Dec. 5, 1939. R. L. TIGER 2,181,926

REFLECTOR ELEMENT

Filed Aug. 1, 1938



Fig. 1

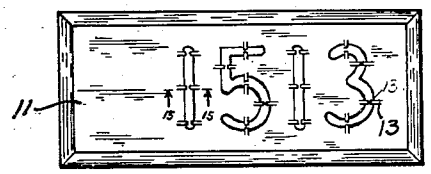


Fig. 2

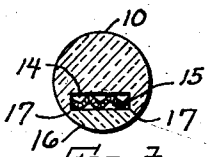


Fig. 3

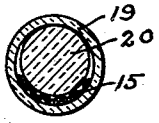


Fig. 4

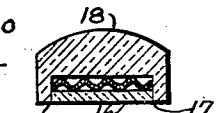


Fig. 5

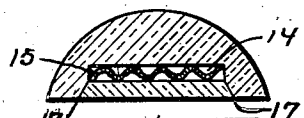


Fig. 6

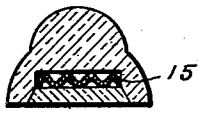


Fig. 7

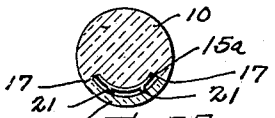


Fig. 12

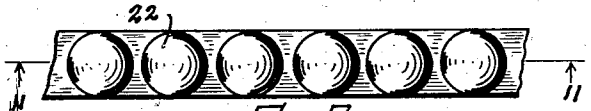


Fig. 8

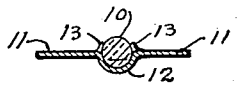


Fig. 13

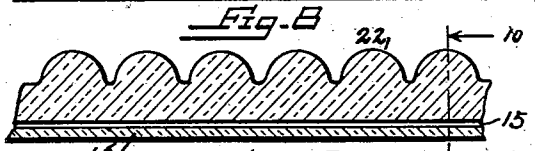


Fig. 10

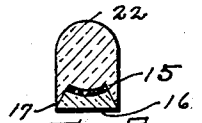


Fig. 9



Fig. 11

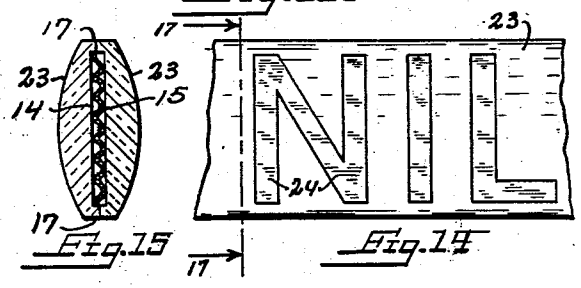


Fig. 15

Fig. 14

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UNITED STATES PATENT OFFICE

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REFLECTOR ELEMENT

Roy L. Tiger, Boulder, Colo.

Application August 1, 1938, Serial No. 222,355

7 Claims. (Cl. 40—141)

This invention relates to signs of the type in which light rays from an outside source pass through a lens onto a reflecting surface from which they are reflected back through the lens, and relates more particularly to the sign unit and its construction.

Signs of the general type to which this invention relates are most frequently formed from small reflecting lens units arranged so as to form letters, numbers or ornamental designs, each letter, number or design employing a large number of units. Such signs, when viewed from a distance, have the appearance of being continuous but when viewed from a near position they show a disconnected line and are therefore not suitable for use in windows or along streets and sidewalks.

It is the object of this invention to produce a sign unit of the reflector type that shall be continuous for an entire letter, figure or design in such a way that the completed sign will have the appearance of a "Neon" sign. Such signs are eminently suitable for use in store windows, and inside of buildings, but are equally well suited for use as road signs and for illuminated license plates, etc.

The object of this invention is to produce an elongated sign element in the form of a rod, of varying cross section, having a reflector embedded in the material and hermetically sealed therein. The element has a lens-like formation opposite the reflector so that when subjected to rays of light from an outside source, it will reflect the light as a continuous line and not as separate units.

Such elements may be heated and bent into the form of letters, numbers or designs, and when illuminated from an outside source of light will appear as continuous lines of light.

Another object is to produce an elongated reflector unit in which the reflector element is embedded in the material itself and hermetically sealed therein so as to remove all danger of the reflector element coming in contact with air and/or moisture which will cause it to tarnish.

Another object is to produce a sign unit in which each separate letter, figure and/or design is continuous, either formed by bending an elongated reflector element into the desired shape or by moulding it from glass, into the shape desired and embedding a reflector element therein, all as will be herein more fully explained.

In the following description and the claims, the word "sign" is used in its generic sense and covers all shapes and forms and signs for any purpose. Wherever a light for illuminating the sign is mentioned, it is to be construed in its generic sense and includes any source of visible light rays however produced.

Having thus described the objects of the invention, the preferred embodiment thereof will now be described in detail, and for this purpose reference will be had to the accompanying drawing in which the invention has been illustrated and in which

Figure 1 is a view showing a sign formed from a continuous sign element bent into the desired shape;

Figure 2 is a view showing an automobile license plate provided with reflecting numbers constructed in accordance with this invention;

Figure 3 is a cross section showing one embodiment of the invention;

Figure 4 is a cross section showing another modification thereof;

Figure 5 is a cross section showing a modified form of the invention;

Figure 6 is a cross section showing another modification;

Figure 7 is a cross section showing a different specific embodiment of the invention;

Figure 8 is a top plan view of another embodiment of the invention;

Figure 9 is a cross section taken on line 9—9 Fig. 10;

Figure 10 is a longitudinal section taken on line 10—10 Fig. 8;

Figure 11 is a top plan view corresponding to that shown in Fig. 9, but showing a specifically different design;

Figure 12 is a cross section showing a modification of the form illustrated in Fig. 3;

Figure 13 is a section taken on line 13—13 Fig. 2;

Figure 14 is a side view of another specifically different form of the invention;

Figure 15 is a transverse section taken on line 15—15 Fig. 14.

In the drawing, reference numeral 10 designates an elongated continuous reflecting element whose construction will be hereinafter fully described. In Fig. 1, the reflecting element has been shown as bent into a form representing five letters forming a name, and this is merely intended to show how such an element can be employed in the construction of signs comprising letters, figures or other designs.

In Fig. 2, an elevation has been shown of a license plate in which the figures representing the license number are formed by reflector elements of the kind forming the subject of this invention. The license plate has been designated by reference numeral 11 and the letters are first formed in the plate by pressing the material downwardly, as indicated by reference numeral 12 in Fig. 13. The reflector elements 10 are positioned in these depressed areas and held in place by fingers 13 that are cut from the material of the plate.

The sign element has been illustrated in vari-

ous specific forms, all of which are generically the same, and reference will now be had to Fig. 3 in which the element is shown as comprising a cylindrical rod 10 that is formed with a longitudinally extending recess 14. The rear of the recess is left open during the manufacture and serves as a compartment for a reflector element 15. In Fig. 3, this reflector element has been illustrated as being longitudinally corrugated. The reflector element may be made from any suitable material having the surface that faces the center of the cylinder polished so as to serve as a reflector. The corrugations provide light dispersing properties so that regardless of the direction in which the light rays strike the cylinder, some of them will be reflected backwardly along substantially the same path. After the reflector element has been put in position, a cover 16 is applied and the two parts are then passed between suitable gas flames that fuse the edges along the lines indicated by reference numeral 17. After the cover has been fused to the main body of the sign element, the compartment containing the reflector is hermetically sealed so that neither air nor moisture can enter the same. This assures that the polished reflecting surface will not tarnish or be adversely affected by moisture or deleterious gases.

It will be noted that the depth of recess 14 is such that the reflector 15 is held firmly and that space is provided to permit the reflector element 15 to alter its shape sufficiently to adjust itself to its greater expansion than the glass when the element is heated. This is an important structural feature because, if a flat metal reflector element is embedded in a glass letter the unequal expansion of the two parts will ultimately cause the glass to crack. In the drawing the corrugations have been shown as running in the direction of the length of the letters, but they may run transversely or diagonally.

The embodiments illustrated in Figs. 5, 6 and 7 are substantially identical with that shown in Fig. 3, with the exception that the transverse section of the element is somewhat different. In Fig. 5 the convex surface, which has been designated by reference numeral 18, is formed on a large radius and the cross section, instead of being circular, has its sides perpendicular to the base and joined by an arcuate surface. The reflector element is formed in the same manner as that shown in Fig. 3. The embodiment illustrated in Fig. 6 differs merely in a slight degree from that shown in Fig. 5, the difference consisting in this, that the straight sides have been eliminated and the cylindrical surface prolonged until it intersects the base.

In Fig. 7, the curvature of the surfaces are somewhat different from those shown in the other figures, and is merely intended to illustrate how the shape can be varied without departing from the invention. In all of the embodiments mentioned, there is a recess extending longitudinally of the member and this recess is closed by cover 16 fused to the body of the element along line 17. In the figures so far mentioned, the reflector 15 has been designated as formed from a longitudinally corrugated strip of metal, but this is merely illustrative and it is the intention to employ any suitable reflecting material in lieu of the specific reflectors shown. It is also contemplated to substitute for a separate metallic reflector a reflector formed by spraying molten metal onto the bottom of the recess so as to metalize this surface and form a reflector of some very refractory metal that will resist high temperatures.

In Fig. 4, a construction has been shown that differs quite materially from that illustrated in Fig. 3, but which still retains the common features of having the reflector element positioned between the center and the outer surface of the sign element. In Fig. 4, the outside comprises a glass tube 19 within which is positioned a glass rod 20. The rod is of somewhat smaller diameter than the opening in the two, and a reflector 15 is positioned between the two adjacent surfaces. Instead of a sheet metal reflector of the type indicated, the surface of the rod may be silvered or sprayed with a molten lead spray, and since this does not require as much space as the reflector illustrated, the diameter of the rod 20 can more nearly approach that of the inside of the tube.

In Fig. 12, the reflector element has been designated by 15a and is transversely concave and may be formed from a smooth piece of metal having its inner surface polished so as to be highly reflective. Tongues 21 are cut from the reflector at spaced intervals and serve to engage the inner surface of the cover 10a, which is fused along lines 17 in the manner already described in connection with Fig. 3. A reflector like that shown in Fig. 12, does not have to be longitudinally corrugated because, due to its concave reflecting surface, there will always be a reflecting surface that is perpendicular to the incident ray, and therefore there will always be some rays reflected in the direction from which the light beam comes.

In connection with Fig. 12 attention is directed to the tongues 21 which hold the reflector element against the inner surface and makes it possible to use a reflector element that is much thinner than the depth of the recess so that danger of breakage, due to unequal expansion, is avoided as explained in connection with Fig. 3.

When the embodiments illustrated in Figs. 3 to 7 and in Fig. 12 are employed, the face of the sign element will present a somewhat cylindrical surface. In Figs. 8, 9 and 10, another form of a sign element has been illustrated in which the face of the element is provided with a plurality of semi-spherical projections 22, which form lenses that serve to concentrate the light on the reflector element 15 and to magnify the reflecting surface. In Fig. 11, a slightly different form has been shown in which the semi-spherical projections have been replaced by pyramidal projections. It is apparent that any form of jeweled surfaces can be used so as to make variations in the appearance of the completed sign.

In Figs. 14 and 15, a further embodiment has been shown. In this embodiment the sign element has been illustrated as comprising two transparent glass rods 23, of substantially the same shape as that shown in Fig. 5. These rods are placed back to back and a reflector element 15 is positioned within the recess 14. In this case the reflector element has both surfaces highly polished so that light will be reflected equally from either surface. The two elements are fused together along line 17 so as to hermetically seal the compartment 14. Letters or numbers can be formed from gold foil, silver foil or paper or can be painted on the surfaces of the members 23 in the manner indicated by reference numeral 24 in Fig. 14. During the day time when

there is good illumination, the letters or figures will be clearly visible on the surface of the sign and will stand out very clearly due to the fact that light is reflected between the opaque portions of the letters. At night time, the portions between the letters will glow from the reflected light, and the letters or numbers will show as dark lines or areas. Signs constructed in the manner shown in Figs. 14 and 15 are especially well adapted for use within buildings and in display windows.

Attention is again directed to the fact that in the sign element that forms the subject of this invention, the reflector element is enclosed in the material of the sign element and hermetically sealed therein so as to preserve it and protect it from deterioration due to moisture and gases. Attention is also called to the fact that these sign elements are elongated and can be bent into any shape in the same manner as now common in connection with tubular vapor lamps of the type known as "Neon lamps." It is contemplated that letters or figures can be molded from glass or other suitable transparent material and the reflector positioned in the recesses in the rear of such letters and then enclosed by means of the covers 16 which are fused to the material of the letter or figure.

In the above description and in the claims the material employed has been designated as "glass." This material has been selected as an example because it is so well known and is also well adapted for the purpose described. It is to be understood that any other suitable material having glass-like properties may be substituted. There are several synthetic products now made and sold that can be used for the purpose indicated and it is the intention to employ the material that is the most suitable, whether it is glass or any other material.

Having described the invention what is claimed as new is:

1. A sign character comprising an elongated body of transparent material having a convex lens at its front and an opening extending longitudinally thereof, the opening being of transversely elongated cross section, and a reflector element positioned in the opening, the reflector element being readily bendable and of less thickness than the width of the transverse section, and having portions thereof engaging the front wall surface of the opening and other portions engaging the rear wall surface thereof whereby the reflector element is held in a predetermined position and free to expand and contract relative to the body member without breaking the latter.

2. A sign character comprising an elongated body of transparent material having a convex lens at its front and an opening extending longitudinally thereof near its rear, the opening having a transversely elongated cross section, the front and the rear wall surfaces of the opening being substantially parallel, a reflector formed from a strip of thin, readily bendable material having its forwardly facing surface formed with reflector properties, the reflector being corrugated, the depth of the corrugations being such that their crests contact with the front and rear wall surfaces of the opening, whereby the material of the reflector may expand at a greater rate than that of the character without setting up breaking strains.

3. A sign character comprising an elongated body of transparent material having a convex lens at its front and an opening extending longitudinally thereof near its rear, the opening having a transversely elongated cross section, the front and the rear wall surfaces of the opening being substantially parallel, a reflector formed from a strip of thin material having one surface formed with reflector properties, the reflector being longitudinally corrugated, the depth of the corrugations being such that their crests contact with the front and rear wall surfaces of the opening, the reflecting surface facing forwardly.

4. A sign element comprising an elongated body of transparent material having its front and its back portions outwardly rounded in a transverse direction so as to form elongated lenses having magnifying properties, the body having an opening extending longitudinally thereof, the opening having a narrow elongated cross section, the sides of the opening being substantially parallel, and a long, narrow reflector element positioned in the opening, the reflector element having both sides formed with reflecting properties and being corrugated, the depths of the corrugations being such that their crests engage the sides of the opening.

5. A sign element comprising an elongated body of transparent material having its front and its back portions outwardly rounded in a transverse direction so as to form elongated lenses having magnifying properties, the body having an opening extending longitudinally thereof, the opening having a narrow elongated cross section, the sides of the opening being substantially parallel, and a long, narrow reflector element positioned in the opening, the reflector element having both sides formed with reflecting properties and longitudinally corrugated, the depths of the corrugations being such that their crests engage the sides of the opening.

6. A sign element comprising an elongated body of transparent material having one side of its cross section transversely convex to form an elongated lens having magnifying properties, the body having an opening extending its entire length, the opening having a narrow transversely elongated cross section whose front and rear surfaces are substantially parallel and a reflector element of thin sheet material positioned in the opening, the surface facing the lens having reflecting properties and being corrugated, the corrugations being of such depth that both sides of the reflector are simultaneously in contact with the sides of the opening, the material of the reflector having a greater coefficient of linear expansion than the lens and being readily bendable, whereby breakage of the lens will be prevented.

7. A sign character comprising a body of transparent material having a convex lens at its front and an opening near its rear, the opening being entirely within the material of the body and thin in comparison to its width, and a reflector element positioned in the opening, the reflector element being readily bendable and of less thickness than the distance between the front and rear walls of the opening and having portions thereof engaging the front wall of the opening, and other portions engaging the rear wall thereof whereby the reflector element is held in predetermined position and free to expand and contract relative to the body member without breaking the latter.

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