June 17, 1930. R. R. WILEY 1,764,485

ELECTRIC SIGN

Filed April 30, 1926

Fig. 1.

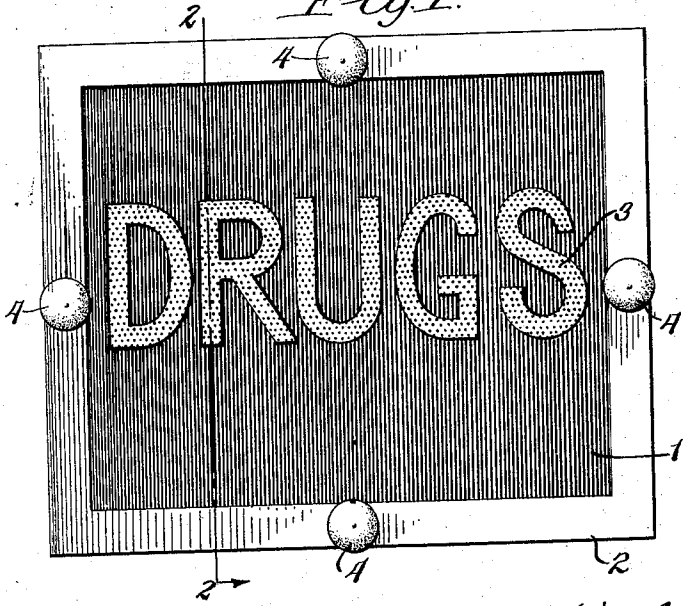


Fig. 2.

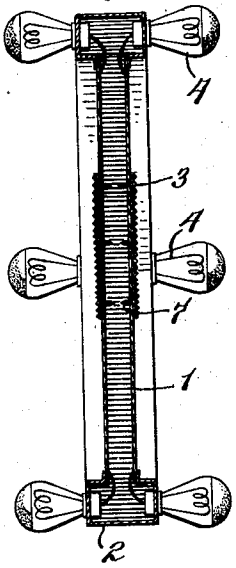


Fig. 3.

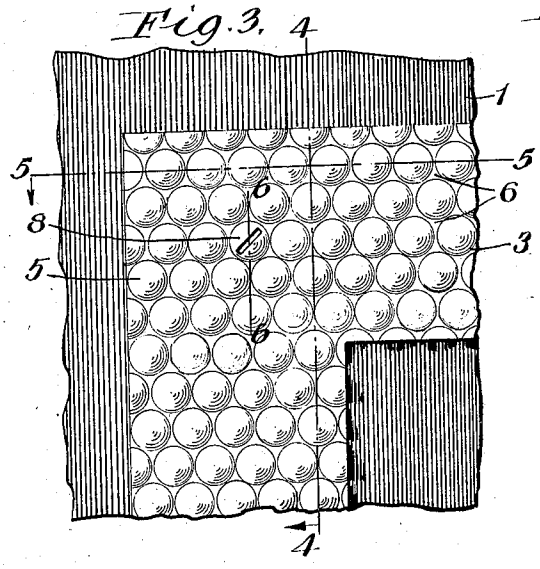


Fig. 4

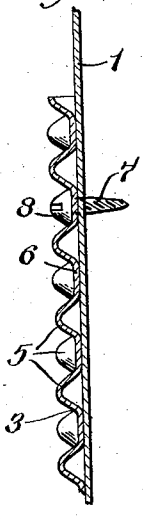


Fig. 5

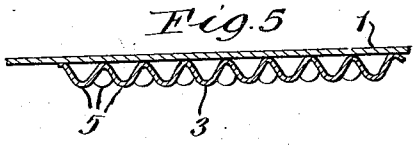
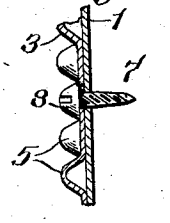


Fig. 6.



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UNITED STATES PATENT OFFICE

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ELECTRIC SIGN

Application filed April 30, 1926. Serial No. 105,713.

This invention relates to improvements in electric signs of the general type wherein the lettering is so produced upon a board or panel as to be conspicuously legible in the daytime and at night is exteriorly illuminated by exposed electric lamps provided at regular intervals. Signs of this type are principally used to call attention to the business conducted on the premises and they are therefore hung, usually from the wall of the building, at an elevation such as to compel observance by persons passing on the street.

A serious objection to such signs as heretofore constructed is that at night, regardless of the illumination, the lettering is legible only for a small part of the full distance in which the image would be clear, under suitable light conditions, to a person of normal vision. In other words while the display of light may be brilliant the light is not used effectively for the proper illumination of the letters and except for the comparatively small distance referred to the lettering cannot be read although the sign can be seen as an area of light. This objection is aggravated in the case of single face signs which are set flat against their supporting walls and are viewed at an angle to the perpendicular by the approaching observer. A further serious objection to such signs is that the illumination is not uniform but is characterized by bright and dull areas which detract from the legibility and also from the appearance of the sign.

The principal object of the invention is to provide a sign of the type described in which the above stated objections are overcome and the lettering is clearly legible at night, equally as in the daytime, for the full distance of the range of normal vision, and is uniformly illuminated throughout its area. In carrying out this object I also attain several other important advantages, namely, the effect of translucent letters illuminated by light shining through them; the effect of letters standing out in relief against the background with the edges of their strokes sharply and clearly defined, giving a much clearer and sharper image than can be obtained in any case with constructions heretofore employed; letters of more striking and pleasing appearance with increased legibility in the daytime as compared with constructions heretofore employed; and an entirely adequate illumination of the letters with a substantially smaller number of lamps than is permissible in the prior constructions.

With the above objects and advantages in view the invention consists generally in a sign in which the letters are specially formed and suitably finished to intercept the rays from the bordering lamps and to reflect them from a multiplicity of closely adjacent surfaces uniformly distributed throughout the areas of the letters at varying angles encompassing the varying lines of view from any point within the full range of normal vision of observers approaching in any direction. The invention also consists in the construction of the letters themselves for the purposes indicated and in various details of structure and relation which will be set forth as the description proceeds.

An embodiment of the invention is illustrated in the accompanying drawing, in which:

Figure 1 is an elevation of the sign;

Figure 2 is a cross-section on the line 2—2 of Figure 1;

Figure 3 is a detail elevation on a full size scale of a portion of one of the letters and an adjacent portion of the supporting board or panel;

Figures 4, 5 and 6 are sections on the respective lines 4—4, 5—5 and 6—6 of Figure 3.

The features of the invention are applicable either to double face signs which project from their supporting walls and overhang the street or to single face signs which are set flat against their supporting walls. A double face sign has been selected for the purpose of illustration.

The sign includes a display board 1 which bears letters 3 and is otherwise finished in a shade, preferably dark, to provide a suitable background against which the letters may be easily read. The letters are illuminated at night by lamps 4 which may have any suitable arrangement beyond the field of the let-

tering but as shown are mounted on a surrounding border 2.

The board 1 may be of any suitable construction and of any suitable material. It is preferably and as shown constructed of metal and is incorporated in a flat shallow casing, said board being double walled in the case of a double face sign. The border 2 is also preferably hollow so as to enclose the wiring for the lamps 4; and by suitable selection of the exterior finish of said border halation effects may be so minimized as to be virtually unnoticeable.

The letters 3 may be of any suitable material but are preferably of metal and are preferably formed separately from the board 1 to which they are attached in any suitable manner.

The letters 3, according to the invention, are formed with a multiplicity of closely adjacent surfaces of relatively small extent, uniformly distributed throughout their areas and arranged to intercept the light rays from the lamps 4 and to reflect them at different angles throughout a range conforming to the varying lines of view from any point within the full range of normal vision of observers approaching in any direction. For this purpose said letters are preferably formed with comparatively small symmetrically warped reflecting surfaces and with small interstitial flat surfaces 6. The warped surfaces are preferably provided by projections 5 which are preferably substantially conical as shown but which may be spherical and are preferably of substantially the dimensions shown in Figs. 3 and 4 of the drawing as filed, that is to say approximately $\frac{5}{16}$ of an inch in diameter at the base, and are arranged in close or substantially immediate mutual adjacency uniformly throughout the areas of the letters with the angles of their surfaces to the perpendicular preferably, in order to obtain the best results, substantially within a range of 30 to 40 degrees. In the production of the letters they are preferably cut from a sheet and then operated on to form the projections 5, these being continued up to the margins of the letters whereby the letter margins are regular in plan but are sinuous or scalloped in side elevation. By virtue of this characteristic of marginal form small shadows will be cast on the background directly adjacent the margins as shown in Fig. 3 and thereby when the sign is illuminated the margins of the letters stand out with extreme sharpness and clearness and a relief effect is produced, that is to say, to the observer the letters, when illuminated, seem to be raised in relief from the background of the supporting board 1. The letters may be attached to the board 1 in any suitable manner. In the construction shown they are attached by screws 7 having heads 8 which conform exactly in outline, dimensions and finish to the projections 5 and in a normal view of the sign are indistinguishable in appearance from said projections. In connection with the attachment of the letters in this manner the sheet may be formed at suitable intervals with blanks, that is to say, surfaces from which the projections 5 are omitted and the screws 7 are threaded through such blanks, their heads 8 taking the place of the projections 5 which would otherwise have been provided. The letters have a suitable reflecting finish which may result either as an incident of the particular material of which the letters are composed or which may be specially obtained by suitable treatment. Preferably the letters have a finish approximating the color and sheen of gold.

Instead of having the projections 5 on the obverse side of the letters as shown they may be on the reverse side in which case the obverse side will have a series of cup-like depressions constituted by the inner sides of the projections and a series of small interstitial flat surfaces; the depressions, having the same angles and finish as the projections 5, will function in the same way, and the flat surfaces will function in the same way as the flat surfaces 6. The rays from the lamps 4 strike all of the projections 5 and flat surfaces 6, the lamps being so arranged with reference to the angles of the surfaces of the projections 5 that the incident light rays, even at considerably varying angles, are reflected to the eye of the observer within the limits of accommodation given by the warped reflecting surfaces. This is true as to any position taken by the observer in viewing the sign because the angles of reflection are both downward and lateral and, due to the quality of the warped surfaces in selecting the tangential reflecting planes, will coincide with or encompass the lines of vision at which the sign may be viewed from both remote and nearer points. The rays so reflected form comparatively narrow angles with and below the horizontal at the remoter points with their angles to the horizontal increasing with the approach of the observer toward the sign. On a still nearer approach to the sign the flat surfaces 6 come into effect and make the letters legible or contribute to this result. The angles of incidence of the rays on the flat surfaces 6 are considerably wider than the angles of the rays on the projections 5 and consequently the angles of reflection from the surfaces 6 are correspondingly wider so that the rays from the surfaces 6 form much wider angles with and below the horizontal than the rays from the projections 5 and give effective illumination of the letters when the observer is close to the sign. In this way the projections 5 and flat surfaces 6 provide for the effective illumination and display of the letters at all points within the full range of

vision of an approaching observer. In addition to the effects described the apices of the projections which in any case are slightly rounded present sharp and comparatively small or minute areas of high light ocurring regularly throughout the area of the lettering and producing an illuminating effect observable virtually throughout the range of vision. The letters by virtue of the reflective characteristics described and of their sharp marginal outlines, are uniformly and brilliantly illuminated and are clearly legible and readable at a distance from the sign several times greater than the distance at which the letters of the signs of the type described as heretofore constructed can be read. It is moreover practical in obtaining the above important effects to reduce the number of lamps employed as compared with the prior constructions. Thus the drawing illustrates a sign having the word "Drugs" in letters which may be assumed to be ten inches high with a stroke approximately two inches wide and, for the illumination of these letters with the attainment of the advantages and effects above described, good results can be secured with the use of but four lamps of suitable power, one lamp being arranged at the center of each side of the rectangular border. The number and arrangement of lamps can, of course, be varied as circumstances may require and in accordance with the dimensions of the sign. The flat surfaces 6, in addition to the effects described, also aid materially in reflecting daylight, especially when the incident rays approach the horizontal.

Having fully described my invention, I claim:

1. An electric sign comprising a display board provided with integral letters formed from individual metal sheets and exposed lamps located beyond the field of the letters and by which they may be illuminated, the letters having uniformly distributed throughout their areas immediately adjacent symmetrically warped inclined surfaces and interstitial flat surfaces to intercept light rays from said lamps and to reflect said rays in all directions through a range of angles conforming to the varying lines of vision at which the sign may be viewed from different points, said inclined surfaces reflecting the rays at narrow angles to and below the horizontal and said flat surfaces reflecting the rays at wider angles below the horizontal, and the display board beyond the strokes of said letters being colored to provide a contrasting background against which the letters may be read.

2. An electric sign comprising a display board provided with integral letters formed from individual metal sheets and exposed lamps located beyond the field of the letters and by which they may be illuminated, the letters having uniformly distributed throughout their area immediately adjacent substantially conical surfaces and interstitial flat surfaces to intercept light rays from said lamps and to reflect said rays in all directions through a range of angles conforming to the varying lines of vision at which the sign may be viewed from different points, said conical surfaces reflecting the rays at narrow angles to and below the horizontal and said flat surfaces reflecting the rays at wider angles below the horizontal, and the display board beyond the strokes of said letters being colored to provide a contrasting background against which the letters may be read.

3. An electric sign comprising a display board provided with letters and exposed lamps located beyond the field of the letters and by which they may be illuminated, the letters having uniformly distributed throughout their area immediately adjacent substantially conical surfaces and interstitial flat surfaces to intercept light rays from said lamps and to reflect said rays in all directions through a range of angles conforming to the varying lines of vision at which the sign may be viewed from different points, said inclined surfaces reflecting the rays at narrow angles to and below the horizontal and said flat surfaces reflecting the rays at wider angles below the horizontal, the margins of said letters being of regular outline and the conical surfaces being continued up to said margins which are thereby sinuous or scalloped in section, and the display board beyond the strokes of said letters being colored to provide a contrasting background against which the letters may be read.

4. An electric sign comprising a display board provided with attached metal letters and exposed lamps located beyond the field of the letters and by which they may be illuminated, the letters being formed with immediately adjacent symmetrically warped inclined surfaces and interstitial flat surfaces uniformly distributed throughout their areas to intercept light rays from said lamps and to reflect said rays in all directions through a range of angles conforming to the varying lines of vision at which the sign may be viewed from different points, said inclined surfaces reflecting the rays at narrow angles to and below the horizontal and said flat surfaces reflecting the rays at wider angles below the horizontal, the margins of said letters being of regular outline and the inclined surfaces being continued up to said margins which are thereby sinuous or scalloped in section, and the display board beyond the strokes of said letters being colored to provide a contrasting background against which the letters may be read.

5. A metal letter for use in signs having exterior illumination and formed with a mul-

tiplicity of substantially conical surfaces and interstitial flat surfaces uniformly distributed throughout its area, said conical surfaces being in immediate adjacency, the letter having a regular margin and the conical surfaces extending to said margin which thereby has a sinuous or scalloped section, said conical and flat surfaces being available to intercept light rays and to reflect them through angles having a range conforming to the lines of vision at which the letter may be viewed from any point.

6. An electric sign comprising a display board adapted to provide a background, exposed lamps arranged about the border of said display board, and a unitary letter formed from a single sheet of metal and adapted to be secured to said board, said letter having uniformly distributed throughout its area immediately adjacent symmetrically warped inclined surfaces and interstitial flat surfaces to intercept light rays from said lamps and to reflect said rays in all directions through a range of angles conforming to the varying lines of vision at which the sign may be viewed from different points, said inclined surfaces reflecting the rays at narrow angles to and below the horizontal and said flat surfaces reflecting the rays at wider angles below the horizontal and the display board beyond the strokes of said letter being colored to provide a contrasting background against which the letter may be read, the margins of said letter being of a regular outline and the conical surfaces being continued up to said margins which are thereby sinuous in section, the raised portions of the said margins being adapted to produce shadows upon said background and to thereby provide a letter of sharp outline with a relief effect.

7. An electric sign comprising a display board provided with letters and exposed lamps located beyond the field of the letters and by which they may be illuminated, the letters being formed from individual metal sheets and having uniformly distributed throughout their areas immediately adjacent symmetrically warped inclined surfaces and interstitial flat surfaces to intercept light rays from said lamps and to reflect said rays in all directions through a range of angles conforming to the varying lines of vision at which the sign may be viewed from different points, said inclined surfaces reflecting the rays at narrow angles to and below the horizontal and said flat surfaces reflecting the rays at wider angles below the horizontal, and the display board beyond the strokes of said letters being colored to provide a contrasting background against which the letters may be read, and means for securing said letters to said background, said means having the same surface characteristics as said letters and being adapted to cooperate with the warped inclined surfaces of said letters to complete a uniform pattern of spaced apart warped inclined surfaces.

In testimony whereof I affix my signature.

ROY R. WILEY.