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(54) Title: PICTURE FRAME WITH ILLUMINATION

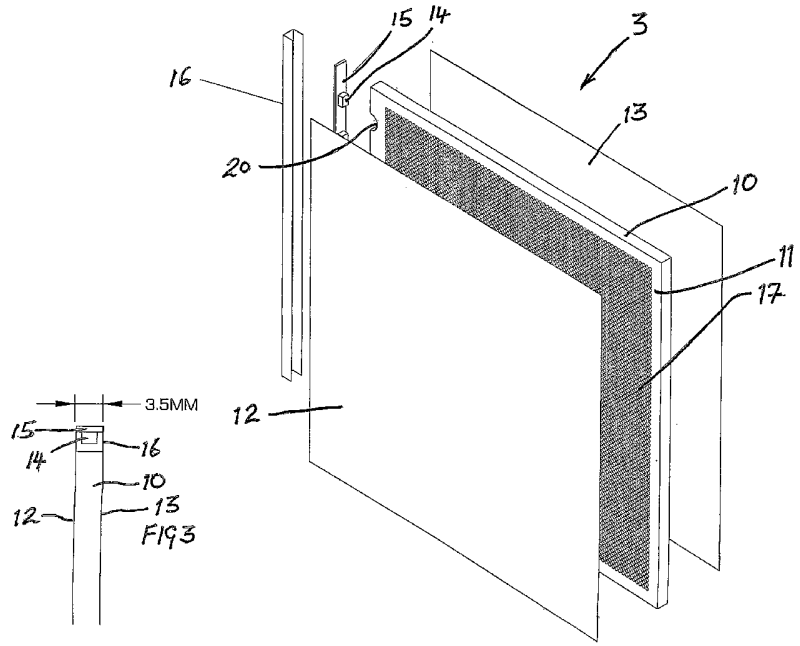


FIG 3

(57) Abstract: An illumination panel assembly in or for use in a picture frame for back illumination of a picture or photograph displayed in the frame comprise a sheet of transparent material (10) having a textured front surface produce by a screen printed dot matrix pattern of white ink to maintain an air gap between the front face and a translucent film (12) positioned against the transparent sheet (10), whereby light emanating from a series of light emitting diodes (14) disposed along an edge of the transparent sheet is uniformly transmitted over the area of the textured front face.

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Picture Frame with Illumination

This invention is concerned with picture frames for the display of pictures and photographs. The invention is also concerned with an illumination panel assembly and resides especially in an illumination panel assembly in or suitable for use in a picture or photo frame.

Personal photographs and pictures are commonly mounted in frames for display and external light, such as daylight or the light emitted by electric lamps, is generally relied upon for illuminating the picture or photograph so that it is easily visible to a person viewing it. There are known back illumination devices which are used, for example, to illuminate drawings and photographic negatives from the rear, but these known devices are large and unsuitable for incorporation in a picture or photo frame.

In accordance with one aspect of the present invention there is provided a picture frame for display of a picture or photograph comprising a frame structure defining a viewing window, the picture/photograph being positioned behind the window, an illumination panel mountable to the frame structure behind the picture/photograph and operable to illuminate the rear of the picture/photograph evenly over substantially the entire area thereof corresponding to the area of the viewing window, the illumination panel comprising a sheet of transparent material with front and rear faces and having a texturing material applied to the front face in a distributed pattern to maintain an air gap between the front face and a film of translucent material positioned against the transparent sheet, and a source of light disposed along an edge of the transparent sheet.

In accordance with another aspect the invention provides an illumination panel assembly for back illumination of a picture or photograph in a display frame, comprising a sheet of transparent material having front and rear faces, and a source of light disposed along at least one edge portion of the transparent sheet, the front face of the transparent sheet having a texturing material applied thereto in a distributed pattern to maintain an air gap between the front face and a film of translucent material applied against the transparent sheet whereby substantially uniform transmission of light emanating from the source of light is obtained through the translucent film over at least the area of the front face having said pattern of texturing material applied thereto.

The surface texturing material is conveniently printed onto the front face of the transparent sheet, and in a preferred embodiment the texturing material is applied as a screen printed dot matrix or other variable density pattern of white ink. An opaque backing sheet is preferably positioned against the rear face of the transparent sheet to avoid unnecessary loss of light. Nonetheless, if desired the front and rear faces could be textured with printed material and have translucent layers applied against them, such as for illuminating two pictures or photographs placed against the front and rear sides of the panel respectively.

The source of light may be a plurality of discrete light sources, preferably opto electronic devices, in particular light emitting diodes, that are conveniently mounted on a circuit board disposed along an edge of the transparent sheet. The light sources can be located within a casing, conveniently formed by a channel member, so that light emitted from the sources is directed into the transparent sheet at the edge where the light sources are located.

The illumination panel assembly according to the invention can have a total thickness of only a few millimetres, e.g. 2 to 7

mounting directly behind a picture or photograph within an otherwise conventional picture or photo frame, and thereby a completely new visual effect is achieved by a uniform level of back illumination of the picture/photograph over the whole visible area of the picture/photograph.

To facilitate the mounting of the illumination panel assembly within an existing picture frame it can be supplied with an annular mount having a centralised opening and an off-centre recess at the rear adapted to receive the illumination panel assembly so that the edge part including the light sources is concealed by the mount. The mount is preferably made of sheet material so that it can be easily cut to shape and size to fit the picture frame, and conveniently has a corrugated form.

An embodiment of the invention is described in more detail below with reference to the accompanying drawings, in which:-

Figure 1 is an exploded perspective view illustrating a picture/photo frame embodying the invention;

Figure 2 is an exploded perspective view of an illumination panel assembly in accordance with the invention and intended to be incorporated in the frame of Figure 1;

Figure 3 is a partial cross-section view through the illumination panel assembly of Figure 2;

Figure 4 is a rear elevation of a mount adapted to receive the illumination panel assembly; and

Figures 5 and 6 are cross-sections taken along the lines V-V and VI and VI respectively in Figure 4.

The picture/photo frame shown in Figure 1 includes a frame structure 1 defining a viewing opening or window 2 and provided with a glass or transparent plastic front as is well known. The picture or photographic print (not shown) to be displayed is positioned within the frame directly behind the glass front. An illumination panel assembly 3 is positioned within the frame structure directly behind the picture/photograph. A backing panel 4 is in turn located behind the illumination panel 3 assembly and is secured in the frame structure 1 by clips, screws or any other known manner. As is conventional, the backing panel 4 may carry a fold-out stand or support 5.

The illumination panel assembly 3 is shown in detail in Figures 2 and 3. It comprises a sandwich construction with a clear plastic e.g. acrylic sheet 10 having a front face 11 against which an opal film front translucent layer 12 is positioned, and a rear face against which an opaque backing sheet 13 is placed. Along one edge the plastic sheet 10 has a series of recesses 20 for receiving respective light emitting diodes 14 mounted on a common printed circuit board 15 which is housed within a casing formed by an extruded channel member 16. In the assembled illumination panel 3 the sides of the channel member 16 cover the diodes 14 whereby the light emitted by the diodes is constrained to enter the material of the clear plastic sheet and to become distributed therein by internal reflection. The sides of the channel member also serve to hold the opal film 12 and the backing sheet 13 together with the transparent sheet 10. The front face 11 of the clear plastic sheet 10 has a surface texturing material applied in a distributed pattern 17 over the main part of its area, and in particular over the area corresponding to the area of the picture/photographic print to be back illuminated. The texturing is produced by screen

matrix pattern, or the like on the front face of the sheet 10 and it serves to define a very small air gap, i.e. of the order of microns in thickness, between the plastic sheet 10 and the opal film 12. As well as creating light reflections at the sheet surface, by ensuring the air gap the texturing material ensures an even light distribution over the textured area and, in particular avoids a pixelated light distribution effect which tends to occur without an air gap present. The function of the opaque backing sheet 13 is to avoid unnecessary light loss through the reverse side of the light transmission sheet 10. With the illumination panel assembly constructed as described it has been found possible to achieve a substantially uniform level of light transmission over the main area of the front face 11, with illuminating diodes positioned along one edge only, and in particular there is no discernable variation in light intensity across the surface in the direction away from the diodes. Nonetheless, illuminating diodes could be located at more than one edge of the light transmission sheet 10 and this may be desirable if very large pictures or photographs are to be displayed.

Constant electric power supply for energising the light emitting diodes can be supplied from an electronic power supply or battery (not shown) which in either case may be mounted at the rear of the backing panel 4 and be connected to the printed circuit board 15 by wires 18, 19 (schematically represented in Fig. 1) and possibly an on-off switch which can also be located on the rear of the backing panel.

From the foregoing description it will be understood that the invention provides a picture frame with a panel for back illumination of the image displayed. This result is achieved by an illumination panel assembly of slim construction, e.g. having a thickness of 2 to 7 mm, and preferably about 3.5 mm, capable of fitting within most standard picture frames. The il

very low voltage levels and with very little heat generation so that it is safe in use. The invention thereby provides a new visual display effect for pictures and photographs and can also be used for background lighting effects or even low level nightlights.

The illumination panel assembly as illustrated in Figure 2 can be supplied for use in an existing picture frame and to facilitate the positioning and mounting of the panel assembly in such a frame an annular mount 30 as illustrated in Figures 4 to 6 may be provided. The mount is formed from sheet material and in cross-section has a corrugated configuration defining a series of alternating annular ridges 31 and grooves 32. The mount has a centralised opening 34 and a rebate 35 is provided around the periphery of the opening 34 to form a recess at the rear of the mount for receiving the illumination panel assembly. The rebate 35 defines a rearwardly facing shoulder 36 against which the illumination panel assembly abuts with the picture or photograph to be displayed sandwiched between them. At one side 37 of the opening 34 the width of the rebate is increased for accommodating the channel member 16 enclosing the circuit board and light emitting diodes so that they are concealed by the mount when the completed assembly in viewed from the front. The sheet material of the mount is easily cut with a sharp cutting instrument, such as scissors, so that a peripheral portion can easily be removed for adjusting the shape and/or size of the mount to suit the frame in to which it is to be fitted.

Modifications are of course possible without departing from the scope of the invention. For example, whilst a rectangular frame has been specifically described the invention is applicable also to frames of other shape, such as oval, circular or hexagonal. Furthermore, the invention can be applied also to three dimensional frames such as cubic photo display frames.

Claims:

1. A picture frame for display of a picture or photograph comprising a frame structure (1) defining a viewing window (2), the picture/photograph being positioned behind the window, an illumination panel mountable to the frame structure behind the picture/photograph and operable to illuminate the rear of the picture/photograph evenly over substantially the entire area thereof corresponding to the area of the viewing window, the illumination panel comprising a sheet (10) of transparent material with front and rear faces and having a texturing material (17) applied to the front face (11) in a distributed pattern to maintain an air gap between the front face and a film (12) of translucent material positioned against the transparent sheet, and a source of light (14) disposed along an edge of the transparent sheet (10).

2. An illumination panel assembly for back illumination of a picture or photograph in a display frame, comprising a sheet of transparent material (10) having front and rear faces, and a source of light (14) disposed along at least one edge portion of the transparent sheet (10), the front face (11) of the transparent sheet (10) having a texturing material (17) applied thereto in a distributed pattern to maintain an air gap between the front face (12) and a film (12) of translucent material applied against the transparent sheet (10) whereby substantially uniform transmission of light emanating from the source of light is obtained through the translucent film (12) over at least the area of the front face having said pattern of texturing material applied thereto.

3. A picture frame or an illumination panel assembly according to claim 1 or 2, wherein the texturing material is printed onto the front face (11) of the transparent sheet (10).

4. A picture frame or an illumination panel assembly according to claim 3 wherein the texturing is printed onto the front face of sheet material in a regular dot matrix pattern.

5. A picture frame or an illumination panel assembly according to claim 3 or 4, wherein the texturing material is a white ink material.

6. A picture frame or illumination panel assembly according to any one of claims 1 to 5, wherein an opaque backing sheet (13) covers the rear face of the transparent sheet.

7. A picture frame or an illumination panel assembly according to any one of claims 1 to 6, wherein the source of light comprises a plurality of discrete light sources (14).

8. A picture frame or an illumination panel assembly according to claim 7, wherein the light sources are located in recesses (20) at the peripheral edge of the transparent sheet.

9. A picture frame or an illumination panel assembly according to claim 7 or 8, wherein the light sources are opto electronic devices (14).

10. A picture frame or an illumination panel assembly according to claim 8 or 9, wherein the light sources are diodes (14).

11. A picture frame or an illumination panel assembly according to any one of claims 7 to 10, wherein a circuit board (15) is mounted at an edge of the transparent sheet (10) and carries the light sources (14) positioned along the edge of the transparent sheet.

12. A picture frame or an illumination panel assembly according to claim 12, wherein the circuit board (15) and the light sources are accommodated in a channel-shaped housing (16).

13. A picture frame or an illumination panel assembly according to any one of claim 1 to 12, wherein the panel assembly of the transparent sheet (10) and translucent film (12) has a thickness from 2 to 7 mm.

14. An illumination panel assembly according to any one of claims 2 to 13, in combination with an annular mount (30) having a central opening (34) and a recess adapted to receive the illumination panel assembly (3).

15. An illumination panel assembly and mount according to claim 14, wherein the mount (30) is corrugated in cross-section.

16. An illumination panel and mount according to claim 14 or 15, wherein the mount (30) is made of sheet material that can be easily cut with a sharp cutting device for removing a peripheral portion of the mount to enable the mount to be inserted into a picture frame.

17. An illumination panel and mount according to claim 14, 15 or 16, wherein the recess is off-centre relative to the opening (34).

18. An illumination panel and mount according to claim 17 wherein the recess is defined by a rebate (35) around the opening (34), the width of the rebate being increased along an edge of the opening for accommodating the light sources (14).

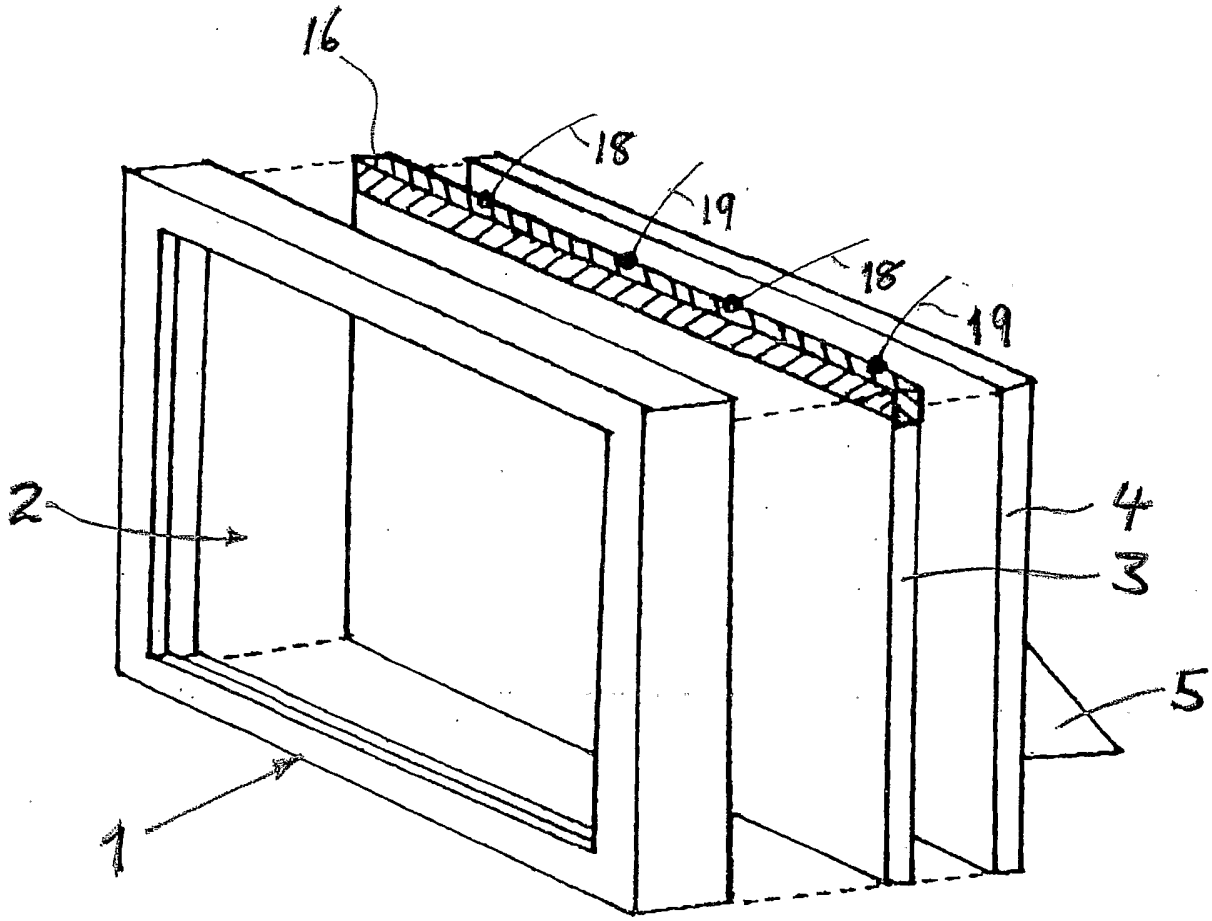


FIG 1

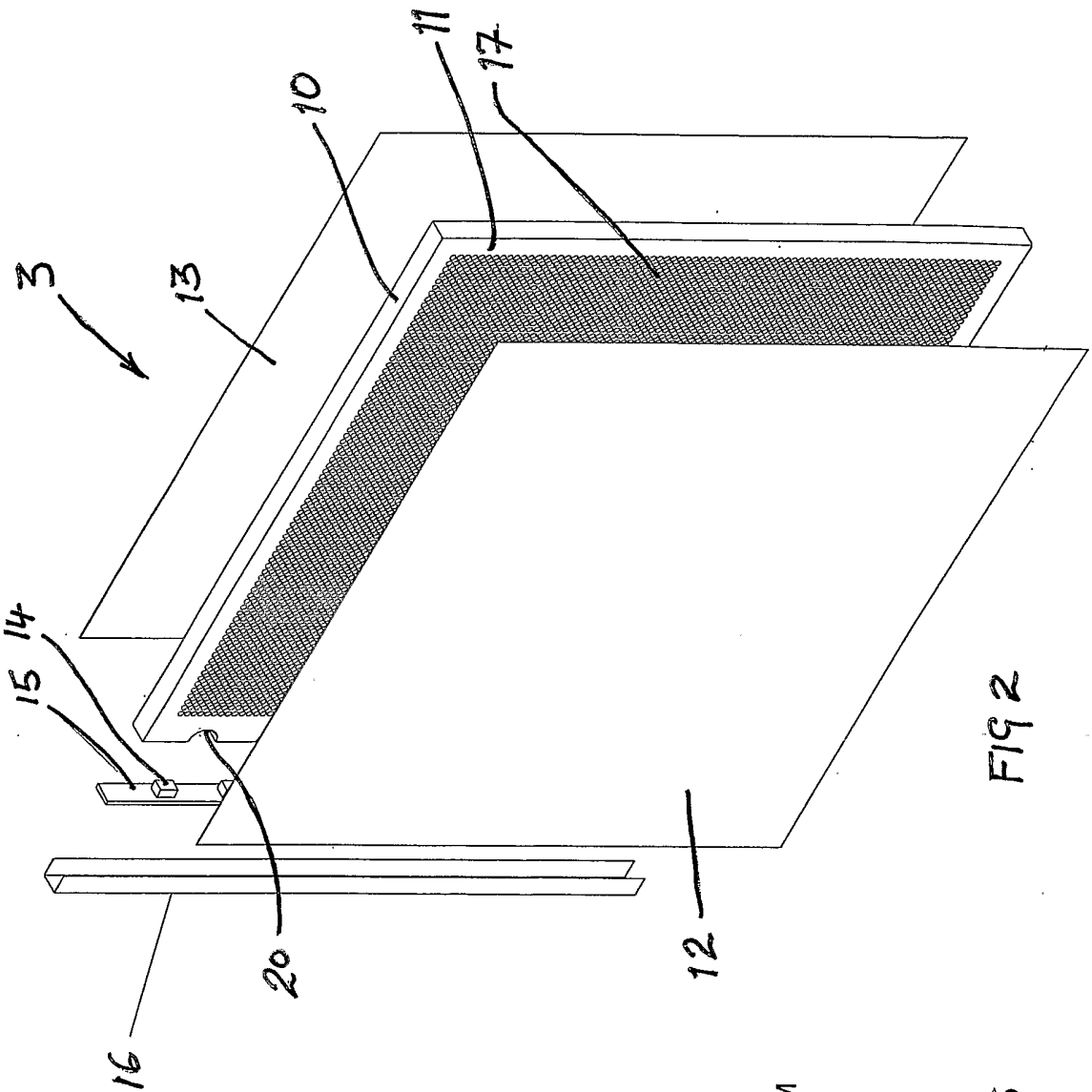


FIG 2

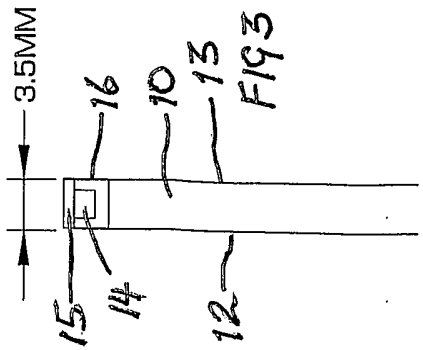


FIG 3

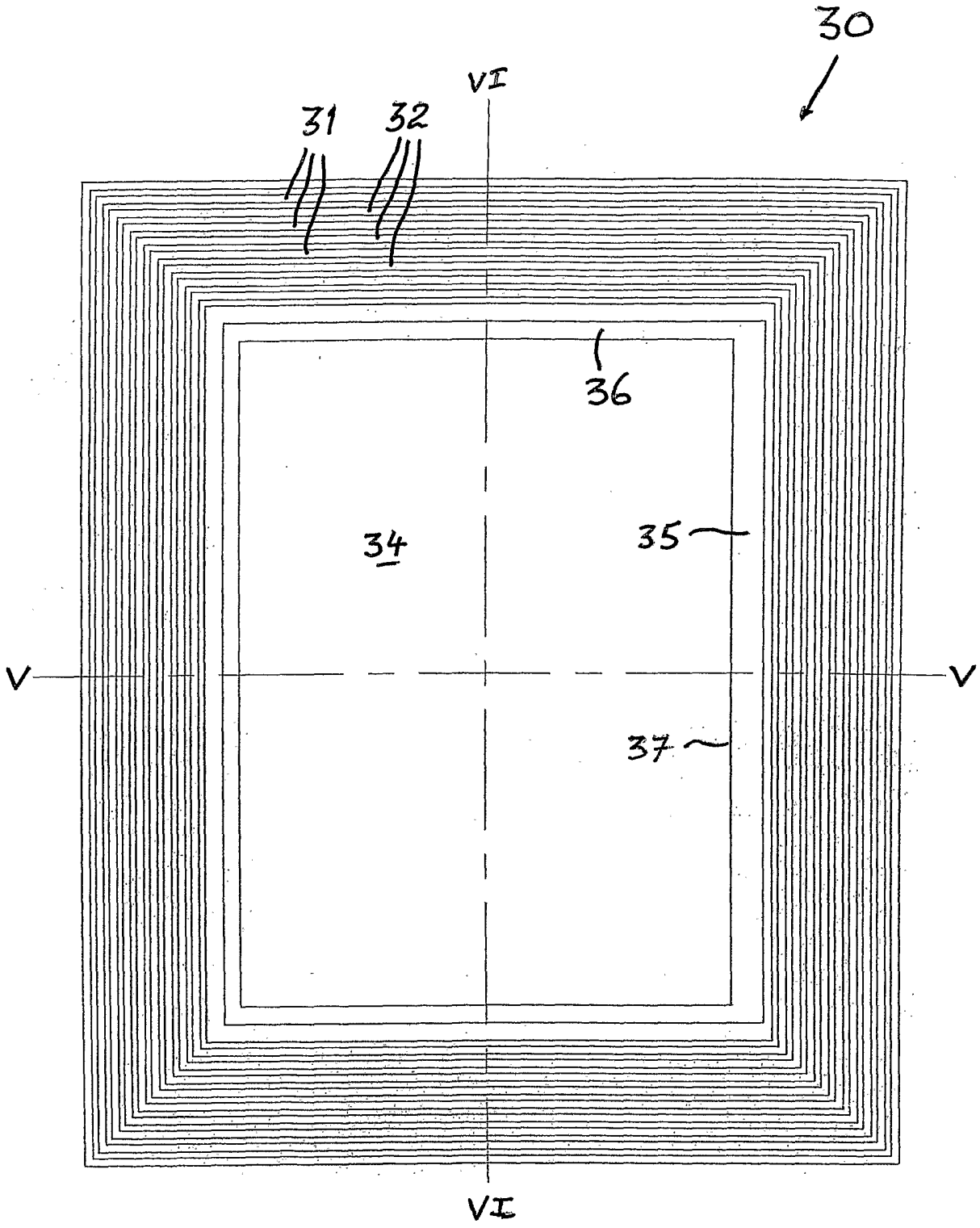


FIG 4

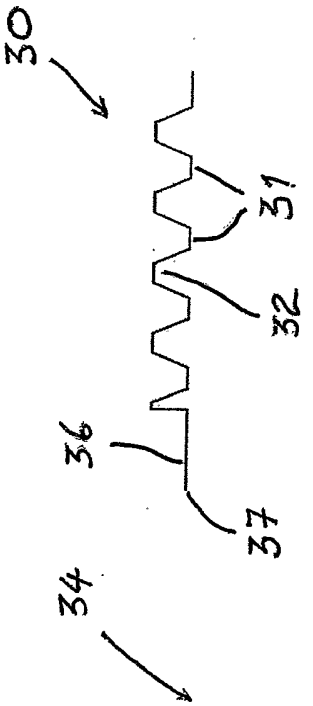


FIG 5

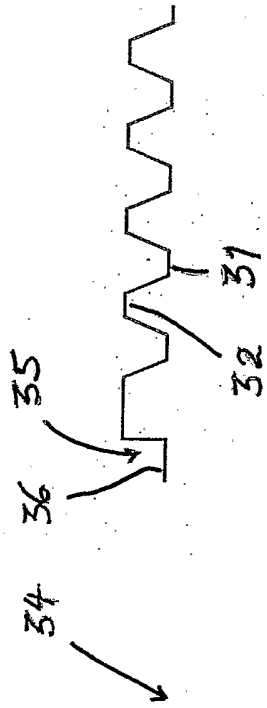
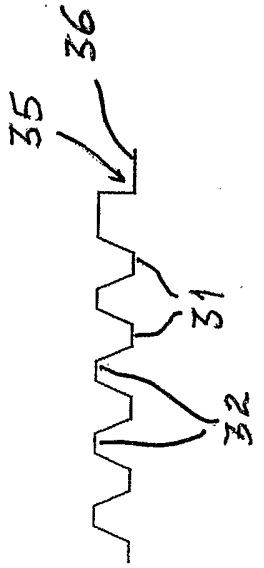
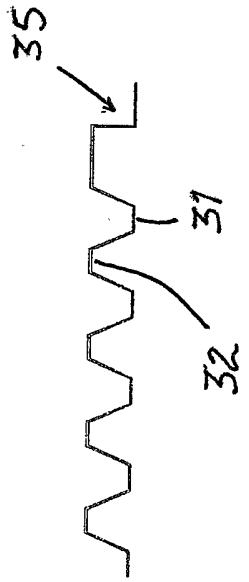


FIG 6





INTERNATIONAL SEARCH REPORT

Inte onal Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A47G1/06 G02B6/00

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)
IPC 7 A47G G02B F21V

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

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	DE 295 01 288 U (LU ALEX ET AL) 12 October 1995 (1995-10-12) the whole document	1,2,6,14

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
4 October 2004	12/10/2004

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Int tional Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

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