

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN BOX SIGNS

(71) We, COLORLUX A/S, a company incorporated under the laws of Denmark, of Hovedvej 12, 6700 Esbjerg, Denmark, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a box sign comprising a reflector formed of sheet material, one or several light sources such as fluorescent tubes mounted on said reflector, and a front plate mounted at the edges of the reflector.

U.S. patent specification No. 3,686,495 discloses a box sign comprising a reflector, a light source, and a front plate transparent to light. The reflector is curved around a longitudinal axis, and formed substantially as a parabolic cylinder surface. However, the reflector has the drawback that it has to be supported by side members if its parabolic curve is to be retained, which increases the number of components.

Furthermore U.S. patent specification No. 1,900,551 discloses a rectangular unit, which is applicable in connection with a box sign if a plate transparent to light is mounted on a surface of the unit. The unit comprises a reflector in the form of parallel embossings or bendings. The latter, however, extend in the longitudinal direction of the unit for which reason they cannot contribute to the support of the reflector in the cross direction.

Finally U.S. patent specification No. 1,513,844 disclosed a paraboloid-like reflector screen having a profiling. This screen, however, cannot be used in connection with a rectangular box sign.

According to the present invention there is provided a box sign comprising a reflector formed of sheet material, one or more light sources mounted on the reflector, and a plate mounted at edges of the reflector, the reflector being curved to meet the said plate and being provided with substantially parallel embossings lying in planes to which

the axis or axes of curvature of the reflector is or are perpendicular and the said plate being such as to allow light from the one or more sources to pass out of the sign, in operation, through an area defined by at least part of the said plate.

The said plate may be an electrolytically refined aluminium sheet presenting apertures and being bent at the bottom, thus forming a bottom in the box sign, the apertures providing the desired signs or the desired mark. An improved lighting of the signs or mark can be achieved by including an acrylic sheet behind the apertured aluminium sheet. Furthermore, by dividing the aluminium sheet into several pieces the box sign may be more flexible. The structure of the reflector gives a very uniform distribution of light at the front plate, and is supported in its transverse direction. As a result a self-supporting structure is achieved.

The embossings may have a substantially trapezoidal cross section. This provides a profiling which relative to the consumption of material gives a reflector of an especially high rigidity.

The embossing of the profiling may advantageously be isosceles trapeziums, in which the ratio of the spacing between two successive parallel planes of symmetry in the trapezoidal embossings to the height of the trapeziums is of the magnitude 1:4.

The spacing between two successive parallel planes of symmetry may be of the magnitude 30 mm. Thus a reflector is obtained being easy to profile and having the necessary rigidity.

The invention will now be described in more detail, solely by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is a perspective view of a box sign embodying the invention,

Fig. 2 is a perspective view of a side plate of the box sign of Fig. 1,

Fig. 3 is exploded perspective view of an alternative embodiment of the box sign,

Fig. 4 is a sectional view of a reflector

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presenting a trapezoidal profiling.

Fig. 5 is a sectional view of a reflector presenting a different profiling, and

Fig. 6 is a perspective view of part of one end of an alternative embodiment of the box sign.

The box sign shown in Fig. 1 comprises a reflector 1, one or several light sources 2 such as fluorescent or neon tubes mounted on said reflector 1, and an aluminium sheet 3a mounted at the edges of the reflector 1, and bent at the bottom. The lighting box sign thereby obtains a plane bottom plate 12 and a sharp edge at the front of the bottom plate. The aluminium sheet 3a allows light to pass through apertures 4. The reflector 1 is a sheet curved locally around one or several substantially parallel longitudinal axes. Before being curved the reflector 1 is provided with a pattern of projections in the form of parallel embossings 5 having a substantially trapezoidal cross section. A cross-section on a larger scale of such embossings 5 is shown in Fig. 4. The strain-hardening during the actual embossing and the resisting moments of the embossings 5 render the reflector 1 rather rigid. A symmetrical distribution of light on the aluminium sheet 3a may be achieved by making the embossings symmetrical, i.e., by forming the embossings as isosceles trapeziums. When the embossings are arranged sufficiently close to each other a completely uniform distribution of light is achieved. A distance of 30 mm between the parallel planes of symmetry in the trapezoidal embossings 5 has proved to be sufficiently small. The ratio of this distance to the height of the trapeziums 5 may for instance be 4:1. The height in the illustrated embodiment is 6 mm. The trapezoidal embossings are easy to provide by means of an embossing tool, i.e., by gradual feed of the unmachined sheet.

The box sign comprises extrusions 7, 8 serving as joining members securing the aluminium sheet 3 to the edges of the reflector 1. The lower extrusion 8 is an edge fillet having two longitudinal grooves 8a, 8b perpendicular to each other. The groove 8a receives the bottom edge of the reflector 1, and the groove 8b receives the back edge of the bottom plate 12. The second extrusion 7 is an angle section secured to the upper edge 1a of the reflector 1, thus turning upwards and supporting the aluminium sheet 3a, said aluminium sheet 3a comprising a downward flange 10, meshing with the angle section, along its upper edge. These extrusions 7, 8 facilitate the assembling of the components of the lighting box sign box. The thickness of the reflector is about 0.7 mm. This thickness

embossings 5 has proved to be sufficiently presenting the illustrated trapezoidal thick for achieving the necessary rigidity. A thicker sheet is somewhat harder to work in, and will only increase the weight of the reflector 1 without increasing the rigidity considerably. The reflector may advantageously be of aluminium.

An acrylic sheet 11 may be situated behind the aluminium sheet 3a. The effect of this arrangement is a diffusion of light at the apertures 4 of the aluminium sheet 3a, cf. Fig. 1, whereby the box sign will serve as a modern neon system.

The aluminium sheet 3a may be brown or a black electrolytically refined aluminium sheet providing an exclusive character.

The aluminium sheet may be divided into several pieces. A dark knurling, if any, may be arranged for every 25, 50, or 75 cm.

The box sign is on its sides provided with side plates, cf. Fig. 2. These plates may also be of electrolytically refined aluminium.

The box sign illustrated in Fig. 3 comprises a reflector 1, one or several light sources 2 such as fluorescent tubes mounted on said reflector 1, and a front plate 3 mounted at the front edges 1a of the reflector 1, said front plate 3 being transparent to light. The reflector 1 is an embossed sheet as in the embodiment of Fig. 1. Covering plates, one, 9, being shown in Fig. 3, close the sides of the sign.

The box sign has an upper extrusion 7 and a lower extrusion for securing of the front plate 3 to opposite edges of the reflector 1. The upper and lower extrusions may either be formed as edge fillets as shown in Fig. 3 in which the extrusions 7 has two longitudinal grooves 7a, 7b, or be a combination of two angle sections with two grooves as shown by the extrusion 8 of Fig. 1. Furthermore, in Fig. 1, the extrusion 7 can be replaced by either a fillet or combined angle section secured to the front edge 1a of the reflector and presenting a groove to receive the front plate 3. In order to avoid rattling, the width of each groove may be adapted to the thickness of the front plate or to the height of the embossings 5.

In an especially advantageous embodiment of the reflector sheet is curved in such manner that its cross section corresponds to a U flattened in the vertical direction. Thereby it is rendered possible to make the lighting box sign relatively high without necessitating its projecting far backwards. In this case several light sources 2 may advantageously be used, cf. Fig. 6. In the illustrated embodiment the light sources are elongated fluorescent tubes 2. Covering plates (not shown) such as the plate 9 of Fig. 3 are provided.

Fig. 5 illustrates an alternative profile for embossing the reflectors 1 for a still better diffusion of light than that of Fig. 4.

WHAT WE CLAIM IS:—

- 5 1. A box sign comprising a reflector formed of sheet material, one or more light sources mounted on the reflector, and a plate mounted at edges of the reflector, the reflector being curved to meet the said plate and being provided with substantially parallel embossings lying in planes to which the axis or axes of curvature of the reflector is or are perpendicular and the said plate being such as to allow light from the one or more sources to pass out of the sign, in operation, through an area defined by at least part of the said plate.
- 20 2. A box sign according to claim 1, wherein the said plate is an electrolytically refined aluminium sheet presenting apertures to allow light to pass out of the sign in operation, the sheet being bent so as to provide a bottom for the box sign.
- 25 3. A box sign box according to claim 2, wherein an acrylic sheet is provided behind the apertured aluminium sheet.
4. A box sign according to claim 2 or 3, wherein the aluminium sheet is divided into several pieces.

5. A box sign box according to claim 1, wherein the or each light sources is a fluorescent tube, and the said plate is transparent to light and is mounted at two front edges presented by the reflector.

6. A box sign according to claim 5, wherein the embossing is of substantially trapezoidal cross section.

7. A box sign according to claim 6, wherein the trapeziums of the said cross section are isosceles, and the ratio of the spacing between two successive parallel planes of symmetry in the trapezoidal embossings to the height of the trapeziums is of the magnitude 1:4.

8. A box sign according to claim 7, wherein the spacing between two successive parallel planes of symmetry in the trapezoidal embossings is of the magnitude 30 mm.

9. A box sign substantially as described hereinbefore with reference to Fig. 1. or 3 or 6 of the accompanying drawings.

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- 10 2. A box sign according to claim 1, wherein the said plate is an electrolytically refined aluminium sheet presenting apertures to allow light to pass out of the sign in operation, the sheet being bent so as to provide a bottom for the box sign.
- 15 3. A box sign according to claim 2, wherein an acrylic sheet is provided behind the apertured aluminium sheet.
- 20 4. A box sign according to claim 2 or 3, wherein the aluminium sheet is divided into several pieces.

5. A box sign according to claim 1, wherein the or each light sources is a fluorescent tube, and the said plate is transparent to light and is mounted at two front edges presented by the reflector.

6. A box sign according to claim 5, wherein the embossing is of substantially trapezoidal cross section.

7. A box sign according to claim 6, wherein the trapeziums of the said cross section are isosceles, and the ratio of the spacing between two successive parallel planes of symmetry in the trapezoidal embossings to the height of the trapeziums is of the magnitude 1:4.

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