

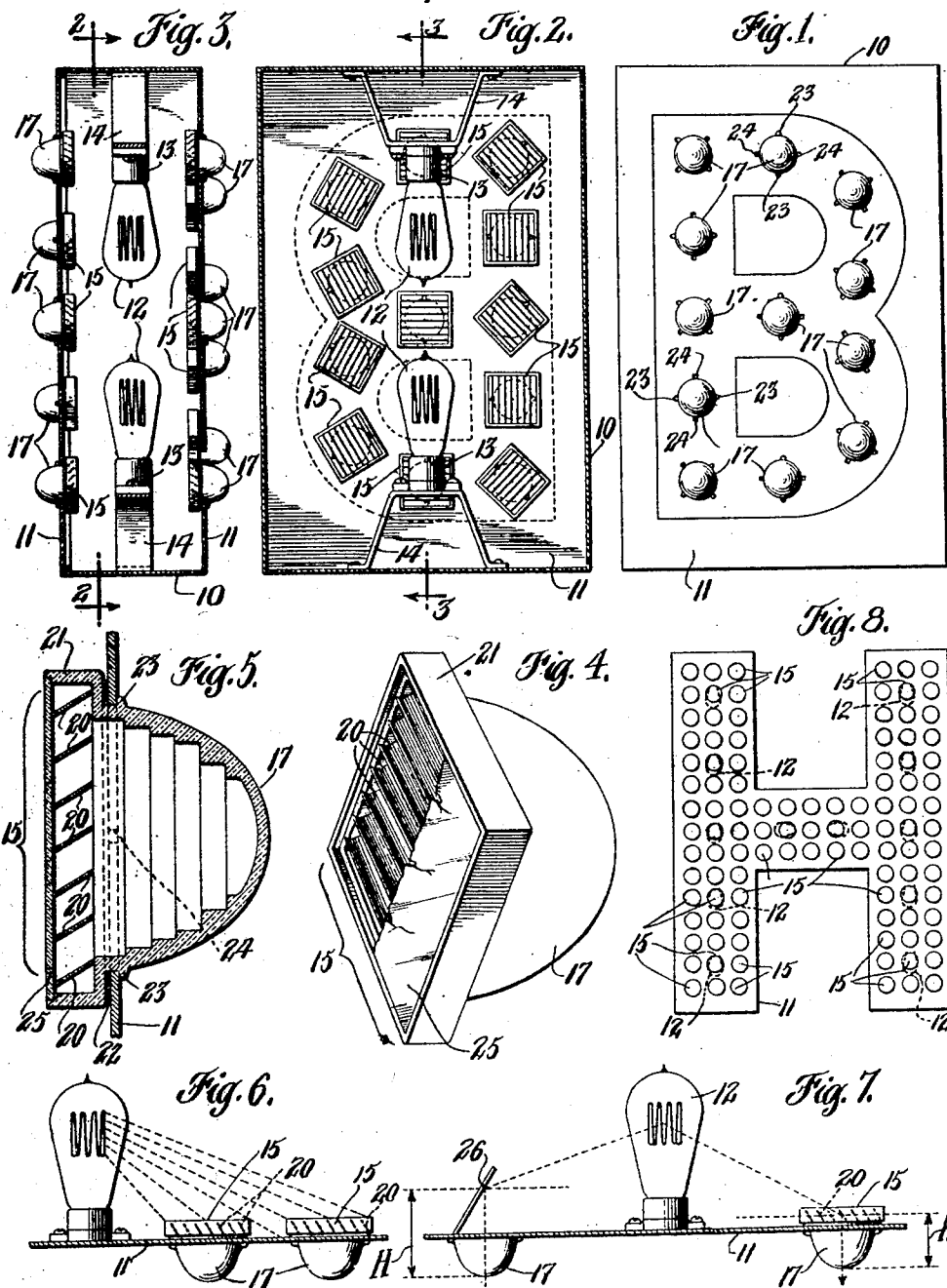
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K. LIMPERT

ELECTRIC SIGN

Filed Dec. 1, 1921



WITNESS.

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ELECTRIC SIGN.

Application filed December 1, 1921. Serial No. 519,044.

To all whom it may concern:

Be it known that I, KATHERINE LIMPert, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Electric Signs, of which the following is a specification.

My invention relates to electric signs and other such illuminated displays. I aim to make the sign most effective in illumination; flexible in design and adaptability to meet varying requirements and conditions of use; easy and inexpensive to manufacture, install and adjust; and in service convenient and economical as regards both operation and maintenance. Still other advantages obtainable through the invention will appear from my description hereinafter of the best embodiments of the invention known to me.

In its broader aspects, my invention is applicable to various different types of signs,—as, for example, the two general types represented by United States Patents Nos. 1,346,499 and 1,348,816, granted to A. S. Limpert July 13, 1920 and August 3, 1920, respectively. The apparatus hereinafter described is of the type represented by Patent No. 1,346,499. An apparatus (corresponding, in some respects to Patent No. 1,348,816) wherein the broad underlying principles of my present invention are applied quite differently is disclosed in my companion application Serial No. 519,045, filed Dec. 1, 1921, concurrently therewith. In both cases, my invention affords important advantages (such as indicated above) over the corresponding prior Limpert devices.

In the drawings, Fig. 1 is a front view or elevation of an illuminated sign apparatus conveniently embodying my invention.

Fig. 2 is a similar view with the front of the sign (as seen in Fig. 1) broken away and removed along the section line 2—2 in Fig. 3.

Fig. 3 shows a vertical cross section, taken as indicated by the line 3—3 in Fig. 2.

Fig. 4 is a perspective or tilted view of one of the reflective illuminating devices or units shown in Figs. 1 to 3, with one part partially broken away.

Fig. 5 shows a mid section through such a unit.

Figs. 6 and 7 are diagrammatic side views

of a light source with several reflective devices or units, illustrating the operation and advantages of my invention.

Fig. 8 is a front view illustrating the application of my invention to a sign of the so-called "roof" type.

The sign shown in the drawings (Figs. 1 to 3) comprises a thin, shallow box 10, with panel or panels 11, 11 carrying the desired design,—in the present instance, the letter "B",—in colors visible by day. The incandescent electric lamp or lamps 12, 12 here shown as source of light for the sign at night or mounted within the box 10, in sockets 13 carried by brackets 14 attached to the top and bottom ends of the box. At night, therefore, the sign design is luminously set out or outlined by the light from the lamps 12, 12 directed by reflective devices or units 15 through openings in the walls or panels 11, 11 and (in the present instance) through supplemental directing or diffusing means 17 (in the form of rounded lens-globes) provided for each unit. The interior of the box 10 may advantageously be painted white or otherwise rendered reflective, in order that a maximum proportion of the total light from the lamps 12, 12 may ultimately find its way out through the devices 15 and be utilized.

Referring to Figs. 4, 5, 6 and 7, it will be seen that the individual reflective device ultimate luminary 15 comprises a series or group of reflector elements or strips 20 arranged to reflect the obliquely incident light coming directly from the corresponding lamp 12 approximately perpendicular or normal to the group. In the present instance, these reflector elements are strips of slat-like form, and are arranged shutter-wise in a common general plane behind but approximately that of the panel or half-sign as a whole, at one side of the light source 12. The elements 20 make with the series as a whole (as represented by their common general plane) such common angle that the light of the source 12 directly incident upon them from behind is reflected and thrown forward by and between them. Ordinarily, variation in the distance of the reflective luminary unit 15 from the lamp 12 (either in the same or in different signs) will not be so great as to require an adjustable shutter-like mounting of the elements 20, or even the provision of a line of units with

the elements 20 set at various different fixed angles. On the contrary, one standard unit, with a group or set of reflector elements 20 fixed at one "universal" angle, will be found satisfactory under considerable variations in distance of units from the light source. With reflector elements 20 of relatively narrow width in proportion to their spacing, as shown, there will be no material shading of one element by another, so that in effect, under conditions of service, the unit 15 will be or appear generally and even quite uniformly luminous.

While the elements 20 of each ultimate unit 15 might be stamped out of sheet metal in one piece, or united in one single piece of glass (in which case, especially, they might even be replaced with refracting prisms), I have here shown them as wholly separate thin, flat, narrow slats, with their ends mounted in grooves in the sides of a shallow frame or base 21 with which the lens 17 is associated. This consolidated lens and frame structure 17, 21 may be moulded in one piece out of suitably transparent or translucent glass. The lens 17 of each luminary or illuminating unit 15 is preferably so designed as to diffuse the light over a large area, so that the lens may appear bright from almost any angle of vision. A lens 17 constructed more or less like the Fresnel bull's-eye (with slightly less space between the refracting zones), as shown, is very suitable; however, quite a variety of lenses will work satisfactorily. As shown (Fig. 5), the frame 21 abuts against the inside of the panel 11 with a rubber or other suitable gasket 22 interposed and slightly compressed between them, and the lens 17 projects through a round hole in the panel. The unit is held in place by engagement of projecting lugs 23 on the lens with the outside of the panel. In assembling, the unit may be inserted in its panel hole from inside the box 10 with the lugs 23 in registry with corresponding notches 24, and then turned to displace the lugs from the notches through which they have passed. The elastic compression of the gasket 22 tends to prevent accidental turning and unlocking of the unit; and the whole unit 15 being evenly balanced, vibration does not practically tend to turn it against the friction of the gasket 22.

The elements 20 may be either specular or non-specular reflectors. They may be of metal, glass or other material suitably formed or treated to render it properly reflective. They may be coated with silver leaf, silver deposit, ordinary mirroring, aluminum leaf or foil, or other reflecting material; and in the case of glass, such material may be applied to either front or back. A dull metallic brightness of the reflector elements 20 (like satin-finished silver) will often suffice

to give brilliant illumination; such brightness may be produced by coating a slightly roughened surface with reflective material, or by stipple-etching glass with hydrofluoric acid and applying mirroring or metallic leaf. Aluminum paint on metal or glass has also given good results.

It will be seen that in front the reflector elements 20 are covered and protected from access of dust, dirt or other deteriorating agencies by the lenses or globes 17. As shown, similar protection at the rear is afforded by a light-permeable, transparent glass cover 25 consisting of a flat pane cemented, sealed or otherwise secured in place in a rabbet at the rear of the frame or base 21. Also, this protective cover 25 holds the elements 20 securely in place. Not only does this cover 25 keep the elements 20 and the rear of the lens 17 free from dirt, but it is itself much more easily kept clean than they,—both because it presents but a single flat, smooth surface, and because its vertical position minimizes adhesion and accumulation of dust on it.

Since the shallow illuminating or reflector units 15 do not project far into the sign box 10, the interior of the box is clear and open. This not only affords maximum unshaded access of available light to every unit 15 and facilitates and expedites replacement of lamps 12 and cleaning of reflector covers 25, but also allows the lamps 12 to be placed in any position desired,—especially the vertical or tip downward position so important to the full life of the high efficiency gas-filled tungsten filament lamp. The openness of the box likewise allows the lamps 12 and their filaments to be placed sidewise toward the units 15, so that a greater proportion of the light shall reach the units directly than if the lamps had to be mounted on the panels 11, 11 and placed end-on toward the units 15.

The small projection of the multi-reflector type of illuminating unit from the panel 11 gives rise to other important advantages. In the first place, it allows one unit 15 to be placed close behind another with reference to their common light source 12 (Fig. 6) without shading or "blanketing" of the one by the other; whereas a unit 26 comprising one large mirror (Fig. 7) instead of a number of small mirrors 20 would throw any unit behind it into deep shadow. My shallow non-shading multi-reflector type of illuminating unit, therefore, gives the sign designer untrammelled freedom in the variant arrangement of units for display formation, and enables him to illuminate his sign with a minimum number of relatively large and efficient lamps, and yet have all its units 15 appear similarly and generally luminous.

In the second place, the multi-reflector type of illuminating unit 15 "covers" or illu-

minates the lens 17 completely and evenly, whereas a single mirror 26 of very considerable size may reflect relatively little light to the right-hand half of the lens 17,—as will readily be evident from Fig. 7,—so that in many cases half the lens would appear very dim.

In the third place, the multi-reflector type of illuminating unit 15 gives the lens a much wider angle of illumination than is possible with a single reflector 26 (Fig. 7), because with it the virtual light source represented by the reflector is much closer to the lens. Without discussing the optical theory of the matter, it may be pointed out that the angle of illumination varies inversely according to the distance from the center of the lens 17 to the plane of incidence on the reflector of the ray from the center of brilliance of the source 12 that is reflected through the center of the lens. In other words, the advantage of the multi-reflector type in Fig. 7 is indicated by the shortness of the distance h as compared with the distance H . A wide angle of illumination of the lens 17 means, of course, that the sign appears brilliant over a considerable angle to either side, as well as directly in front.

Still other advantages are afforded by the multi-reflector type of illuminating unit. For example, if it should prove necessary to place a lamp 12 directly behind one of the units 15 (as in Fig. 8), then the reflector elements 20 will partially shade one another to such an extent that the corresponding lens 17 will not mar the general effect of the sign by undue brilliance. This is of especial importance when it is attempted to light a whole letter with a single lamp. If this were done with the "B" of Figs. 1 to 3, the lamp used would need to be placed directly behind the central lens 17 (Fig. 1).

It is further to be noted that in the sign of Figs. 1 to 3 the box 10 is rendered weather-proof and practically dust-tight by the gaskets 22, and the lamps 12 are completely enclosed. No particular skill is required in the location of the units 15, or in their adjustment,—which latter is effected by simply turning each unit one way or the other till the position of greatest brilliancy (which is that in which the reflector elements lie perpendicularly across the shortest line from the center of the light source thereto) is found. It is unnecessary, of course, that the two opposite sides or panels 11, 11 be just alike. Multi-colored effects are easily obtained by using differently colored lamps for illuminating different groups of units 15, or by using appropriately colored covers 25. Double or composite color effects can be obtained by simultaneously using several differently colored

lamps to illuminate one whole group of units 15; or vari-colored effects can be obtained by flashing such lamps in alternation.

As compared with a sign in which each illuminating unit is an incandescent electric lamp, the type of sign shown in Figs. 1 to 3 affords a very considerable economy in both current consumption and lamp renewal costs. According to my invention, for example, both sides of a "Drugs" sign can be well illuminated with ten 25-watt tungsten lamps. The cost of operating such a sign on current at 6¢ per KW hour is 1½¢ per hour; whereas with "all-lamp" letters averaging ten 10-watt lamps apiece for each side, the operating cost would be 6¢ per hour. For operating the two signs five hours every evening for one year, the costs would be \$27.32 and \$109.50, respectively. In each of these signs, lamp replacements must be made something like twice a year, at the same cost per lamp, so that for my type of sign each renewal would cost only one-tenth as much as for the other. Since, furthermore my type employs the larger and longer-lived lamps,—less fragile, especially under vibration, because their filaments are not so fine,—my type will not require such frequent renewals as the other type. In Fig. 8 is shown a sign (letter "H") of the so-called "roof" type constructed according to my invention. In this sign, more illuminating units 15 and lamps 12 are used than in that of Figs. 1 to 3; but the principles are the same. It will be apparent to those skilled in the art that various other displays,—such as borders of steady or flashing type, friezes, or lighting fixtures,—can readily be illuminated according to my invention.

The term "longitudinal axis" as employed in the claims has reference to the axis extending from the front to the rear of a unit.

What I claim is:

1. A reflectively illuminated display comprising a light source, and a plurality of shallow units illumined thereby cooperating to form a sign design; the individual unit comprising a multiplicity of reflector elements in a plane approximately that of the sign as a whole, a common light permeable protective cover at the side of said elements toward said light source, and a diffusing lens at the other side of said elements.
2. A reflectively illuminated display comprising a light source, and a plurality of shallow units illuminated thereby cooperating to form a display design, the individual unit comprising a series of reflector elements adapted to reflect light from said source forward between them, and diffusing means in front of said elements evenly illuminated by them.
3. An illuminated display comprising a

light source, and a plurality of generally luminous reflector units illumined thereby cooperating to form a display design, the individual unit comprising a multiplicity of parallel reflector elements in a plane approximating that of the display as a whole.

4. An illuminated display comprising a light source, and a plurality of generally and similarly luminous reflector units illumined thereby cooperating to form a display design, the individual unit comprising a series of reflector elements adapted to reflect normally light incident obliquely to the series.

5. A reflective display unit comprising a series of slat-like reflector elements arranged shutter-wise for reflection of light from behind forward between them, and a diffusing lens in front of said elements.

6. A reflective display unit comprising a series of reflector elements adapted to reflect light from behind forward between them, and diffusing means in front of said elements evenly illumined by them.

7. A reflective display unit comprising a series of slat-like reflector elements arranged shutter-wise for reflection of light from behind forward between them, and a common protective cover at one side of said elements.

8. A reflective display unit comprising a series of reflector elements in a common plane making a common angle therewith, and a common light permeable protective cover for said elements.

9. An illuminated display comprising a light source, and a plurality of generally luminous reflector units illumined thereby cooperating to form a display design, the individual unit comprising a series of rela-

tively narrow reflector elements for reflecting forward obliquely incident light from the source.

10. An illuminated display comprising a light source, and a plurality of generally luminous reflector units illumined thereby cooperating to form a display design, the individual unit comprising a series of slat-like reflector elements arranged shutterwise for reflection of light of said source incident from behind forward between them.

11. A generally luminous ultimate luminary unit for variant display formation, comprising a single series of relatively narrow reflector strips for reflecting forward between them light incident obliquely to the series and a diffusing lens in front of said strips.

12. A generally luminous ultimate luminary unit for variant display formation comprising a series of reflector strips making such common angle with the series as a whole as to reflect light incident obliquely thereto between them approximately parallel to the longitudinal axis of said unit and diffusing means in front of said strips.

13. A shallow, non-shading ultimate luminary unit for variant display formation, comprising a series of slat-like reflector elements arranged shutterwise within such unit for reflection of light from behind forward between them, so narrow in proportion to their spacing as to obviate material shading as amongst themselves and make the unit in effect generally luminous and means whereby said light is diffused.

In testimony whereof I have hereunto signed my name.

KATHERINE LIMPET.