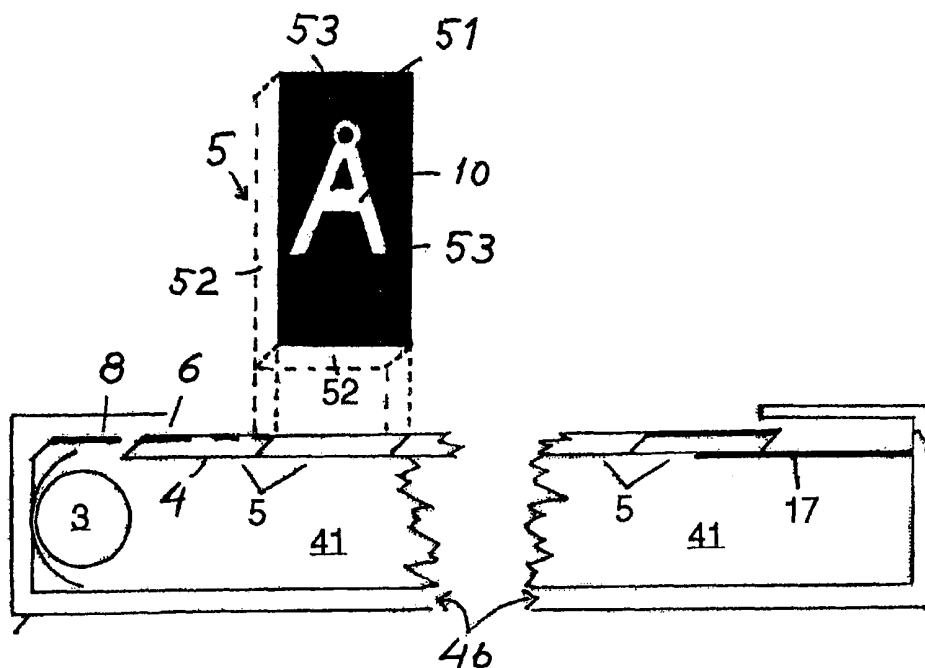




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(21) International Application Number: PCT/SE99/01557 (22) International Filing Date: 7 September 1999 (07.09.99) (30) Priority Data: 9803023-2 7 September 1998 (07.09.98) SE (71)(72) Applicant and Inventor: SÖDERLUND, Björn [SE/SE]; Hagvägen 3, S-191 47 Sollentuna (SE). (74) Agent: BERGENSTRÄHLE & LINDVALL AB; Bjelkstam, Peter, Box 17704, S-119 93 Stockholm (SE).	(81) Designated States: AU, CA, CN, JP, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <i>In English translation (filed in Swedish).</i>	

(54) Title: ILLUMINATED SIGN WITH EXCHANGEABLE SYMBOLS



(57) Abstract

The invention refers to an illuminated sign consisting of a box containing a source of light (3) where the box (2) has at least one side (6) which partially allows light to shine through to detachable but attached plates (5). The plates (5) are coated with layers (9) to define letters or figures (10). The side (6) has at least one wall (41) which allows light to shine through against which the plates (5) can be attached edge to edge directly adjoining each other with a slanting supporting seam in two different directions at the level of the side (6).

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"Illuminated sign with exchangeable symbols"

The invention refers to a neon sign consisting of a light box which contains a source of light where the box has at least one side surface, which can be partially illuminated through plates attached to each other, which define symbols such as letters or figures. The plates, which are rectangular in form, have two opposing edges formed to establish an overlapping seam.

The illuminated side of the illuminated sign consists of a horizontal section in which there is a horizontal row of symbol plates and the side edges of these plates are formed to produce an overlapping seam. The plates are attached to the horizontal section by means of an adhesive with the appropriate properties and secure adhesion to allow the plates to be changed frequently. In this respect the box differs from previously designed light boxes which have an additional horizontal section securing the plates in position. This box has no such section. The symbols on the plates consist of a clear transparent area in the central part of the plate while the rest of the plate surface consists of coloured stencils which allow light to shine through. In contrast to previously designed light boxes, this box does not require any springs to push the plates in each row together to prevent light from seeping out between the seams between the plates.

In previously designed light boxes there are horizontal guide rails which receive the upper and lower parts of the rim of each row of symbol plates, and these rails dominate the light box's display surface by vertically dividing the rows of symbols from each other.

The object of the invention is to provide a light box accommodating more rows of symbol plates and which does not require any guide rails between the rows of symbol plates in vertical proximity to each other. Nor does it require a second horizontal section to hold the symbol plates in position, nor a spring to push the plates in each row together.

A further object of the invention includes the ability to prevent any seepage of light between the seams of plates situated in close proximity to each other. Any gaps allowing light through due to unevenness caused during production, or as a result of any variation in the width of the symbols, will be compensated by the overlapping seams where the final symbol of each row is completely black and overlaps the black enlarging easel around the illuminated horizontal front surface. The only guide rails required for the text to be set straight on the left hand side in straight rows, are two guide rails along the upper and left side, which acts as a dolly which the symbol plates can be stacked against to keep the text straight. The distinguishing features of the invention are disclosed in the accompanying claims.

The light box, as described for this invention, has one side which light shines though constructed either of a light permeable wall or a completely light conducting wall through which light enters from the sides so that the plates can be attached directly against each other in two directions along the plane of the side. Therefore, plates which are normally rectangular can be stacked both vertically and horizontally directly against each other along the supporting functions which the two rulers form along the left and upper edge of the box.

The symbols on the plates are defined preferably by stencils which are very opaque, while the plate itself is transparent or allows light through so that the opening in the stencil forms the symbol. The stencil should be placed on the outer side of the plate. For production reasons the plate edges are cut along the flat cut lines which create a sharp angle against the outer surface of the plate which bears the stencil print where the sharp angle is less than or equal to 45 degrees. The edges of the plate, which form a blunt angle with the plate's main surface, is coated with a very opaque layer of material along at least one part of the row which is connected to the outer surface of the plate. The surface edges which form sharp angles with the plate's

main surface can also be coated with a layer of opaque material, at least on the part of the row connected to the plate's inner main surface.

In order to coat the surface edges of the plates, they can be stacked so that the similar edges define one level where the stacked level formed by these surface edges is then coated with the opaque layer. The plates can then be separated. The condition of having flat edges is dictated by the fact that the plates can be mass produced and must therefore be able to be manufactured at low cost. Water jet cutting is, so far, the only acceptable method of cutting edges in the material the plates are made of. It is the only cutting method which, at a slanting cutting angle, provides straight and evenly cut edges without the optical deflection phenomenon which occurs in the equivalent cutting using lasers. This is a necessary condition to allow the resulting symbol plates to be connected together, without further work being carried out on them, so as to avoid light seepage through the seams which is why the surface edges are coated with opaque material.

An alternative method for the mass production of the symbol plates would be to use mould casting whereby the stencilled impression is slightly lower so that the front surface of the plate could then be coated with an opaque material. In this way the symbol itself would not be coloured in and would then allow light through the opening defining the symbol. Fluorescent plastic with the appropriate properties is available as a granulate which opens the way for mass production at the lowest possible price. The finer details along the length of the plates' side seams with the hooks and extensions which allow the plates to be clipped together, could be integrated in the plastic only if cast in a mould.

The wall that allows light to shine through or the light conducting material's outer main surface can, by means of

blasting for instance or another method, be ideally formed in the manner of frosted glass which would even out the flow of light from the light sources in the box. It would also be possible to allow the wall through which light can shine or the outer main surface of the box to which the plates are attached, to be equipped with, or consist of, an opaque strip grating which would cover the seam area between the plates situated close to each other horizontally.

The invention will be described in the following in the form of examples with references to the accompanying drawings, where

- Fig. 1 is a schematic illustration - a horizontal cross-section through the light box according to the invention,
- Fig. 2 illustrates a plan view over a part of the side of the light box through which light can shine,
- Fig. 3 illustrates a section taken from III - III in fig. 2,
- Fig. 4 illustrates the light box in light conducting mode with the source of light placed in the part of the strip of the light conducting material,
- Fig. 5 illustrates a horizontal cross section through a symbol plate which has been equipped with extensions and a receiving structure or hook which enables the plates to be fixed together horizontally and
- Fig. 6 illustrates an example of a complete set of symbols equipped with negative text and where the opaque surface coating defines the symbols.

The light box 1 as described in the present invention includes a box 2 which contains one or more sources of light 3 and against the main outer surface 4 of these a number of plates 5, which are

secured by the adhesive mentioned in the second paragraph above. The plates 5 are securely attached to each other at the edges and are formed of a material which allows light to shine through, preferably a coloured polymer plastic. The plates 5 should ideally be formed in the same way inside with regard to the design of the edges. The side 6 of the box 2 should be surrounded by a frame 7 whereby the higher and also the lower side edges overlap the edge sections of the plates 5, which are situated closest to the periphery of side 6 and there should be as large a distance so as to partly absorb any gaps in the measurements which may arise due to unevenness in production. It should also partly take up any gaps in measurements resulting from the symbols being of differing widths so that the rows do not therefore appear of the same shape in terms of length. In the upper and also in the left hand edge side of the frame 7 which surrounds the box 2, there are borders 8 which create support and which simplify assembly of the plates 5. In order to fill in the areas between the symbol plates 5 and to conclude the rows of text so that light does not seep through from the light box 2, there are completely black plates of standardised proportions as in the principle applying for parts which fit together. The plates 5 are to one side 51, which is intended to be turned away from the box 2, equipped with an opaque stencil 9, which defines an opening equivalent to symbols such as a picogram, a letter or a figure 10.

The edge of the plates 5 are fronted by having been cut along a plain, which creates a slanting angle against the main surface 51 of the plates 5. The angle α is at most 60° and is preferable in production at around 45° at the side edges of the plates. The upper and lower horizontally oriented side edges are at angle α at most 70° , preferably around 45° , at the side edges of the plates. The surface edge 52 of the plates 5 is coated with an opaque material 11 along at least its outer rim where it meets the stencil print 9. It is preferable that the entire surface of the rim 52 is coated with an opaque layer 11.

A rim surface 53 of the plate 5 which creates a sharp angle α with the outer main surface 51 can ideally also be coated with an opaque layer 12 at least along that part of the edge which meets the stencil 9 on the outer main surface 51. The plates 5 have both outer edges 52, 53 formed to be complementary and are covered as shown in figure 3.

Figure 3 also illustrates a source of light 3 for a light box 2 and one can see the advantage of coating the edge 52 with an opaque material 11. If there is any gap between the adjoining edges 52, 53 of the plates 5, light from the source may shine through this gap only on condition that the light forms an angle against the surface 51, which is equivalent to the angle β or larger than the angle β . If, moreover, an opaque coating 12 is placed on the surface edge 53 in the proximity of the part of the rim adjoining the outer main surface 51, only light which forms the angle β against the main surface 51 will pass through any seam which may exist.

The surface edges 52, 53 would preferably form such a flat cutting surface after cutting with a water jet, that the plates 5 could in practice be joined without any seepage of light through the seams, at least if the edge 52 is coated 11 up to the stencil 9. Since the plates 5 have phased surface edges 52, 53 this would permit a certain degree of space between the adjoining plates 5 without any disturbing seepage of light occurring.

Since the plates 5 can be stacked in two directions, the side 6 through which light can pass in the light box 2 can be free of guide rails so that the observer's impression of the side 6 of the box 2 would consist of the seamed plates 5 directly adjoining each other without the seams being distinguishable in practice. By producing the plates 5 using a transparent material such as a polymer plastic, which would preferably be coloured with fluorescent colouring, the light box has an attractive appearance without the visual disturbance of controls between the rows of

the plates 5.

The coating 9 which defines the symbol surfaces 51 through which light shines are, as mentioned, preferably imprinted with stencils but it is obvious to a craftsman that the opaque surfaces may be produced in any number of ways. The coating 11,12 would best be painted on but could of course also be established using another method or be formed by another technically feasible method so as to prevent any disturbing light seepage from occurring. This is also the case for the surfaces and rim areas which are situated close to the surface edges 52, 53 as well as on the side 6 of the box 2 which allows light through and on the plates 5.

So the coating 11 may be achieved by painting. In this way the plates 5 may be stacked so that the surface edges 52 lie on a common plane which would mean that the surface edges 52 could be painted with the coating 11 closely adjoining the layer 9. When coating 11 has hardened the stack can be divided up.

In one embodiment example the plates 5 can be provided with hooks 13 and extensions 14 (see figure 5) in a horizontal direction to ensure that they are also securely attached along the overlapping seam. Thanks to said hooks 13 and extensions 14 in the longitudinal sides of the plates an extra stability is achieved along the sides to ensure that the rows are as straight as possible and to ensure accurate design for the width of the symbols. This would allow for symbols adapted for writing with typographical carefully measured accuracy.

As can be seen in the reference numeral 17 i figure 4 any gaps resulting from unevenness in manufacture or as a result of variations in the breadth of the symbols would be taken up by the overlap where the last symbol plaate in each row is completely black and covers the black frame around the horizontal surface of the front.

In an alternative form of production, the light box could be equipped with an outer transparent sheet 42, in yet another form the sheet 42 could be foldable and attached with a hinge device to one edge of the frame 7 of the box 2. In this way one could place the box 2 with the layer 41 on a horizontal plane which would make it easier to create the desired message with the plates 5 placed the right way round in relation to the observer on the material consisting of the sheet 41 after which the lid sheet 42 can be closed and locked into place.

In figure 4 we can see an alternative where a source of light 3 in the form of a strip light is placed along a side edge 7 of the box 2 and the sheet 41 would then preferably be about the same thickness as the strip light 3 in order to create a light conductor. The main surface of the back of the sheet 41 could then be suitably equipped with a white layer 46 which would deflect the light generally at a transverse angle against the plane of the sheet 41.

Claims

1. Illuminated sign consisting of a box (2) with at least one source of light (3), said box (2) comprising at least one side (4) which partially allows light to pass through to detachable but attached plates (5) which are coated (9) to define symbols such as letters or figures (10), **characterized in** that the side (6) comprises a wall (41) through which light can shine against which the plates (5) are mounted fixed to the wall (41) by a coating of adhesive in the attached outer areas and in that the plates (5) are sealed together directly against each other at the edges in two different directions in the plane of the side (6).
2. Illuminated sign according to claim 1, **characterized in** that means (11) is provided for limiting the flow of light from the light source (3) between the seams between adjacent plates (5).
3. Illuminated sign according to claim 1 and 2, **characterized in** that the wall (41) acting as a light conductor is formed whereby at least the foremost main surface area is a dull sheet.
4. Illuminated sign according to any of the claims 1-3, **characterized in** that the plates (5) are provided with hooks (13) and corresponding extensions (14) along the length seams to provide accurate symbol design and side stability.
5. Illuminated sign according to any of the claims 1-3, **characterized in** that the plates (5) having a rectangular form so that the opposing edges of the plates (52, 53) are flat and form a 90° angle against the main surface (51) of the plates (5) so that the plates (5) are attached by means of an overlapping seam.
6. Illuminated sign according to any of the claims 1-5, **characterized in** that the plates (5) being produced of a material which allows light to shine through for the formation of a symbol (10) by means of an opaque layer of stencil (9) being printed on

the side facing away from the box (2).

7. Illuminated sign according to claim 6, **characterized in** that the stencils (9) reaching at least to the edge of the outer surface area (51) of the plates and by the frosted front edges (52) create a blunt angle β with the outer main surface (51) which is coated with a very opaque material (11) at least in the areas along the edges adjoining the outer main surface area (51).

8. Illuminated sign according to claim 7, **characterized in** that the plate edges (53) which create a sharp angle α with the plates' (5) outer main surface (51) being coated with an opaque layer of material (12) at least in the area adjoining the plates' (5) outer surface area (51).

9. Illuminated sign according to any of the calims 6-8, **characterized in** that the outer edges (52, 53) of the plates (5) creating a sharp angle α of at most 70° against the main surface of the plates (51) where the angle is ideally around 45° .

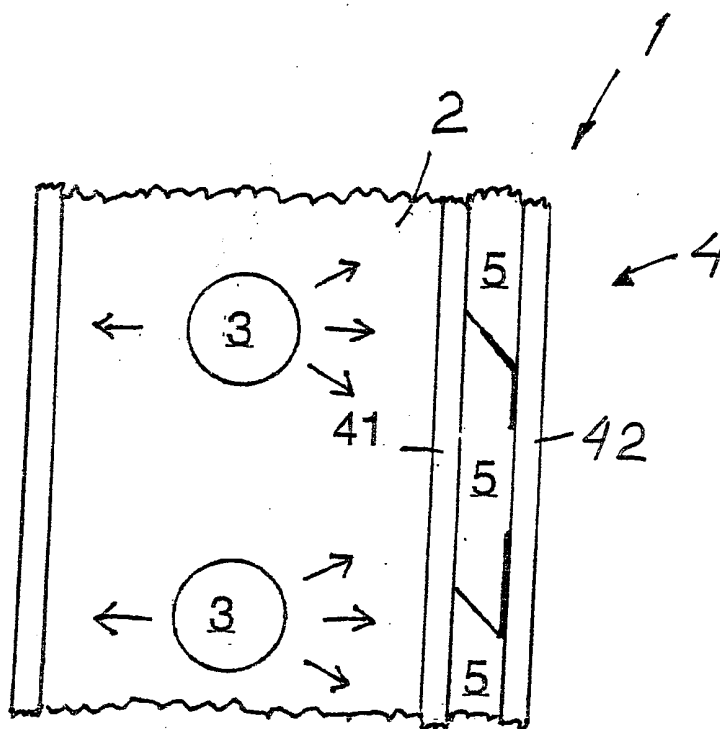


Fig. 1

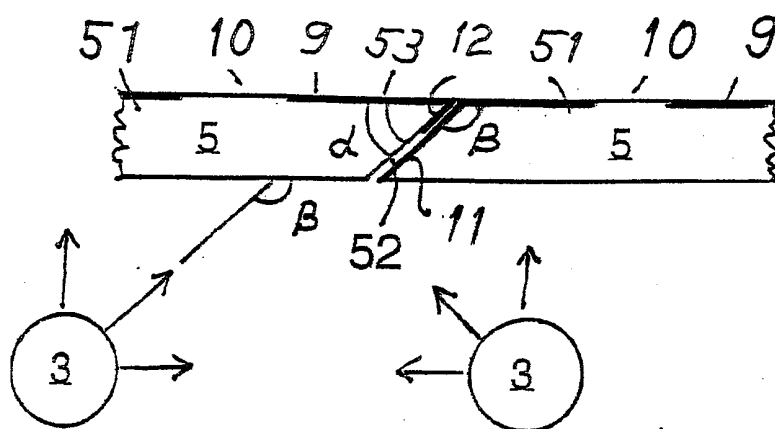


Fig. 3

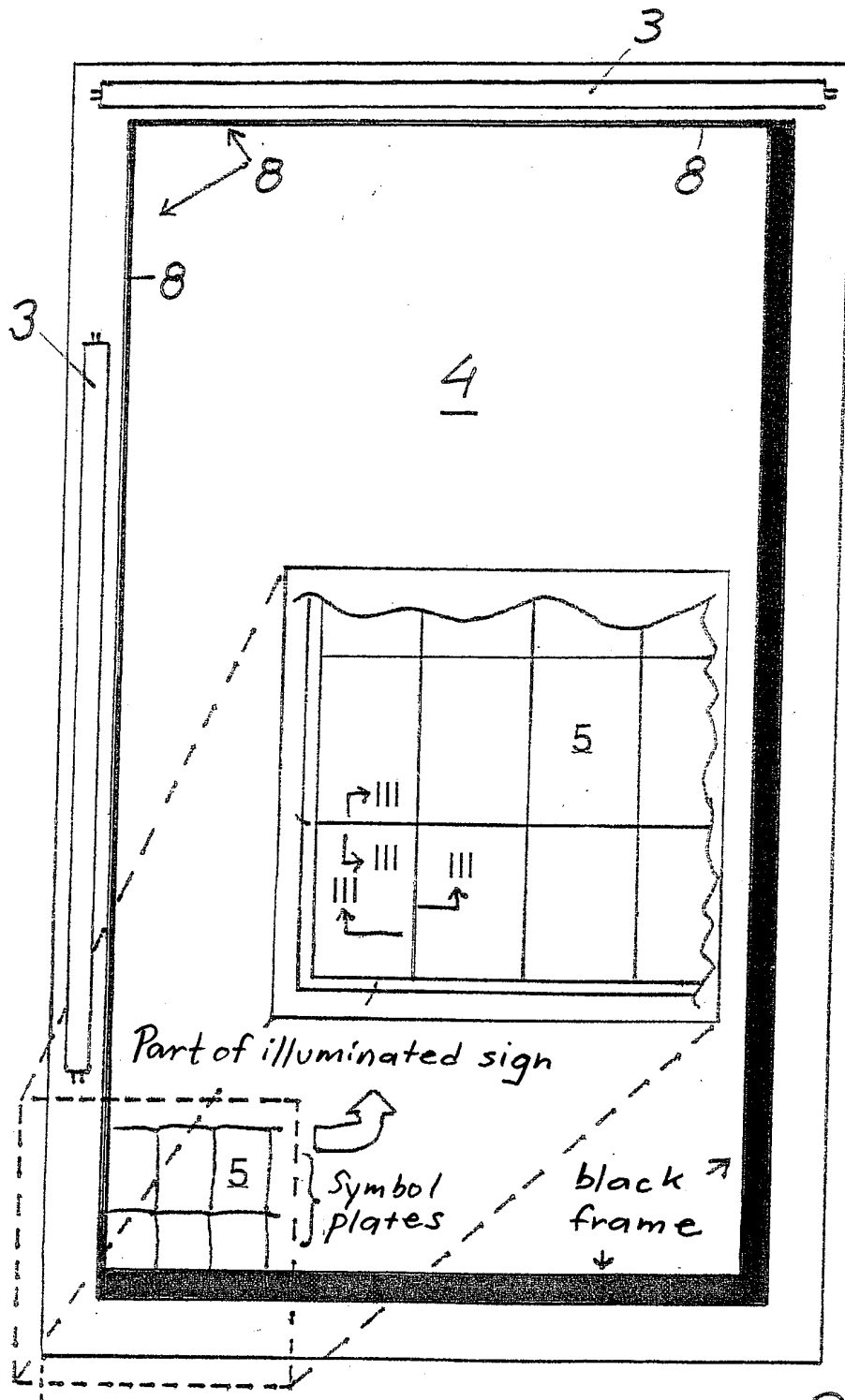
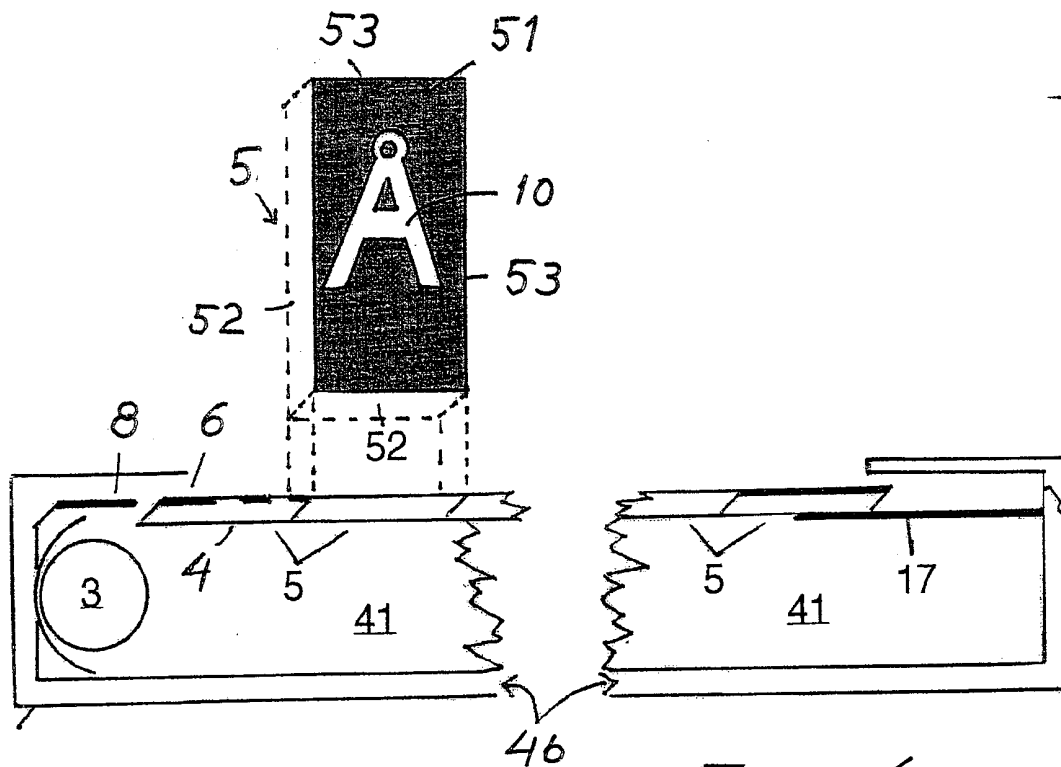
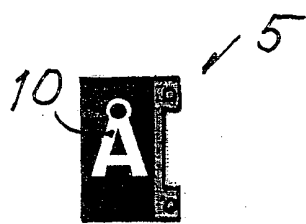
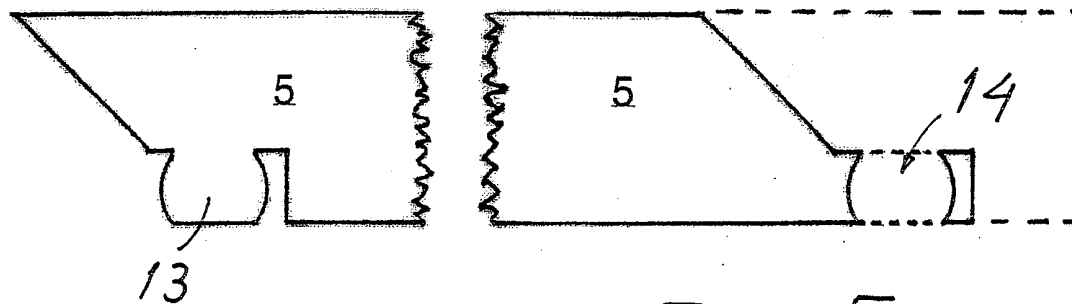
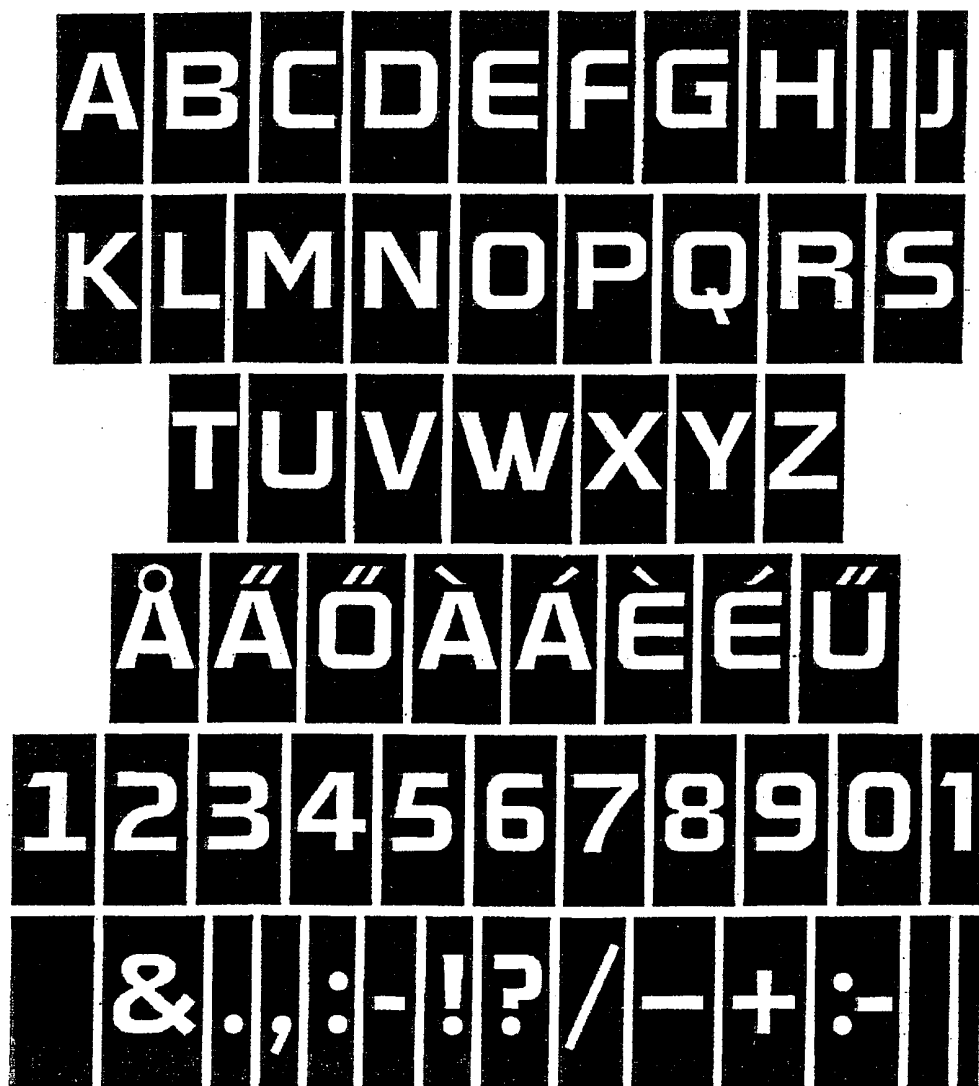


Fig. 2



*Fig. 6*

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/01557

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G09F 13/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G09F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4602448 A (H.R. GROVE), 29 July 1986 (29.07.86) --	1-9
A	US 4765080 A (W.L. CONTI), 23 August 1988 (23.08.88) -- -----	1-9

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT
Information on patent family members

02/11/99

International application No.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4602448 A	29/07/86	NONE	
US 4765080 A	23/08/88	NONE	