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D. SWAROVSKI
SIGNAL DEVICE
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Fig.1

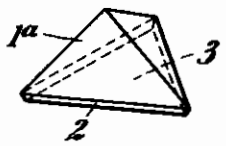


Fig.2

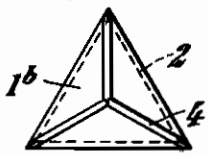


Fig.3

Fig.4

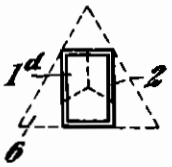


Fig.5

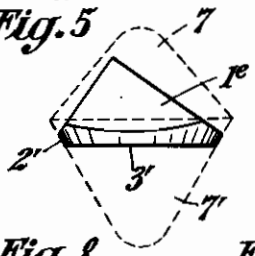


Fig.6

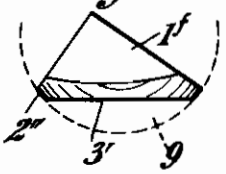


Fig.7

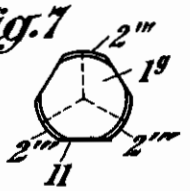


Fig.8

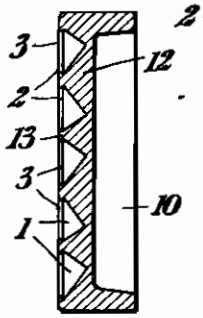


Fig.9

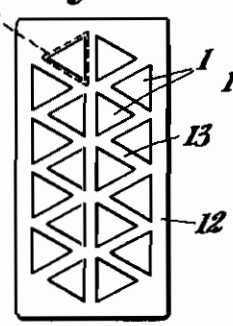


Fig.11

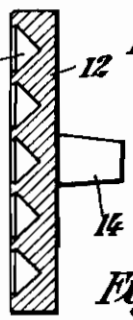


Fig.10

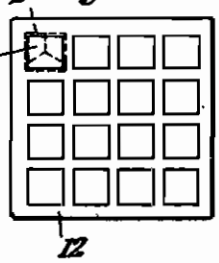


Fig.12

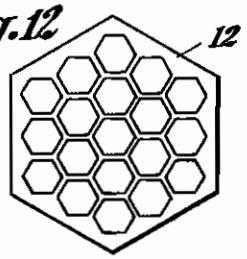
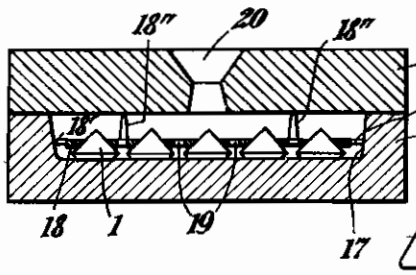


Fig.14



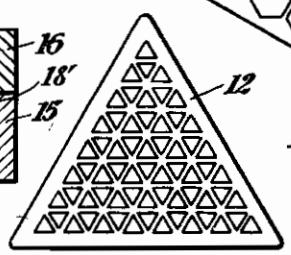


Fig.13

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ALIEN PROPERTY CUSTODIAN

SIGNAL DEVICE

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vested in the Alien Property Custodian

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The present invention relates to signal devices which reflect light impinging upon same in the direction in which it arrives and which particularly are used for traffic signals on highways, deck lights of vehicles, or for advertising purposes.

Known light signals, utilizing for instance the total reflection of triple prisms to reflect the entering light in the direction towards the source of light, are so constructed that the rear side of the glass plate has the prism forms. Proposals to cover the rear side of a plate of glass or another transparent material with individual prisms have practically remain without importance, because the manufacture of such light signals would be very complicated. It has, however, been proposed to surround a reflecting plate consisting of one piece together with a cover plate with a solidifying moldable mass tightly surrounding all sides of them except the surface into which the light enters. The usual metallic holders and casings of light signals also must very tightly close, because the light signals, whether fixed or arranged at vehicles, are as a rule subjected to atmospheric actions. The different coefficients of expansion of glass and metal hereby have an unfavorable effect. Water penetrated behind the surfaces of the triple prisms reduces the reflection effect of triple prism surfaces having no mirror-foil or destroys the silver coating of reflecting surfaces.

The pressed glass bodies formed as a unit of the known light signals have the drawback that the surfaces engaging the holder during manufacture often have unequal distances from each other or are uneven and partially warped so that a great deal of defective work results when mounting the metal holders. For removing this defect as well as for obtaining a better sealing rubber insertions have been provided the life of which, however, is not of long duration and which, moreover, due to their sulphur content have harmful effects on the silver coating. By assembling a plurality of different parts which, of course, are made with various thicknesses rather different total dimensions of thicknesses result which render difficult the exchange of the individual members. Due to the non-uniform mass distribution owing to the notches at the rear side, the glass bodies have interior stresses which cause fractures already at low strains due to exterior forces or temperature differences. Finally these glass bodies may only be used with the surface condition obtained by pressing and the thereby caused light losses due to undesired light diffusion, because the reflecting surfaces cannot be finished by a grinding and polishing operation due partially to the forming and partially to technical and economical reasons.

The invention relates to light signals with individual juxta-positioned reflecting elements and the object of the invention is to remove the above mentioned numerous drawbacks of the known reflectors. The object aimed at is obtained in a particular manner by the fact that in contradistinction to the light signals comprising a glass body forming a single piece, i. e. the always preferred union, a subdivision is effected, as the reflecting elements are individually produced and then combined. In the sense of the invention this may also be effected in a manner suitable for mass production which in all respects offers great advantages.

With the light signals according to the invention the individual reflecting elements except their surfaces into which enters the light are embedded arranged in rows in a common holder consisting of a mass capable of being pressed, press-cast, cast, sprayed or atomized and of tightly connecting the elements.

If the adhesive capacity between the reflecting elements and the mass alone is not sufficient to securely hold the elements in the mass, the elements, preferably consisting of triple-prisms, are provided at the border of their light entrance face with facets overlapped by the embedding mass. According to the invention these facets also may be made without performing a grinding operation by the fact that the elements are ground from double cones, double pyramids or balls the remaining surfaces of which form the facets. If facets are to be avoided the mass may overlap the edge of the light entrance surface.

The method for producing light signals according to the invention which also forms a subject matter of the invention is fundamentally carried out in such a manner that the reflecting elements, consisting for instance of triple prisms, are secured in the desired position preferably in a slight distance from each other, whereupon, by means of a press-, press-casting-, casting, spraying- or atomizing method, the elements are provided from the rear side with the common holder. The embedding is effected in such a manner that the individual elements are completely surrounded by the mass except for the light entrance surfaces which totally or nearly totally remain uncovered.

During the manufacture of the common holder the mass of the latter shrinks upon the reflecting elements and perfectly tightly closes off the lat-

ter. In this connection it is of particular advantage that due to the smallness of the reflecting elements the difference of heat expansion between these elements and the temperature changes, occurring when using the light signals in the open air, even with regard to the elasticity of the enclosing material, cannot effect a harmful or disadvantageous influence so that the elements permanently maintain a fixed and tight seat. All drawbacks mentioned above are omitted which are due to stresses occurring in large membered glass bodies. Specially if the individual elements are in contact with each other along one edge only or are arranged in a slight distance from each other, i. e. are separated from each other by mass bridges, the particular advantage results that stresses due to temperature changes cannot occur in between the entire body. Moreover, the great danger of breakage of light signals comprising a glass body in one piece, is obviated. Experiments have proved that even heavy blows exerted upon a light signal according to the invention may destruct the individual reflecting elements only which are hit by the blows, whereas the adjacent elements remain safe and sound the reflection effect of which is by no means reduced.

The individual elements, forming the light signal, may in the hitherto usual manner be bright pressed. A substantially more complete optical effect is obtained, however, if either all or a part of the surfaces of the reflecting elements are ground and polished. Experiments have proved that this operation may economically be carried out.

In the accompanying drawing the invention is shown by way of example.

In this drawing:

Fig. 1 is a perspective view of a reflecting element,

Fig. 2 shows a view of another form of a reflecting element,

Fig. 3 illustrates a view of a third form of reflecting elements,

Fig. 4 shows a fourth form of reflecting elements,

Fig. 5 is a side elevation of a triple prism ground from a double cone.

Fig. 6 is a side elevation of a triple prism ground from a ball,

Fig. 7 illustrates a further form of a reflecting element,

Fig. 8 is a section through a light signal,

Fig. 9 illustrates a top plan view of the light signal according to Fig. 8,

Fig. 10 is a top plan view of a light signal,

Fig. 11 shows a section through a light signal,

Fig. 12 illustrates a top plan view of a light board in the form of a hexagon,

Fig. 13 shows a light board in the form of a triangle, and

Fig. 14 is a longitudinal section through a device used for carrying out a method to obtain light signals as shown in Figures 8 and 9 by spraying the mass.

Fig. 1 shows a perspective rear view of a triple prism 1a having small facets 2 at the light entrance surface 3. Fig. 2 shows a rear plan view of a triple prism 1b of same construction. The edges 4 of the pyramid of this prism are provided with facets. According to Fig. 3 the corners 5 of the original light entrance surface 3 of triangular shape are cut away so that the remaining light entrance opening of the triple prism 1c forms a hexagon. According to Fig. 4 the corners 6 of the triangle are cut away in such a manner that a light entrance surface in the shape of a rectangle remains of the body 1d. Both figures show the small facets 2 which as a rule are desired for holding the element when being embedded in the mass.

Fig. 5 shows a side elevation of a triple prism 1e ground from a double cone 7, 7' whereby the facet 2' is formed without performing a grinding operation by the remaining conical surface. The triple prism also may be ground from a double pyramid. According to Fig. 6 the triple prism is ground in a similar manner from a ball 9. The facets 2'' are formed by the remaining spherical surface. The light entrance surfaces according to Figures 5 and 6 have circular form. If the surfaces of the triple prisms are ground so deep as to intersect with the light entrance surface 3' so that the conical surface or the spherical surface partially disappears, then the construction shown in Fig. 7 results according to which the light entrance surface of the triple prism 1g nearly forms a hexagon. The edges of the surfaces of the triple prism intersecting the light entrance surface are designated with 11. The facets 2 in this case are present at three points only.

Fig. 8 shows a section through and Fig. 9 an elevation of a light signal 12 which for instance is adapted to be connected to the pedal crank of a bicycle. The light entrance surfaces 3 of the triple prisms 1 are embedded flush with the front surface of the holder 12, whereby the mass 13, present in bridge form between the light entrance surfaces, overlaps the facets 2. The rear side 10 of the holder is hollow for the purpose of saving costs. Fig. 10 shows a light signal provided with elements 1 having rectangular light entrance surfaces. Of course, facets 2 are present at all elements in spite of the fact that for the sake of simplicity they are not shown in Figs. 9 and 10.

With the extremely simple manner of forming the holder and the embedding of the reflecting elements in the same operation preferably care may also be taken for fixing the light signal, for instance by providing a projection 14 at the holder 12 as shown in Fig. 11. Moreover, other connecting means may be embedded into the holder.

Figs. 12 and 13 show further examples of light boards in the form of a hexagon and a triangle respectively.

As may be seen from Fig. 14, the spraying mold consists of a lower portion 15 and an upper portion 16. The lower portion 15 contains a hollow space 17 which corresponds to the outer shape of the total object. In the hollow space 17 the elements 1 are introduced as a group, whereby the individual elements are held in the proper mutual distance from each other by a holding device consisting for instance of the same moldable mass. This holding device consists of a plate 18 having distance pieces 18', 18'' and perforations into which engage the elements. Other perforations 19 of the plate allow passing through of the spraying mass which is introduced by way of an opening 20 provided in the upper portion of the mold.

For the manufacture of the holder masses plastic when heated and capable of being hardened by additional heat which may be obtained on the market first of all come into consideration, i. e. such masses which in a hot state may be worked by a method of pressing, press-casting, or casting and eventually may be hardened by an additional

supply of heat. Moreover, sprayable or atomizable metals may be used for the manufacture of the holders.

It is evident that light signals according to the invention are free of such interior stresses as are unavoidable in connection with the above mentioned known light signals. The small reflecting elements I have very low stresses only which, moreover, have no effect whatever on the light signal itself in spite of the fact that the signal forms a uniform piece. The latter preferably is produced with smooth upper surfaces so that the front side lying free after mounting may easily be cleaned by wiping. The reflecting elements may, however, be embedded somewhat deeper in the holder. The dimensions of the light signals produced in large masses are exactly equal, because they are made in exactly limited hollow molds. The tight and exact closure of the reflecting prism surfaces also is of particular importance and it is possible to arrange elements of different form, construction or diffusing in the light signal, for instance for the purpose of influencing the light distribution in between a given diffusion angle. Elements of different colours also may be embedded to obtain corresponding colour effects. With regard to the known light signals the advantage is obtained that the quantity of glass used is considerably reduced and stamped metal holders, casings, rubber insertion and the like are completely rendered superfluous. The light signals according to the invention are far superior to the known signals by the fact, that the prism surfaces may be ground. The superiority exists with regard to the reflection effect as well as with regard to the possibility of obtaining any desired diffusion of the reflected light by changing the angle of the pyramid as well as by hollow or bombed grinding of the prism surfaces.

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