

Nov. 5, 1968

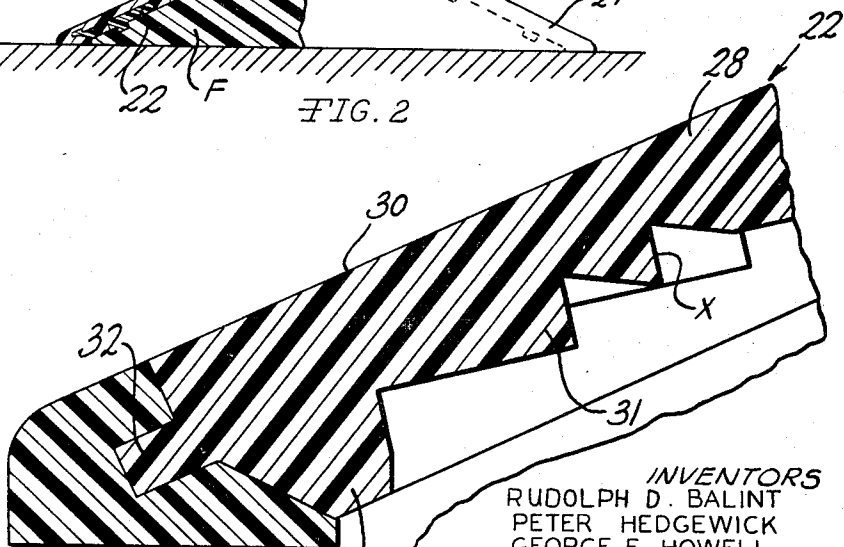
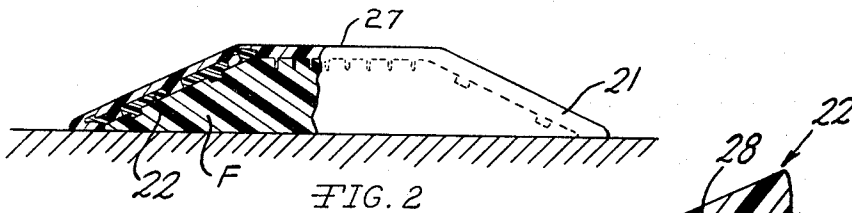
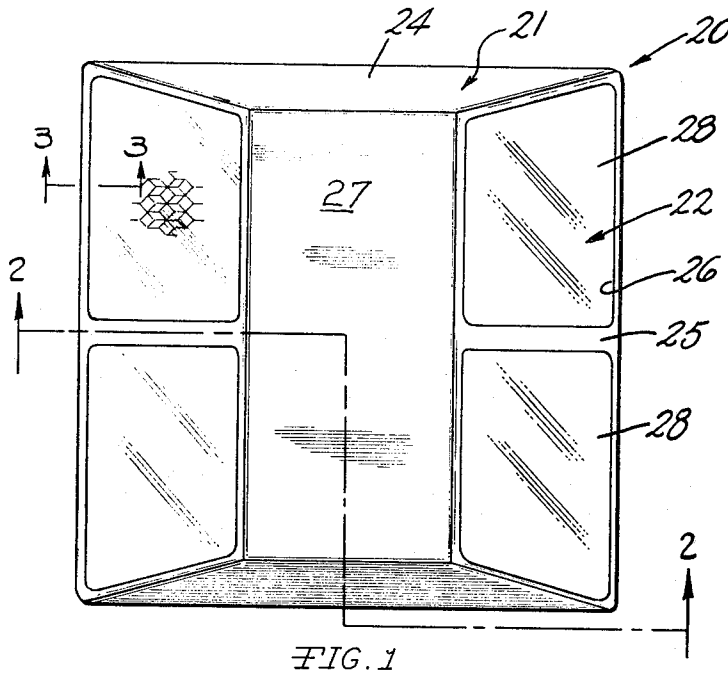
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3,409,344

ROADWAY REFLECTORS

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5 Sheets-Sheet 1



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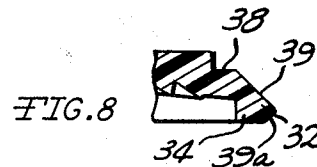
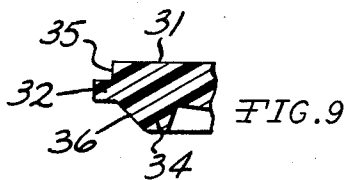
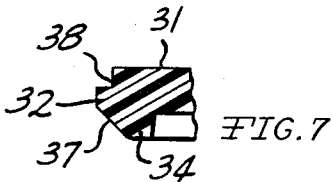
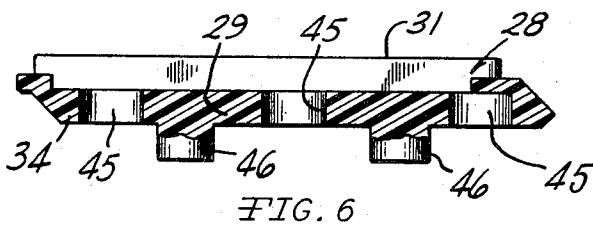
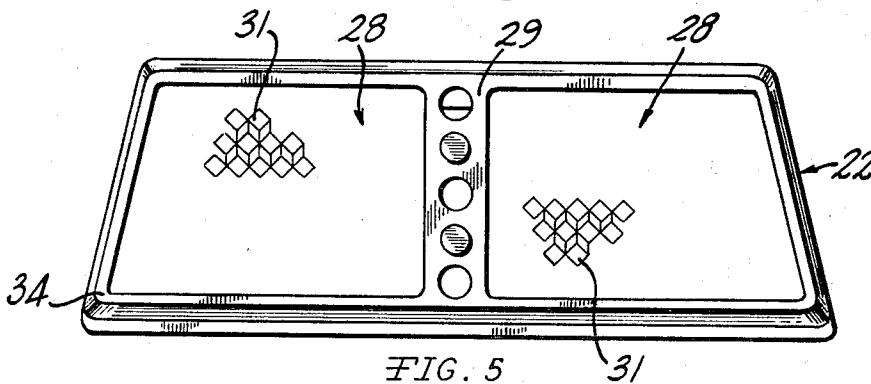
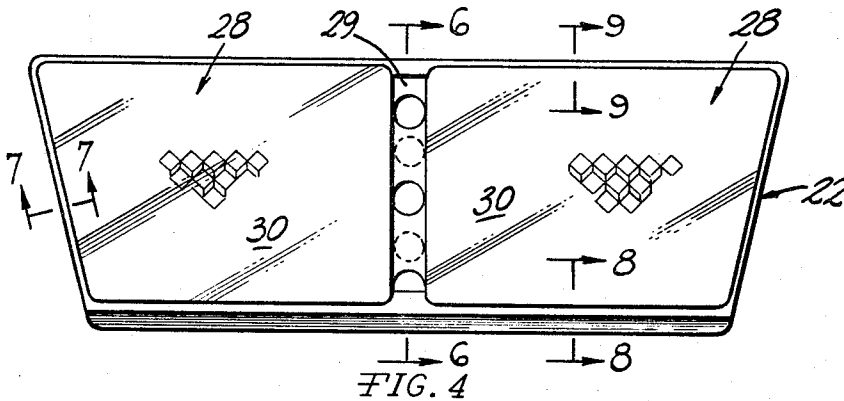
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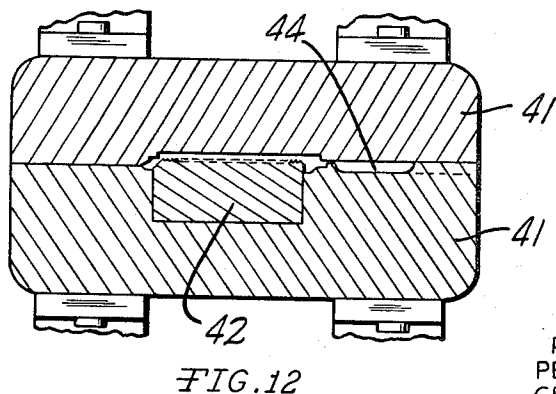
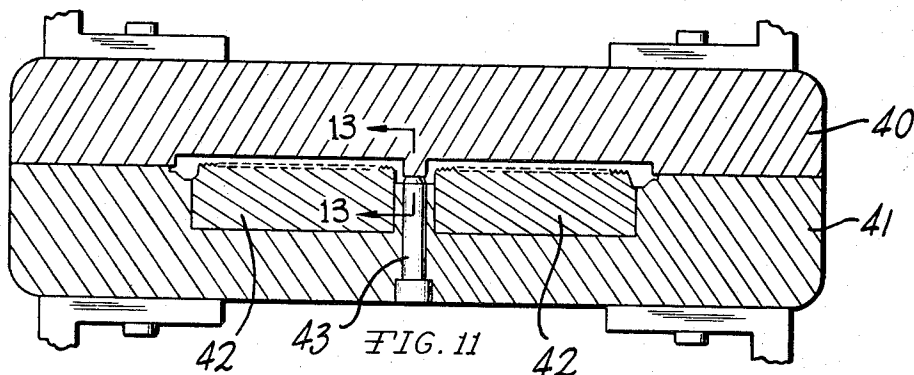
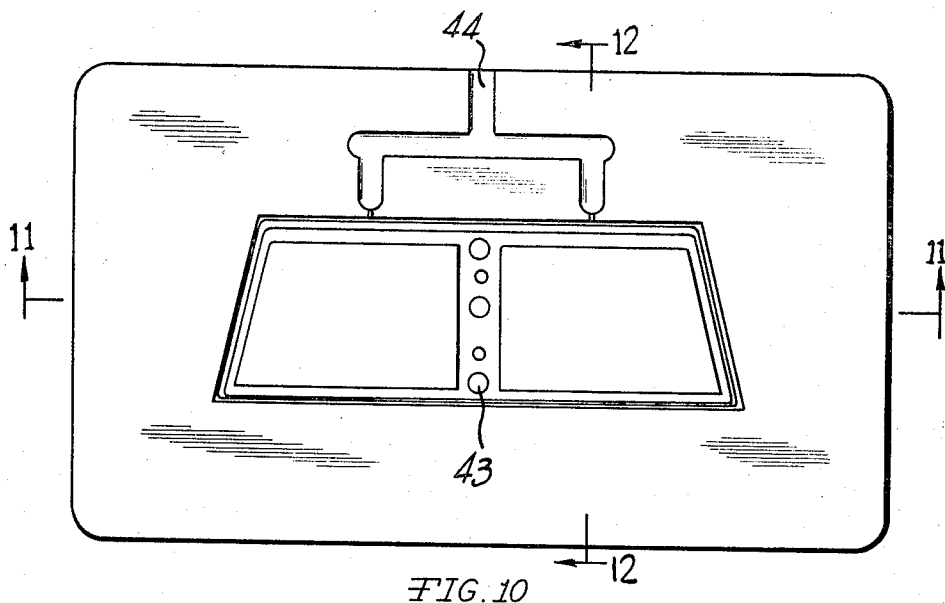
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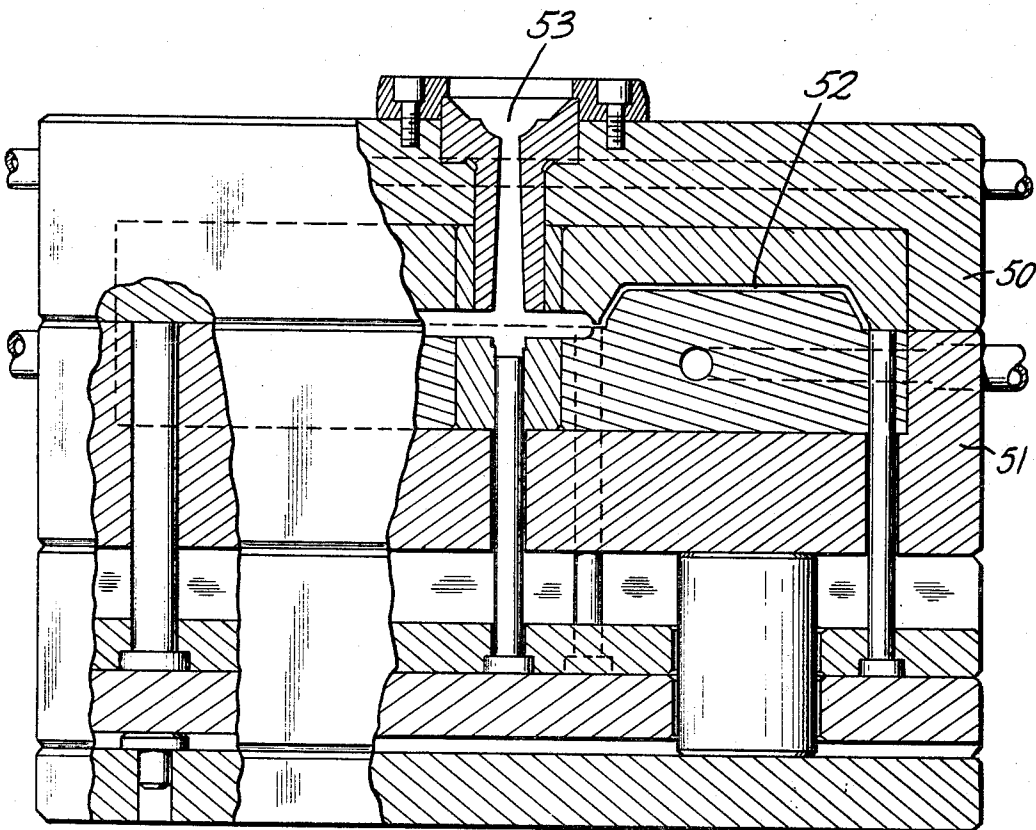
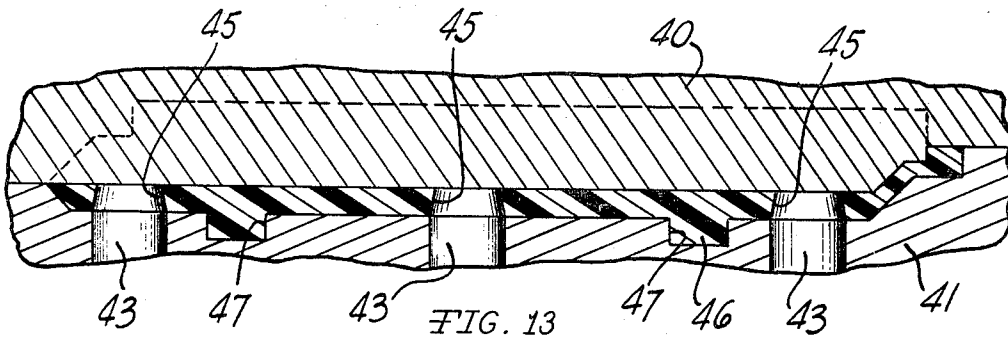
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ROADWAY REFLECTORS

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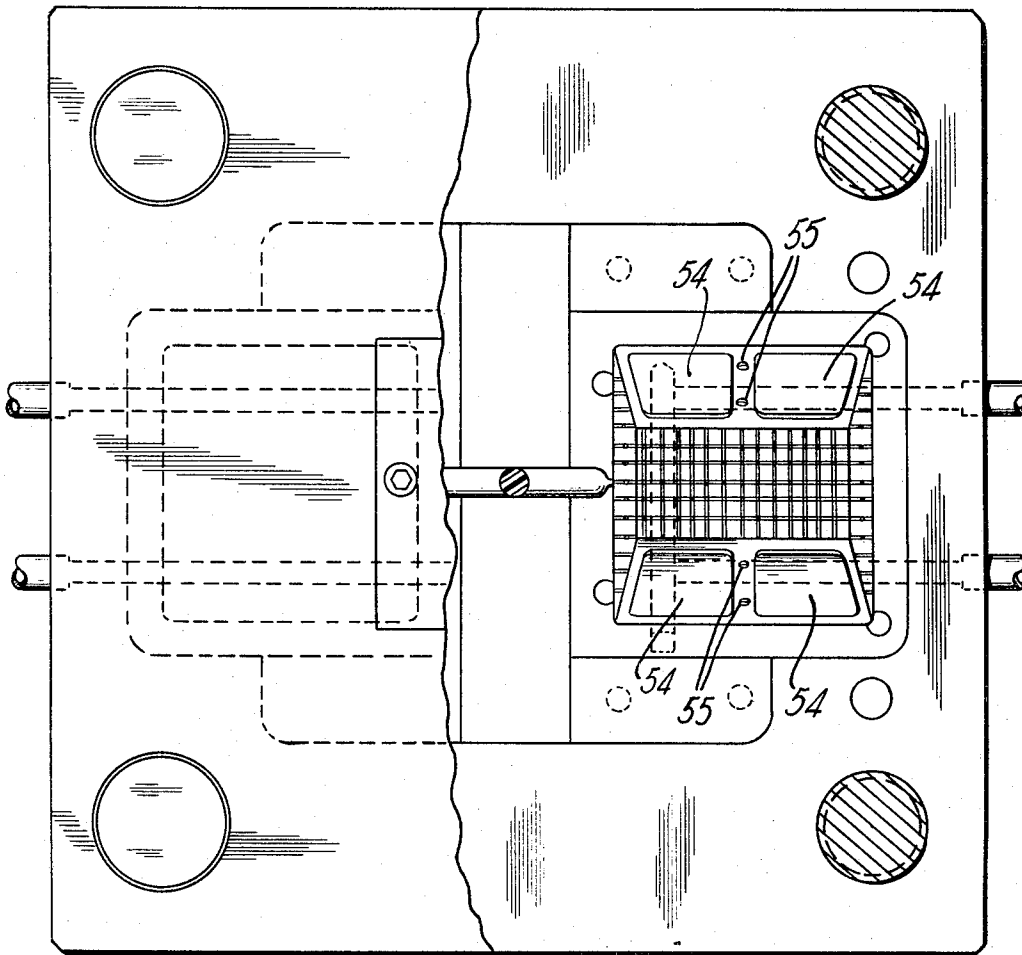


FIG. 15

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3,409,344

ROADWAY REFLECTORS

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11 Claims. (Cl. 350—103)

ABSTRACT OF THE DISCLOSURE

The roadway reflector disclosed herein comprises a hollow housing which has inclined side and end walls and a flat top wall. The housing is molded in situ about the periphery of previously molded reflective inserts so that the inserts are in the end walls. The inserts have substantially flat outer surfaces and a plurality of retro-reflective prisms on the inner surfaces thereof, the axes of the prisms forming an angle with the plane of the insert and in turn with the pavement when the marker is in position such that the light beams from the automotive vehicle is reflected back to the eyes of the driver. The surfaces of the prisms are coated with a metallized layer and the entire housing is filled with a plastic material to provide strength and rigidity to the marker. A method and apparatus for making the roadway reflector is disclosed.

Background of the invention

This invention relates to roadway reflectors and particularly to roadway reflectors that are adapted to be mounted on a roadway to reflect the light from the headlight of an oncoming automotive vehicle and thereby delineate the roadway to the driver of the vehicle.

It has heretofore been suggested that reflective prisms may be utilized as roadway markers to delineate the roadway to the driver of an automotive vehicle. Such prior roadway markers may comprise a previously formed housing in which a reflector is positioned by the use of some fastening means or alternatively a one-piece housing having integrally molded reflective prisms. The former construction has a disadvantage in that it lacks strength and is subject to having the reflector become loosened and displaced in use. The latter construction has the disadvantage in that the desired angle of the reflector cannot be formed in order to provide optimum reflection because of the inability to withdraw the one-piece housing and reflector from the mold.

Among the objects of the invention are to provide a roadway reflector which effectively reflects light back to the eyes of the driver of the vehicle; which is sufficiently strong; which can be provided with an opaque housing of different color; and which is relative low in cost.

Summary

The roadway reflector disclosed herein comprises a hollow housing which has inclined side and end walls and a flat top wall. The housing is molded in situ about the periphery of previously molded reflective inserts so that the inserts are in the end walls. The inserts have substantially flat outer surfaces and a plurality of retro-reflective prisms on the inner surfaces thereof, the axes of the prisms forming an angle with the plane of the insert and in turn with the pavement when the marker is in position such that the light beams from the automotive vehicle is reflected back to the eyes of the driver. The surfaces of the prisms are coated with a metallized layer and the entire housing is filled with a plastic material to provide strength and rigidity to the marker. A method and apparatus for making the roadway reflector is disclosed.

Description of the drawings

FIG. 1 is a plan view of a roadway reflector embodying the invention.

FIG. 2 is a part sectional view taken along the line 2—2 in FIG. 1 showing the reflector in position on a roadway.

FIG. 3 is a fragmentary sectional view on an enlarged scale taken along the line 3—3 in FIG. 1, parts being removed.

FIG. 4 is a top plan view of a reflective insert utilized in the roadway reflector shown in FIG. 1.

FIG. 5 is a bottom plan view of the reflective insert shown in FIG. 4.

FIG. 6 is a sectional view taken along the line 6—6 in FIG. 4.

FIG. 7 is a fragmentary sectional view taken along the line 7—7 in FIG. 4.

FIG. 8 is a fragmentary sectional view taken along the line 8—8 in FIG. 4.

FIG. 9 is a fragmentary sectional view taken along the line 9—9 in FIG. 4.

FIG. 10 is a plan view of a mold utilized in making the reflective insert shown in FIGS. 4 and 5.

FIG. 11 is a sectional view taken along the line 11—11 in FIG. 10.

FIG. 12 is a sectional view taken along the line 12—12 in FIG. 10.

FIG. 13 is a fragmentary sectional view on an enlarged scale taken along the line 13—13 in FIG. 11.

FIG. 14 is a part sectional elevational view of another mold utilized as in making the roadway marker.

FIG. 15 is a part sectional plan view of the mold shown in FIG. 14.

Description

Referring to FIGS. 1—4, the roadway reflector 20 embodying the invention comprises a housing 21 which is molded in situ about reflective inserts 22, as more fully described below. The housing 21 is hollow and comprises side walls 24, end walls 25 in which the inserts 22 are embedded and a flat top wall 27.

As shown in FIGS. 4—9, each reflective insert 22 comprises spaced walls 28 connected by an integral web 29. Each wall 28 includes an outer surface 30 that is substantially flat and an inner surface having a plurality of retro-reflective prisms 31 thereon. The prisms 31 are preferably formed by three right angle surfaces in accordance with well-known retro-reflective prism construction. The angles of the axes prisms with respect to the general plane of the wall 28 and in turn the surface 30 is such that the prisms will reflect the light beam from the rays of the automobile, as presently described.

Each reflective insert 22 includes a peripheral bead 32 that extends along sides thereof and is embedded in the housing. Each reflective insert further comprises a marginal rib 34 that extends axially and isolates the prisms 31 from the periphery of the insert for reasons presently described. At the center of the insert, rib 34 merges with web 29. The rib 34 is adapted to engage a surface of a mold in which the insert is placed. Along the bottom edge the peripheral bead 32 has cross sectional shape such as shown in FIG. 9 wherein the bead is rectangular and is spaced substantially centrally between the surface 31 and the base of the marginal rib 34. A substantially straight axial surface 35 extends to the surface 31 and inclined surface 36 extends to the base of the rib 34. The cross section of the bead 32 along the sides of the insert is shown in FIG. 7 wherein the bead merges with the inclined surface 37 extending to the base of the rib 34 but has a shoulder or step 38 extending to the surface 31. The cross section of the rib 32 along the top of the insert is shown in FIG.

8 wherein the rib has an inclined top surface 39 that merges with the step 38 and a short inclined surface 39a that extends to the base of the rib 34.

A typical apparatus for forming the reflective inserts 22 is shown in FIGS. 10-13 and comprises mold halves 40, 41 that define a mold cavity for forming the insert. The mold cavity includes inserts 42 that have complementary retroreflective prisms formed thereon so that they will shape the plastic which is injected in the mold to form the prisms 31. Further, the mold half 41 includes pins 43 that form openings 45 in the web 29 of the insert. The plastic material subsequently molded around the insert enters the openings 45 to facilitate interlocking the insert and the housing. In addition, projections 46 are molded integrally in the web by depressions 47 in the mold half 41 and extend downwardly for engaging openings in the subsequent mold as presently described to hold the insert in position for molding of the housing around the insert.

The insert is molded by injecting plastic material into the mold through a runner 44 thereby forming the transparent insert shown in FIGS. 4-8.

The surfaces of the prisms 31 on the insert are then coated with a metallic layer as by vacuum deposition.

The resultant inserts are thereafter transferred to the apparatus shown in FIGS. 14-16 where the housing is molded in situ about the inserts.

As shown in FIGS. 14-16, the apparatus comprises mold halves 50, 51 which as shown define two cavities 52 to which plastic is supplied by runners 53. Each lower half 51 has portions shaped to define the inner surface of the housing which is to be molded and each upper half 50 has portions shaped to define the outer surface of the housing. Each lower half 51 also has raised portions 54 that extend upwardly within the insert 22 and cooperate within the marginal rib 34 of the insert to isolate the prisms 31 from the cavity so that when the plastic is injected it will flow around the insert 22 to form the housing but will not enter the space of the prisms 31. The marginal rib 34 engages the surface of the mold around the raised portions 54 and holds the prisms of the insert out of contact with the raised portions 54. To facilitate insertion of the inserts into the mold, openings 55 are provided into which the projections 46 on the insert extend.

When the plastic is injected into the mold, the plastic flows around the inserts and between the walls 28 in overlying relation with the web 29 and into the openings 45 (FIG. 2).

The mold is also formed with a plurality of depressions 56 which produce interlocking ribs 57 which form on the top end walls of the resultant housing (FIG. 2) which facilitate the locking of the resin fill with the housing.

After the housing is formed about the inserts, the resultant unitary structure is removed from the mold and a mass F of plastic material such as epoxy resin is then poured within the housing and cured to strengthen the roadway marker so that when it is placed in position on a roadway as shown in FIG. 2 by adhesive it will withstand the weight of automotive vehicles passing thereover.

The resultant roadway marker has the prisms of the reflector therein forming an angle with the plane of the roadway such that the light beam of the oncoming automotive vehicle will be reflected back to the eyes of the driver. Where the angle of the end walls 25 with the horizontal is 25°, the angle which the axes of the prisms make with a normal to the plane of the walls 25 is preferably 37°30'. Where the angle of the end walls 25 with the horizontal is 20°, the angle which the axes of the prisms make with a normal to the plane of the end walls 25 is 39°08'.

By making the insert in a separate step, it is possible to provide in the marker the desired angle of the prisms without being limited to the draft angle which necessarily

limits the angle that can be produced in the prisms where the housing and reflector are molded in a single operation. More specifically, the retro-reflective prisms that are formed on the resultant roadway marker have surfaces X (FIG. 3) which extend upwardly and outwardly at an angle to the vertical which angles would preclude the manufacture of the roadway marker in a single piece since the angles would prevent removal of the molded part from the mold. Moreover, by the present invention, the inserts may be made of transparent material as is necessary while the housing may be made of opaque material. This produces a roadway marker that can be more readily visible in darkness or in daylight. Furthermore, by making the housing of a different material, the housing may be made of a stronger plastic such as acrylonitrile butadiene styrene while the reflective insert can be made of suitable but less strong plastic material such as acrylic resin, for example, methyl methacrylate.

We claim:

1. A roadway reflector comprising an integral housing of plastic material including a base portion and a wall extending upwardly and inwardly, the width and height of the wall forming one side of said housing, said wall having a plurality of recesses therein forming a web therebetween, an integral reflective insert of transparent plastic material, said insert comprising spaced portions connected by a web underlying the web of the housing, said insert comprising spaced outer flat surfaces and spaced inner surfaces forming retro-reflective prisms, said prisms forming an angle with the general plane of said wall of said housing, said insert being bonded in the recesses to said wall of said housing in such a manner that the prisms extend at an acute angle to the plane of the wall and at an acute angle to the horizontal.
2. The combination set forth in claim 1 wherein the prisms of said insert are coated with a metallized layer, said housing being filled with a mass of plastic material.
3. The combination set forth in claim 2 including anchoring means between said housing and said mass of plastic material.
4. The combination set forth in claim 1 wherein said housing is molded in situ about said reflective insert.
5. The combination set forth in claim 1 wherein said reflective insert includes a peripheral bead bonded to said housing.
6. A roadway reflector comprising a housing of plastic material including a base and a wall extending at an angle to the base and having a recess therein, a reflective insert of transparent plastic material having a flat outer surface and an inner surface formed with retro-reflective prisms, the optical axes of said prisms forming an acute angle with the general inclined plane of said wall of said housing, said insert having an effective surface with a width and height substantially equal to the width and height of said housing and being bonded to the recess in said wall of said housing in such a manner that the optical axes of said prisms extend at an acute angle to the plane of the wall and at an acute angle to the horizontal, each of said prisms having at least one surface thereof forming an angle extending upwardly and outwardly thereof with respect to the outer surface of the reflective insert in such a manner that said surface would interfere with retraction if the housing and insert were molded in a single piece in a mold, the angle which the optical axes of the prisms make with the outer surface of the insert being such that light rays from the light beam of an oncoming ve-

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hicle will be reflected back to the eyes of the driver of a vehicle.

7. The combination set forth in claim 6 wherein the prisms of said insert are coated with a metallized layer, said housing being filled with a mass of plastic material. 5

8. The combination set forth in claim 7 including anchoring means between said housing and said mass of plastic material.

9. The combination set forth in claim 6 wherein said housing is of substantially uniform thickness and molded in situ about said reflective insert. 10

10. The combination set forth in claim 6 wherein said reflective insert has spaced outer surface portions.

11. The combination set forth in claim 6 wherein said housing includes a second wall on an opposite end thereof from said first-mentioned wall, 15

said second wall extending at an angle to the base and having a recess therein,

a second reflective insert of transparent plastic material having a flat outer surface and an inner surface formed with retro-reflective prisms, 20

the optical axes of said prisms on said second insert forming an acute angle with the general inclined plane of said second wall of said housing,

said second insert having an effective surface with a width and height substantially equal to the width and height of said housing and being bonded to the recess in said second wall of said housing in such a manner that the optical axes of said prisms extend at an acute angle to the plane of the second wall and at an acute angle to the horizontal, 30

each of said prisms of said second insert having at least one surface thereof forming an angle extending

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upwardly and outwardly thereof with respect to the outer surface of the reflective insert in such a manner that said surfaces would interfere with retraction if the housing and inserts were molded in a single piece in a mold,

the angle which the optical axes of the prisms of said second insert make with the outer surface of the second insert being such that light rays from the light beam of an oncoming vehicle will be reflected back to the eyes of the driver of a vehicle.

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