate 82 in front of which is mounted a rotatable indicating needle 84. Also located in the rear face to one side of the central drive 80 is a socket supporting member 86 which resiliently holds the socket 88 in the same manner as pointed out in the similar device shown in Fig. 2. A bulb 90 is supported by the socket and as many of these units are placed in the rear face of the casing as desired. A plurality of light shields 92 running longitudinally of the casing are provided to prevent too much of the light from being absorbed on the speed indicating mechanism. The inner surface of the casing is coated with white paint 94 to assist in reflecting the light to give a sufficient amount of illumination.

The forward end of the casing 76 is flanged outwardly to form a substantially narrow flange

96 and adjacent to which there lies the periphery of a retainer plate 98. This retainer plate is substantially circular in form, its periphery being offset a short distance to one side and then extending in the radial direction for clamping purposes. In this offset portion there is a stamped-out lug 100 which is adapted to be pressed up around the edge of a transparent dial 102, thus supporting the dial in proximity with the retainer, as many of the pressed-out lugs being supplied around the periphery as is necessary. A circular deformable washer 104 is provided between the rear face of the glass dial and retainer plate to prevent cracking of the glass and, as said before, in order that the plate 98 will be spaced from the glass dial and appear black when the glass is illuminated at night. As in the former case, various indicia 106 are painted on the rear face of the glass dial.

Immediately in front of the glass dial and retainer assembly is an annular spacing ring 108 the outer end of which lies parallel with the outer periphery of the retainer plate and the inwardly extending portion presses a deformable gasket 110 against the inner face of a conventional cover glass 112. A bezel 114 is provided, one end of which presses the cover glass against the deformable gasket, the opposite end forming a U-shaped groove surrounding the extending ends of the spacing ring, the retainer plate and the flange 96 on the casing to clamp the whole together and form a complete assembly.

Around the periphery of the retainer plate 98 is provided a series of arcuate slots 116 through which the beams of light from the source are supplied to the rear face of the glass dial. These rays of course proceed through the cross section of the glass plate or dial and provided on the front face is an annular opaque band 118 which is adapted to cause the rays to be reflected back through the glass plate or dial. This action, as will be seen, is the same as that in the first form of the invention described and upon multiple angular reflections the light travels radially of the glass dial and illuminates the indicia 106, the indicating needles 84 in this instance being illuminated by reflection from the inside walls of the casing. It will be noted that in this construction the opaque paint 118 placed at the outer periphery of the glass dial 102 is behind the spacing ring and bezel so that the same is not visible.

In both of these forms it is therefore evident that I have provided a new type of illumination for a transparent dial the light rays of which are admitted from one face and then caused to travel radially through the dial by diffusion and reflection to illuminate various indicia painted on the rear face of the dial. This particular construction is very advantageous from a manufacturing standpoint in that it enables this indirect type of illumination without the use of any new or enlarged casings such as would be needed if straight edge illumination were used and therefore these casings may be applied to the same openings in the instrument panels as were before provided.

I claim:

1. In an indicating device, a casing open at its forward end, indicating means within the casing and fixed thereto, a retaining plate secured to the casing adjacent the forward end thereof and having formed therein a first opening through which light rays may pass and a second opening through which said indicating means is visible,

a transparent imperforate plate fixed to said retaining plate at the forward side thereof, opaque means forming indicia on the rear of said transparent imperforate plate adjacent said second opening in the retaining plate, a source of light within the casing behind said retaining plate and in substantial alignment with said first opening formed therein, and opaque means on the forward side of said transparent imperforate plate in substantial alignment with said first opening and source of light to prevent rays of light from said source of light which travel through said first opening from passing out of the forward side of the transparent imperforate plate but diffusing and reflecting said light rays to illuminate the indicia on the rear of said transparent imperforate plate.

2. In an indicating device, a casing open at its forward end, indicating means within the casing and fixed thereto, a metallic retaining plate secured to the casing adjacent the forward end thereof and having formed therein a first opening and a second opening through which said indicating means is visible, a transparent imperforate glass plate fixed to said metallic retaining plate at the forward side thereof, a gasket between said retaining plate and said transparent imperforate glass plate for cushioning the latter and maintaining the retaining plate and transparent imperforate glass plate in spaced relation, opaque means forming indicia on the rear of said transparent imperforate glass plate adjacent said second opening in the retaining plate, a source of light within the casing behind said retaining plate and in substantial alignment with said first opening, and opaque means on the forward side of said transparent imperforate glass plate in substantial alignment with said first opening and source of light to prevent rays of light from the light source which travel through said first opening from passing out of the forward side of the transparent imperforate glass plate but diffusing and reflecting said light rays to illuminate the indicia on the rear of said transparent imperforate glass plate.

3. An indicating device as in claim 2, in which is provided a means for reflecting a portion of the light within the casing to illuminate a pointer of the indicating means.

4. In an indicating device, a casing open at its forward end, indicating means fixed within the casing including an index or pointer, a retaining plate secured to the casing adjacent the forward end thereof having an opening through which said index or pointer is visible, a transparent plate fixed to said retaining plate, indicia on said transparent plate adjacent said opening, a source of light arranged behind said trans-

parent plate to illuminate the same, a light shield fixed in said casing between said source of light and said indicating means, openings in said light shield, a conical reflector disk secured between said transparent plate and said source of light to reflect light therefrom through said openings to said index, an orifice in the center of said reflector disk through which said source of light may directly illuminate said transparent plate, opaque means on the forward side of said transparent plate in alignment with said orifice and said light source for light reflection and diffusion within said transparent plate to illuminate said indicia.

5. In an indicating device, a casing open at its forward end, a plurality of indicators fixed within said casing including an index or pointer, a retaining plate secured to the casing adjacent the forward end thereof having a plurality of openings through which said indicators are visible, a transparent plate fixed to said retaining plate, indicia on said transparent plate adjacent said openings, a source of light arranged behind said transparent plate to illuminate the same, a light shield fixed in said casing between said source of light and said indicators, restricted light passages in said light shield, a reflecting surface between said source of light and said transparent plate to reflect light through said light passages to said index, a light passage through which said source of light may directly illuminate said transparent plate, opaque means on the forward side of said transparent plate in alignment with said light passage for light reflection and diffusion to illuminate said indicia, and a shrouding disk having a plurality of openings through which said indicia and said indicators are visible.

6. In an indicating device, a casing open at its forward end, indicating means fixed within said casing including a pointer, a retaining plate secured to the casing adjacent the forward end thereof having an opening through which said pointer is visible, a transparent plate fixed to said retaining plate, indicia on said transparent plate adjacent said opening, a source of light arranged behind said transparent plate, a light shield fixed in said casing between said source of light and said indicating means, restricted light passages through said light shield, a reflecting surface between said source of light and said transparent plate to reflect light through said light passages to said pointer, a light passage through which said source of light may directly illuminate said transparent plate, opaque means on the forward side of said transparent plate in alignment with said light passage for light reflection and diffusion within said transparent plate to illuminate said indicia.

HENRY CHARLES STUERZL.