Aug. 11, 1942. J. L. PEDEN 2,292,715

REFLEX UNIT

Filed Jan. 27, 1939

Fig. 1

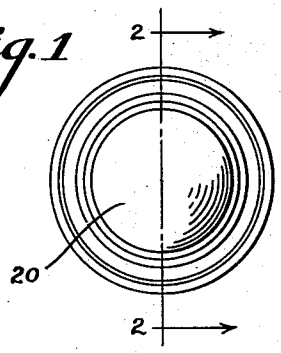


Fig. 2

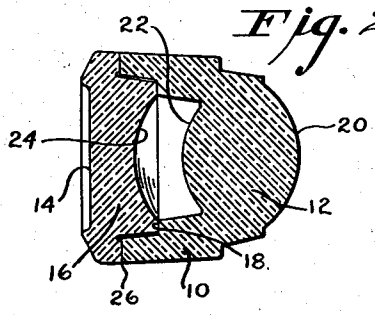


Fig. 3

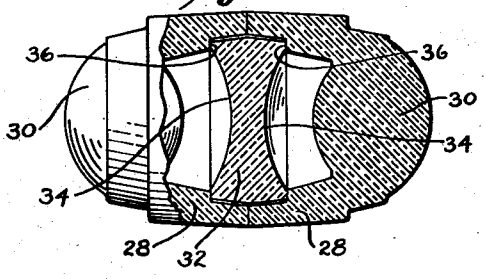


Fig. 6

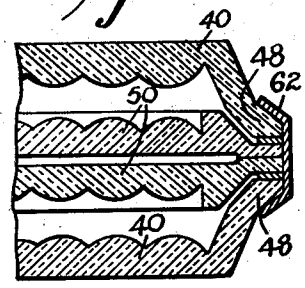


Fig. 4

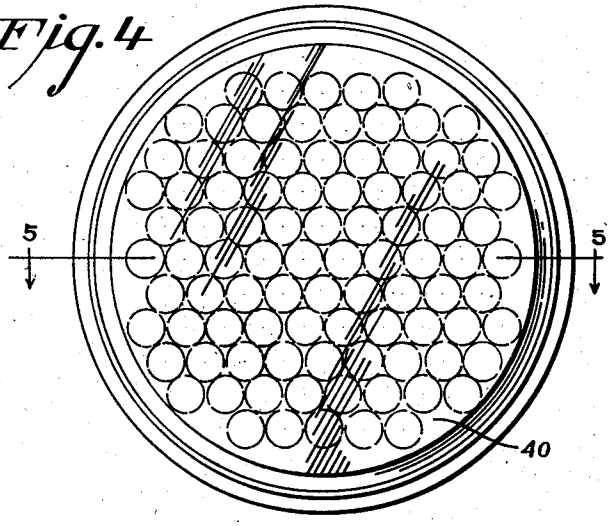
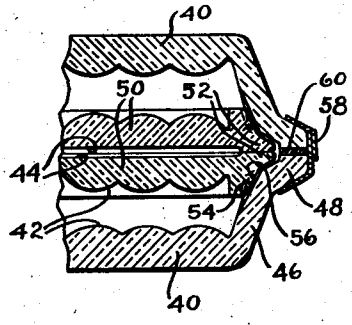


Fig. 5



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2,292,715

REFLEX UNIT

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Application January 27, 1939, Serial No. 253,179

4 Claims. (Cl. 88—82)

This invention relates to reflex signals of the autocollimating type and more particularly to a signal construction in which the reflecting surface is located within the body of the signal and protected from exposure to the atmosphere.

Hitherto large numbers of reflex units have been manufactured by molding a solid body of proper configuration from transparent material and providing a mirror surface on one end thereof. Manufacturers of these products have gone to great lengths to protect the reflecting surface, pitches, lacquers and other protecting coatings being liberally applied and, in many instances, metal shells being applied to protect the adherent coating from mechanical abrasion and maintain it in position.

The object of the present invention is a reflex unit in which the reflecting surface is effectually and permanently protected against atmospheric attack and mechanical abrasion without the use of auxiliary devices.

This object may be attained, within the contemplation of this invention, in a reflex unit having the reflecting surface located wholly within the body of the unit which may be hermetically sealed by convenient means to prevent access of atmospheric agents to the reflecting surface. Such a unit may be hollow and carry the reflecting material on a suitably contoured inner surface, or it may include a separate member sealed within the unit and having one or more reflecting surfaces of proper contour.

These and other features of the invention will be readily apparent from the accompanying drawing in which:

Fig. 1 is an end view of a single ended reflex unit;

Fig. 2 is a longitudinal section on line 2—2 of Fig. 1;

Fig. 3 is a side elevation, partly in section, of a double ended reflex unit of similar design;

Fig. 4 is an elevation of a reflex panel according to the present invention;

Fig. 5 is a partial section taken on line 5—5 of Fig. 4; and

Fig. 6 is a partial transverse section of a modified form of reflex panel according to the present invention.

Referring to the drawing in more detail, the reflex button unit shown in Figs. 1 and 2 may be formed of glass or other translucent material and consists of a generally tubular shell 10 having a lens portion 12 formed integrally in one end thereof. A cup member 14 of the same material is formed to engage the open end of the shell 10 and has a generally concave body portion 16 extending into shell 10. The position of the concave end of body 16 is determined by a shoulder 18 formed on the inside of shell 10, which shoulder the end of body 16 abuts. The lens 12 includes a convex outer face 20 which intercepts impinging light rays over a relatively wide angle of incidence and an inner convex surface 22 of such radius as to focus a substantial portion of the light intercepted by surface 20 onto the concave inner surface 24 of body 16. This surface is provided with a reflecting coating which may preferably be metal film deposited in any well known manner. The light impinging on this surface is reflected back onto the lens 12 from which it is projected back toward the source in the usual manner.

As will be readily observed, the above described construction places the reflecting portion of the reflex unit entirely within the body of the unit where it is mechanically protected by the walls of the unit itself. To assemble the parts into a single, unitary structure, a hermetic seal is effected between the cup 14 and shell 10 along their line of joinder 26. If the unit is formed from glass, the parts may be heated throughout to a relatively high temperature in an atmosphere which will not harm the reflecting film after which the parts may be locally heated to a higher temperature along their line of joinder to seal them together. As an alternative, a lower melting point glass may be placed in the line of joinder either in powdered or wafer form, and the parts heated sufficiently to fuse this material and seal the parts together. In the case of units formed from organic materials, such as the methyl methacrylate resins, organic solvents or cements of a comparable composition may be used. Such cements and other organic sealing material may also be used to unite glass, but such seals are more subject to deterioration and atmospheric attack than the glass and result in a less satisfactory article as a whole.

The structure shown in section in Fig. 3 differs from that of Figs. 1 and 2 in that it combines the functions of two separate units and will accept and reflect back light from each of two oppositely disposed faces. In this structure, two complementary parts each composed of a shell 28 and lens 30 completely enclose a button 32 having oppositely disposed concave surfaces 34 which are silvered or otherwise rendered reflecting. The position of the concave surfaces 34 with respect to the lenses 30 is determined by shoulders 36 formed in the shells 28 which

bear against the rim of button 32 in assembled relation. Shells 28 may be sealed along their abutting edges by the same methods employed with respect to the structure of Figs. 1 and 2.

Figs. 4 and 5 illustrate a somewhat different form of doublet reflex unit. In this form of the invention, the exterior surfaces 40 are flat and the lenses 42 for collecting and focusing incident light on the reflecting surfaces are formed on interior surfaces of the unit. This general form of optical structure is disclosed in the patent to H. P. Gage No. 2,009,769, issued July 30, 1935. In the present structure, the outer shell of the unit is formed from a pair of complemental saucer shaped members consisting of a face plate 40 bearing lenses 42, an upstanding sidewall 46 extending about the periphery of the plate and an outwardly flaring rim 48 coextensive with the wall 46. The reflecting portion of the illustrated construction consists of a pair of disc shaped members 50 bearing lenses 42 and rendered reflective in any suitable manner on adjacent opposed faces 44. These discs terminate in low, complementary flanges 52 extending about their peripheries which, when placed in abutting relation, slightly separate the adjacent surfaces 44. To properly locate the lenses 42 on the respective parts, a lug 54 is molded into the periphery of each disc 50 and a corresponding notch 56 is formed in the wall and rim of the outer member.

In the disclosed structure, discs 50 are silvered or otherwise rendered reflecting on their surfaces 44, assembled with their respective lugs 54 in alignment and fused or otherwise hermetically sealed together about their peripheries. The sealed discs are then positioned between a pair of outer members, lugs 54 engaging notches 56, and the whole is fastened together with a metal clamp 58 engaging the outwardly flaring rims 48. A gasket 60 may advantageously be positioned between the rims 48 to prevent the entrance of dirt and moisture into the unit and to provide a cushioning effect between the rims which will diminish the possibility of breakage from mechanical shock. The clamping strip may be a single metal band which is spun down onto the rims during the assembly operation such as band 62 in Fig. 6 or may be formed from a number of preformed metal parts soldered together after assembly. Such an arrangement is shown at 58 in Fig. 5.

Various modifications of the structure shown in Figs. 4 and 5 are contemplated within the scope of the invention. For example, as shown in Fig. 6 the diameter of discs 50 may be substantially equal to that of outer members 40 so that they extend between the rims 48 and into contact with the clamp 62. Furthermore, when the parts are formed from organic substances, the entire structure may be held together with suitable cements and the clamp 58 either eliminated or replaced with a band of cellulosic or other organic material cemented in position. In each of these modifications, the basic feature of the invention remains unchanged for the reflecting surface is so located as to be completely enclosed by parts of the body of the unit, which parts are hermetically sealed together to eliminate all possibility of deterioration of the reflecting surface from atmospheric attack or from mechanical abrasion. Accordingly, the present invention is not to be confined solely to the forms illustrated herein, but is to be limited solely by the scope of the appended claims.

What is claimed is:

1. An autocollimating unit comprising a pair of complementary pressed glass members adapted to form a hollow body, lenses formed in the oppositely disposed faces of said members, and a separate glass member accurately positioned within said body midway of said faces, said member being formed with a plurality of accurately contoured surfaces, each bearing a reflecting coating adapted to receive and reflect back light rays transmitted thereto through said lenses, said mirror surfaces being so contoured and positioned as to include the points at which light rays entering the unit are brought to a focus.

2. An autocollimating unit comprising a pair of complementary pressed glass members adapted to form a hollow body, lenses formed in the oppositely disposed faces of said members, and a separate glass member accurately positioned within said body midway of said faces and in engagement with circumferentially disposed locating shoulders therein, said member being formed with a plurality of accurately contoured surfaces and bearing a pair of reflecting coatings adapted to receive and reflect back light rays transmitted thereto through said lenses, said reflecting coatings being located at approximately the points where said rays come to a focus, said complemental glass members being joined together along their abutting edges to form a sealed hollow body.

3. An autocollimating unit comprising complemental glass parts joined together to form a hollow glass housing, lens units molded in the walls of said glass parts in oppositely disposed relation and a sealed hollow glass member positioned between said glass parts and accurately located with respect to said lens units and carrying on its inner surface mirror coatings so located as to reflect incident light focused thereon by said lens units.

4. An autocollimating unit comprising complemental glass parts joined together to form a hollow glass housing, lens units molded in the walls of said glass parts in oppositely disposed relation and a sealed hollow glass member enclosed in said housing and accurately located with respect to said lens units and carrying on its inner surface mirror coatings so located as to reflect incident light focused thereon by said lens units.

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