

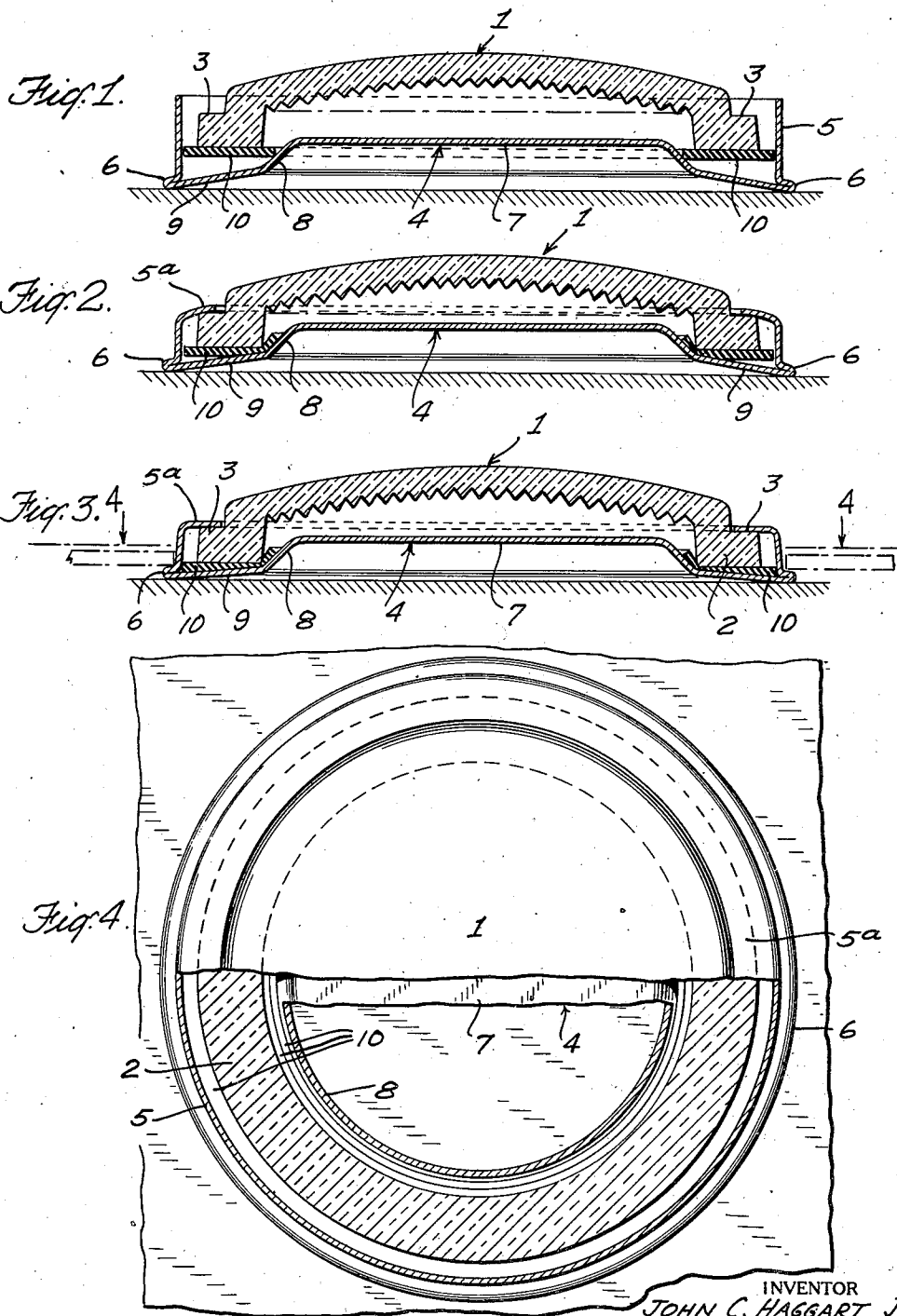
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REFLECTOR UNIT AND METHOD OF MAKING SAID UNIT

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REFLECTOR UNIT AND METHOD OF MAKING
SAID UNITJohn C. Haggart, Jr., Westfield, N. J., assignor to
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7 Claims. (Cl. 88-73)

This invention relates to the art of auto-collimating reflecting units and especially reflectors which comprise a number of individual reflecting elements integrally joined to form a composite reflecting area. Such reflectors are usually in the form of discs of glass or plastic material with the individual reflecting elements so closely associated that the effect is that of a single large reflector. These elements may be of the lens-reflector type or they may be of the central triple type.

For mounting these glass or plastic discs in supporting plates on standards along the highways, for example, where they become luminous by reflection of the light projected by vehicle lamps, it is necessary to enclose them in metallic holders or housings. These are cup-shaped members the outer edge of which is crimped or turned over a peripheral radial shoulder on the front of the reflector, and normally this holder has a peripheral bead on its rear edge to bear against the rear face of a mounting plate through a hole in which the unit is inserted. The standard includes a backing member to hold the unit in place.

The problem in connection with the assembly of the reflector and its holder is to obtain a permanent moisture tight seal and avoid the production of strains which will warp the reflector and impair its efficiency.

As is well known these reflectors are provided with a rearwardly extending flange which sits in the cup-like holder and is peripherally clamped between the bottom of the holder and a turned-over lip or flange. The production of this clamping engagement is apt to create a radial stress which will warp the disc. I have disclosed a way to avoid this in my prior Patent No. 2,255,748 issued September 16, 1941, the principal feature of which is the provision of a clearance between the flange of the cup and the periphery of the disc. In that construction the center of the bottom of the cup is raised and fits into the disc flange, thereby centering the disc with respect to the cup flange, and the gasket receiving annular portion surrounding the raised center is flat. In the assembly the cup flange is crimped over the shouldered front edge of the disc and the final compression is obtained by closing down the surrounding bead.

While this method practically eliminates the formation of warping stresses, it has been found that the permanence of the seal is not entirely reliable. This invention therefore contemplates a modification of that method.

In accordance with the present invention the cup member is so preliminarily shaped that a resilient force is created during the assembly which operates to bias the turned over edge of the cup flange toward the shoulder and reactively to cause the cup to bear especially against the gasket at the inner corner of the reflector flange and thus effect a tight seal.

More particularly the annular gasket receiving part of the holder is formed with a downward and outward inclination so that as it is drawn up into the plane of the rear face of the disc flange it bends about the inner corner of the reflector flange and is held there against its resilient reaction by the engagement of the turned over edge or lip of the flange with the shoulder. The opposing forces are therefore between the corner which constitutes the fulcrum and the shoulder. As a consequence the maximum compression of the gasket is at the corner.

I shall now describe the method with particular reference to the construction and steps illustrated in the accompanying drawing and shall thereafter point out the invention in claims.

Fig. 1 is a cross section of the component elements at the first stage of the assembly.

Fig. 2 is a similar view at an intermediate stage.

Fig. 3 is a similar view at the completion of the operation.

Fig. 4 is a plan partially in section of the completed unit.

The reflector 1 is a disc of plastic or other glass like composition, slightly meniscus in form, and is shown as having tetrahedral formations on its rear face of the construction disclosed in the Stimson Patent No. 1,807,350. For mounting purposes it is provided with a rear flange 2 that has a circumferential extension beyond the boundary of the reflecting surface forming a front shoulder 3.

The holder is a metallic cup member 4 the diameter of which is somewhat greater than that of the reflector. As initially formed it has a surrounding flange 5 that joins the bottom by a projecting bead 6. The center part 7 of the bottom of the holder is raised and is joined by a flaring neck portion 8 to the surrounding annular portion 9. The parts are so proportioned that the raised center with its flaring neck portion fits up into the back of the reflector and centers it, the inner corner of the reflector flange opposing the bottom of the neck. The annular portion 9 is initially formed at a substantial inclination to the general plane of the unit, as shown in Figs. 1 and 2.

In assembling the unit the annular gasket 10 is first laid in the annular space and slightly overlaps the neck portion 8, the outer diameter being such that it just fits within the flange 5, and is thereby centered as shown in Fig. 1. The reflector 1 is then placed centrally into the holder in which position the inner edge of its flange face rests upon the gasket near its inner edge. A forming die (not shown) of proper shape is brought to bear upon the top edge of the flange 5. The axial movement of this die toward the reflector crimps the edge over to form the lip 5a overlying the shoulder 3. This movement in opposition to the backing member for the holder first brings the lip into contact with the shoulder and from that point further movement, as it continues to turn over the flange 5, forces the reflector down, compressing the gasket at the line of contact. This condition is illustrated in Fig. 2. Continued movement of the die substantially flattens the portion 9 against the backing member and completely centers the reflector flange at the base of the neck portion. Meanwhile the lip 5a is caused to follow the shoulder 3 and is flattened until its inner periphery is adjacent the axial wall of the reflector forming the inner terminus of the shoulder. This is the final condition as illustrated in Figs. 3 and 4.

The gasket 10 is probably under more or less equal compression at the terminal movement of the die, but there is bound to be a slight spring back leaving the portion 9 at a slight inclination. This spring back is only that allowed by the lip 5a which is bent past its point of elasticity and is set at substantially the final angle. While the gasket 10 is under substantial compression throughout, the moment about the angle of the flange 2 causes the reaction of the shoulder 3 on the lip 5a to urge the bottom of the holder against the gasket at the line of turning and therefore accentuates the compression on that line. As a consequence the seal has proven to be satisfactory and this method of assembly results in a uniform production.

It will be understood that the component steps of the method may be carried out in a manner other than that precisely described without departing from the scope of the invention as pointed out in the following claims.

I claim:

1. The method of making a reflecting unit, comprising forming a reflector having a rearwardly extending peripheral flange radially shouldered on its front face, forming a cup-shaped metallic holder with a raised center having a flaring neck portion and with the annular portion surrounding the raised center at a substantial inclination to a plane perpendicular to the axis of the holder so as to form the frustum of a cone with the base at the outer periphery, seating the reflector coaxially within the holder with the rear face of the reflector flange opposing the said inclined annular portion of the holder and resting at its inner edge upon the said flaring neck portion, exerting a combined axial and radial force upon the outer edge of the holder flange in opposition to a backing member until the flange is turned over into engagement with the front face of the radially shouldered peripheral flange of the reflector, and then continuing the axial force until the inclined annular portion of the holder is brought into substantial parallelism with the rear face of the reflector flange to put the said annular portion of the holder under tension so that the radially shouldered peripheral flange of the reflector is resiliently held between the annular portion of the holder and the turned over flange thereof.

2. The method of making a reflecting unit comprising forming a reflector having a rearwardly extending peripheral flange radially shouldered on its front face, forming a cup-shaped metallic holder with a raised center having a flaring neck portion and with the annular portion surrounding the raised center at a substantial inclination to a plane perpendicular to the axis of the holder so as to form the frustum of a cone with the base at the outer periphery and with the wall folded back at the juncture of said outer periphery with the flange of the holder to form a peripheral bead, laying an annular gasket in the holder on the said inclined annular portion and partially overlapping the said neck portion, seating the reflector coaxially within the holder upon the gasket with the inner edge of the rear face of the reflector flange upon the said overlapping part of the gasket, exerting a combined axial and radial force upon the outer edge of the holder flange in opposition to a backing member until the holder flange is turned over into engagement with the front face of the radially shouldered peripheral flange of the reflector, and then continuing the axial force upon the turned over holder flange and the reflector flange until the said annular portion is brought into substantial parallelism with the rear face of the reflector flange thereby flexing the holder at the line of bearing of the inner edge of the reflector flange and putting the said annular portion of the holder under tension so that the reflector flange and the gasket are resiliently held under substantial compression between the annular portion of the holder and the turned over flange thereof.

3. The method of making a reflecting unit comprising forming a reflector having a rearwardly extending peripheral flange radially shouldered on its front face, forming a cup-shaped metallic holder with a raised center having a flaring neck portion and with the annular portion surrounding the raised center at a substantial inclination to a plane perpendicular to the axis of the holder so as to form the frustum of a cone with the base at the outer periphery and with the wall folded back at the juncture of said outer periphery with the flange of the holder to form a peripheral bead, laying an annular gasket in the holder on the said inclined annular portion and partially overlapping the said neck portion, seating the reflector coaxially within the holder upon the gasket with its periphery spaced from the holder flange and with the inner edge of the rear face of the reflector flange upon the said overlapping part of the gasket, exerting a combined radial and axial force upon the outer edge of the holder flange in opposition to a backing member until the holder flange is turned over into engagement with the front face of the radially shouldered peripheral flange of the reflector, and then continuing the axial force upon the turned over holder flange and the reflector flange until the said annular portion is brought into substantial parallelism with the rear face of the reflector flange while maintaining the spaced relation between the periphery of the reflector and the holder flange thereby flexing the holder at the line of bearing of the inner edge of the reflector flange and putting the said annular portion of the holder under tension so that the reflector flange and the gasket are resiliently held under substantial compression between the annular portion of the holder and the turned over flange thereof.

ket are resiliently held under substantial compression between the annular portion of the holder and the turned over flange thereof.

4. The method of making a reflector unit comprising forming a reflector having a rearwardly extending peripheral flange radially shouldered on its front face, forming a cup-shaped metallic holder with a raised center and an annular portion surrounding the raised center at a substantial inclination to a plane perpendicular to the axis of the holder so as to form the frustum of a cone with the base at the outer periphery, seating the reflector coaxially within the holder with the inner edge of the reflector flange resting upon the said inclined annular portion, applying an axial force to the reflector and the holder to flex the said annular portion thereof at the line of contact with the inner edge of the reflector flange and put it under tension and bending the outer end of the holder flange over into engagement with the outer face of the reflector flange to maintain the annular portion in its flexed position so that the reflector flange is resiliently held between the annular portion of the holder and the turned over flange thereof.

5. A reflector unit comprising a reflector element having a rearwardly extending peripheral flange radially shouldered on its front face, and a cup-shaped metallic holder, said holder comprising a peripheral flange with its outer end turned inwardly into engagement with said shoulder, a raised center fitting within the rearwardly extending reflector flange, and an annular portion connecting said raised center and the peripheral flange of said holder, said annular portion being flexed about the inner edge of the rearwardly extending reflector flange to put it under tension so that the reflector flange is resiliently held between the annular portion of the holder and the turned in flange thereof.

6. As an article of manufacture a reflector unit

comprising a reflector element provided with a rearwardly extending peripheral flange radially shouldered on its front face, and a metallic cup member the bottom of which has a raised center and a surrounding annulus inherently conical in shape with the base of the cone at its outer edge, the cup member being applied to the reflector element with the peripheral flange seated in the annulus and the flange of the cup member turned down on the shoulder to an extent to flex the annulus about the inner edge of the peripheral flange and bring the annulus substantially in a plane perpendicular to its axis, thereby creating a moment about the inner edge of the peripheral flange and causing the reaction of the turned over flange and the shoulder to urge the annulus into close engagement with said inner edge.

7. As an article of manufacture a reflector unit comprising a reflector element provided with a rearwardly extending peripheral flange radially shouldered on its front face, an annular gasket, and a metallic cup member the bottom of which has a raised center and a surrounding annulus inherently conical in shape with the base of the cone at its outer edge, the cup member being applied to the reflector element with the peripheral flange seated on the gasket in the annulus and the flange of the cup member turned down on the shoulder to an extent to flex the annulus about the inner edge of the peripheral flange and bring the annulus substantially in a plane perpendicular to its axis, thereby creating a moment about the inner edge of the peripheral flange and causing the reaction of the turned over flange and the shoulder to substantially compress the gasket between the annulus and the inner edge of the rearwardly extending peripheral flange.

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