(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 005 009 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
31.05.2000 Bulletin 2000/22

(51) Int. Cl.[7]: **G09F 11/00**

(21) Application number: **98203967.9**

(22) Date of filing: **26.11.1998**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(71) Applicant: **van Kerckhoven, Filip**
1860 Meise (BE)

(72) Inventor: **van Kerckhoven, Filip**
1860 Meise (BE)

(74) Representative:
Quintelier, Claude et al
Gevers & Vander Haeghen,
Patent Attorneys,
Rue de Livourne 7
1060 Brussels (BE)

(54) Method for manufacturing a display device.

(57) A method for manufacturing a display device wherein a first fixedly mounted picture, which is lengthwise divided in strips, is associated with a second picture which can be shifted and which is also lengthwise divided in strips, and wherein the second picture is applied on a transport member provided for shifting the second picture with respect to the first one and render it in this way visible, and wherein the first and second picture are each time printed on a carrier which is already stripwise built up and wherein, upon mounting, the strips of the second picture are each time placed behind those of the first one.

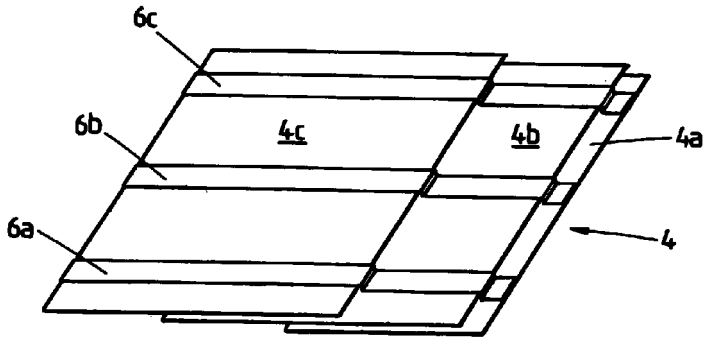


Fig. 2

EP 1 005 009 A1

Description

[0001] The invention relates to a method for manufacturing a display device where a first fixedly mounted picture, which is lengthwise divided in strips, is associated with a second displaceable mounted picture, which is also lengthwise divided in strips, and wherein the second picture is applied on a transport member provided for shifting the second picture with respect to the first, and render it in such a manner visible.

[0002] Such a method is known from the US patent No. 3,659,367. With the known method the first fixed picture is built up in two parts which are shifted into each other. Thereafter, the second picture is stripwise shifted into the fixed picture, in order to let the two pictures shift with respect to each other, and thus alternatively display the first and the second picture. With the known method, the first and the second picture are each time printed on a plate, which is thereafter divided in strips. The strips show a profile which can only be accurately obtained by a mold having been designed for this purpose. Moreover, it is necessary to form two identical pictures of the first one.

[0003] A drawback of the known method is that the manufacturing of two identical pictures for the first picture imposes relatively high constraints to the printing process. These constraints cannot be fulfilled for example with an inkjet color printer and require a professional printer. Moreover it is necessary to use a printing disk in order to obtain the required precision. Indeed the smallest deviation between the two pictures, which form the first picture, will be directly visible and lead to unacceptable deforming of the picture.

[0004] The object of the invention is to realize a method for manufacturing a display device with two pictures which can be shifted and which does not impose such critical constraints.

[0005] A method according to the invention is therefore characterised in that the first and second picture are each time printed on a carrier which is already stripwise built up and wherein, upon mounting, the strips of the second picture are each time placed behind the one of the first picture. The printing being done on a stripwise built up carrier, the picture is directly printed on the strips and does not necessitate two separate pictures for the fixed picture. This enables to print the picture each time as a whole and it is no longer necessary to print two identical pictures. The printing can thus be done by means of an inkjet printer. By moreover shifting each time the strips one behind the other, a simple mounting of the picture is realized which, if wanted, can be done by the user himself.

[0006] A first preferred embodiment of a method according to the invention is characterised in that the strips of the first picture are longitudinally connected with each other on the lateral border. The different strips are therefore easily and reliably connected with each other. By applying this connection on the lateral border, it does not disturb the movement of the second picture.

[0007] A second preferred embodiment of a method according to the invention is characterised in that the strips of the first as well as of the second picture are, with the exception of the upper strip, each time connected with each other in an overlapping manner, such that in a direction as from the upper border on a preceding strip overlaps a subsequent one and wherein the distance over which the strips overlap each other is substantially smaller than that printed part of the strip. This simplifies the mounting of the strips and offers a larger flexibility upon shifting the picture strips of the first and the second picture into each other.

[0008] Preferably, the first picture is broader than the second one. This enables to offer sufficient space for mounting the second picture into the first one.

[0009] The invention will now be described with more details by means of the drawings showing an embodiment.

[0010] In the drawings :

Figure 1 shows schematically the set up of the fixed picture ;
Figure 2 shows schematically the set up of the picture to be shifted ;
Figure 3 gives a cross-section along line III-III' through the fixed picture ;
Figures 4 up to 8 show the building up of the moving picture in the fixed picture ;
Figure 9 shows a cross section through the assembled fixed and movable picture ;
Figure 10 shows the backside of an embodiment of the display device according to the invention ;
Figure 11 shows the propulsion of the picture to be shifted ;
and Figures 12 and 13 show the mounting and cutting mold for manufacturing the picture strips according to the invention.

[0011] In the drawings the same reference has been assigned to a same or analogous element.

[0012] The fixed or first picture 3 is built up of a series of strips 3a, 3b, 3c and 3d as shown in figures 1 and 3. For the sake of clarity only four strips are shown, but it will be clear that the first picture can be formed by more or less than four strips. The strips are, on their lateral border in longitudinal direction and on the backside, connected with each other, for example by means of adhesive tape 5a, 5b. Because the connection is applied on the lateral border, the mounting of the second picture in the first one will not be disturbed, as will clearly appear hereinafter.

[0013] The strips 3b up to d have preferably the same length, whereas picture strip 3a may be somewhat longer. The different picture strips are each time connected in such a manner that a preceding, for example 3a, partially overlaps the subsequent 3b, for example over substantially 20 to 25 % of the strip length. Due

to this a passage is each time formed between the different strips, which passage is limited by the overlapping strip parts and which will serve as a guide for the second picture.

[0014] The second picture 4 is also stripwise 4a, 4b and 4c built up, as shown in figure 2. The strips are also connected to each other, for example by means of adhesive tape 6a, b and c applied on the backside. Using here three strips of adhesive tape is due to the fact that the second picture can be shifted and is thus submitted to displacement forces, what necessitates a more solid connection. That the connection is not applied along the border side originates from the fact that due to this the border can be slightly bent upon mounting the strips of the second picture between the one of the first. With the second picture, the strips overlap each other over a larger length, more than 50 %, as with the first one. Also with the second picture a preceding strip 4a overlaps a subsequent strip 4b. This larger overlap is necessary for stripwise mounting the pictures into one another as well as for shifting the strips of the first picture with respect to the one of the fixed picture.

[0015] With a method according to the invention, only after the different strips of the first and/or the second picture are connected with one another, such as described, the picture is printed on the front side of the strips. Because the strips are preferably made of paper, the printing of the picture can be done with an usual inkjet printer, preferably a color inkjet printer. Due to this, the end user can, if he likes, print his own pictures. Because moreover the printing is done directly on strips connected to one another, the tolerance with which the strips are fixed to one another is not too critical. The printing on the strips does also not impose critical constraints on the printing process because the picture is always printed in one printing step.

[0016] The mounting into one another of the picture strips of the second picture in the first fixed picture will now be described by means of the figures 4 to 8. The printed pictures are set up headwise with respect to one another, in such a manner that strip 4a is head to head with strip 3a. Strip 4a of the second picture is now folded over an angle of 180° and afterwards shifted behind strip 3a of the first fixed picture up to when the under border of strip 4a is placed into the passage between the picture strips 3a and 3b. Thereafter picture strip 4b undergoes a same rotation of 180° and is shifted behind strip 3b in an analogous manner as strip 3a. Thereafter strip 4c undergoes the same movement, in such a manner that the different strips are mounted into one another.

[0017] After the strips of the second picture are shifted in the first, a plate 11 is applied on the second picture as shown in figure 10. The assembled set up of first and second picture 12 and plate 11 are now placed in a frame 10, preferably behind a transparent glass sheet 1 (see figure 9). Preferably, behind the glass sheet and before the picture assembly 12, intermediate pieces 2 are applied, which can cover invisible parts of the picture. Plate 11 is for example fixed by means of adhesive tape at the backside of the second picture.

[0018] On plate 11, on the other side than the one where the strips of the second picture are fixed, a spring 13 is attached to a fixing pin 14. The spring 13 has a spring tension which is approximately equal to the mass of the movable part, in such a manner that the latter part will not shift down due to its own weight. An other end of the spring is fixed on a further plate 8 which is fixed on the frame 10. On that plate a motor 9, preferably a synchronous alternative current motor, is fixed. The motor 9 has for example a rotation speed of approx. 10 revolutions per minute which leads to a picture change each 6 seconds. Of course other speeds are also possible. The motor drives an arm 19, for example in a direction shown by arrow 21. A synchronous motor which has an undefined starting direction is preferably used. By an eventual starting in a wrong direction, the correct direction is chosen in case of the slightest blocking.

[0019] The arm 19 exerts a torque on the movement pins 15 and 16 which are applied in grooves 17 and 18 of the plate 11. The pins are fixedly applied. Because the arm rotates, the torque is alternatively exerted on pins 15 and 16. The purpose of applying the pins 15 and 16 in the grooves is for creating some adjustment by mounting the picture, the motor and the arm. Preferably the pins are not permanently fixed.

[0020] When the rotating arm now touches the pin 15, a force is applied thereon, which takes care that plate 11 moves in a downwards direction (arrow 22). Because the second picture is connected with the plate 11, the movement of the plate will cause a movement of the picture strips of the second picture. Due to this, the picture strips of the second picture are shifted behind the one of the first and the first picture appears. When the arm 19 leaves the pin 15, the downwards movement comes to an end and the first fixed picture is completely visible.

[0021] The arm 19 continues to rotate and reaches subsequently the movement pin 16 in groove 18. Due to this, an upward force (arrow 20) is exerted on the plate. Due to this the strips of the second movable picture are now shifted over the one of the first and in such direction (see figure 9) that the strip 4a respectively 4b and 4c will cover the strips 3b, 3c and 3d. In such a manner the second picture is shown. As is shown in figure 9, strip 3a is a white strip on which no picture information is given. The latter is necessary because the picture strips are shifted over each other. Upon further rotation the arm reaches again movement pin 15 and the process repeats.

[0022] The set up of the arm 19 and the pins 15 and 16 is chosen in such a manner that they get in touch with each other in a region where the arm exerts a maximum torque on the pins with less friction. The place of the pins 15 and 16 in the grooves 17 and 18 determines the distance over which the strips are shifted. It is there-

fore also necessary to take this into account upon adjustment.

[0023] In figure 12 an embodiment is given of a mold for cutting the different strips to be printed. A paper sheet is put and clamped into the cutting mold 27 against an abutment border 26. The paper is cut at the requested dimension by a cutting knife which passes along the borders 23 and 28. The grooves 24 serve as conducting member for the cutting knife. By having the knife passing along these grooves, the strips are cut at the desired dimension. The assembling of the strips is done via mold 30, shown in figure 13. The strips 3a, 3b are each time fixed under the clamps 29 against the abutment border 25. Thereafter they are fixed to each other. Once fixed they can be removed from the mold. All sides of the used strips form each time uninterrupted direct lines and consequently are easy to produce, if desired by the end user.

Claims

1. A method for manufacturing a display device wherein a first fixedly mounted picture, which is lengthwise divided in strips, is associated with a second picture which can be shifted and which is also lengthwise divided in strips, and wherein the second picture is applied on a transport member provided for shifting the second picture with respect to the first one and render it in this way visible, characterised in that the first and second picture are each time printed on a carrier which is already stripwise built up and wherein, upon mounting, the strips of the second picture are each time placed behind those of the first one.

2. A method as claimed in claim 1, characterised in that the strips of the first picture are longitudinally connected with each other on the lateral border.

3. A method as claimed in claim 1 or 2, characterised in that the strips of the second picture are longitudinally connected with each other.

4. A method as claimed in claim 2 or 3, characterised in that said strips are connected with each other by means of adhesive tape.

5. A method as claimed in anyone of the claims 1 to 4, characterised in that the strips of the first as well as of the second picture, except for the upper strip, are each time connected with each other in an overlapping manner, such that in a direction as from the upper border on, a preceding strip overlaps a subsequent one and wherein the distance over which the strips overlap each other is substantially smaller than the printed part of the strips.

6. A method as claimed in anyone of the claims 1 to 5, characterised in that the first picture is broader than the second one.

7. A method as claimed in anyone of the claims 1 to 6, characterised in that the first and second picture are printed with an inkjet printer.

8. Display device obtained by application of the method according to anyone of the claims 1 to 7, characterised in that the transport member is formed by a plate connected to a motor.

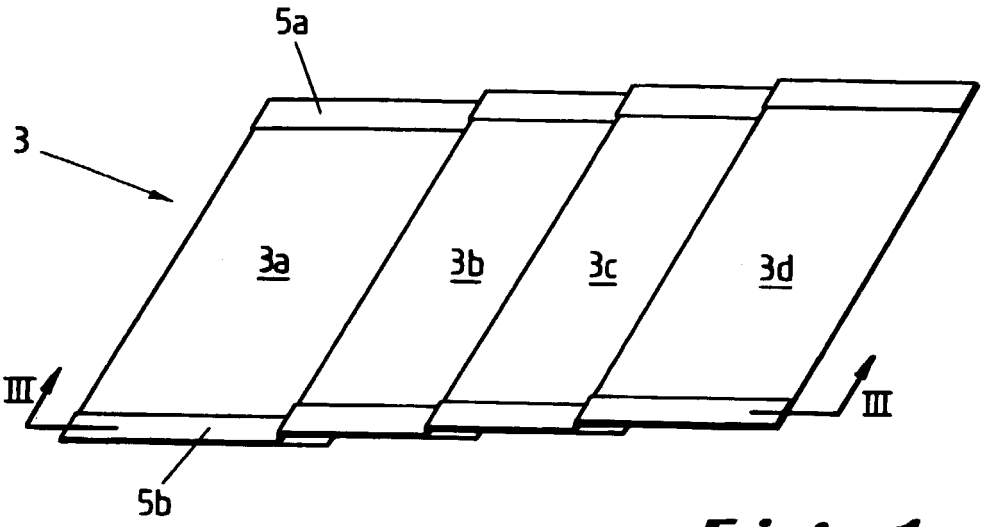


Fig. 1

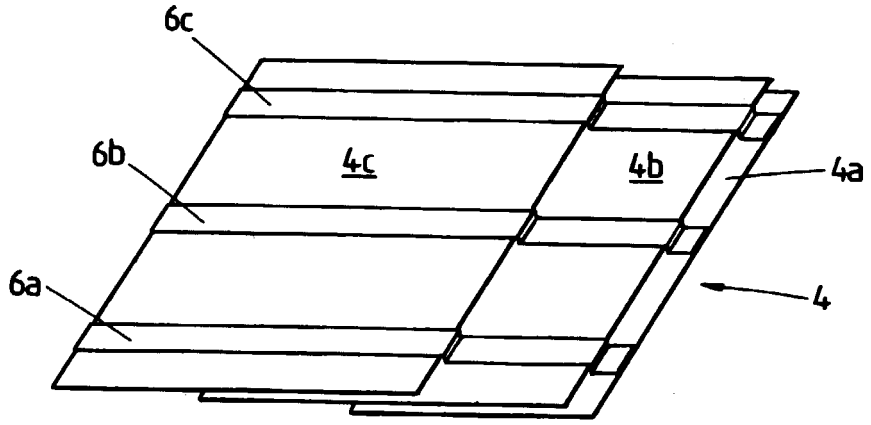


Fig. 2

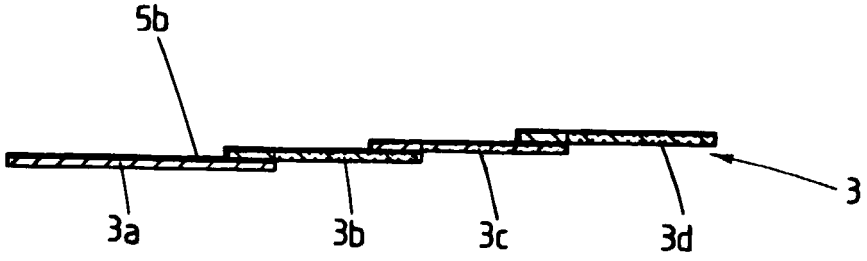


Fig. 3

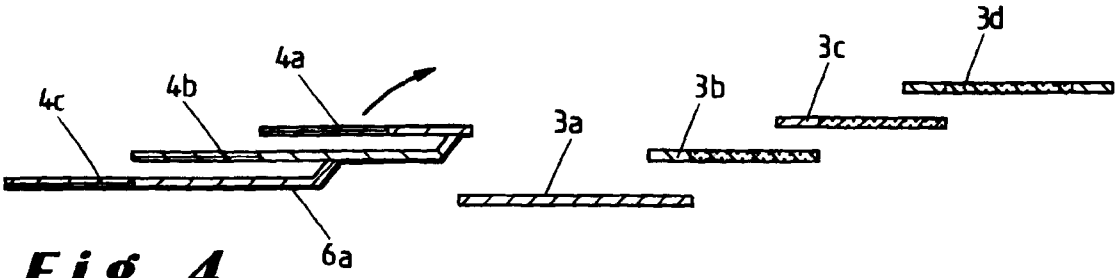


Fig. 4

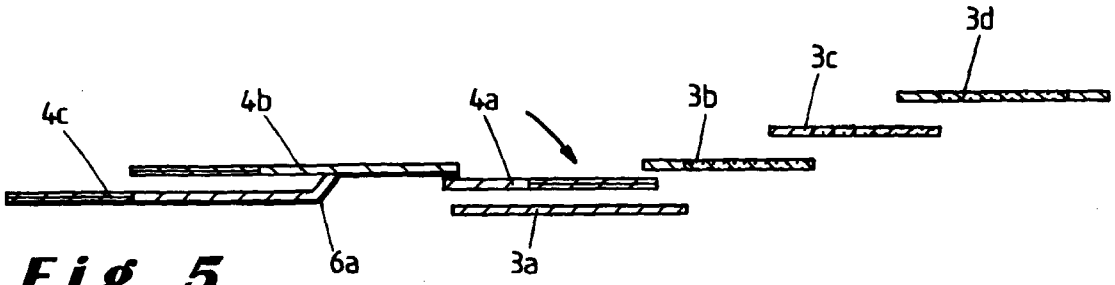


Fig. 5

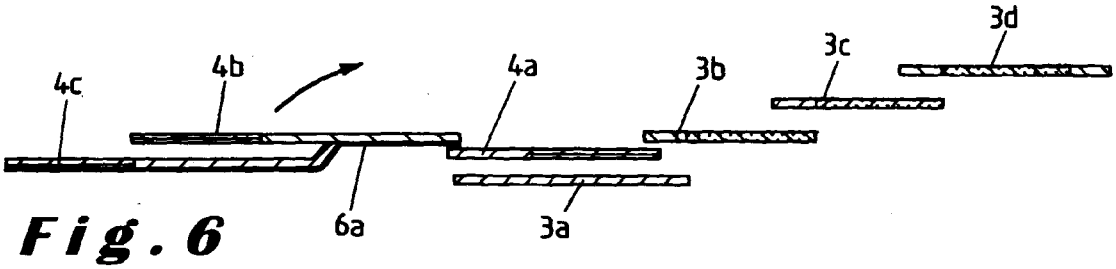


Fig. 6

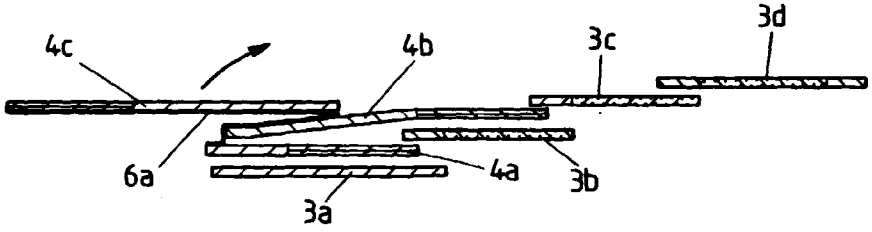


Fig. 7

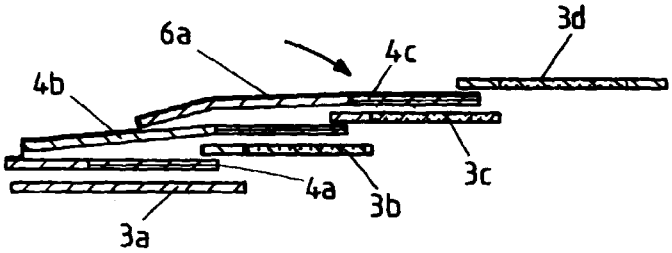


Fig. 8

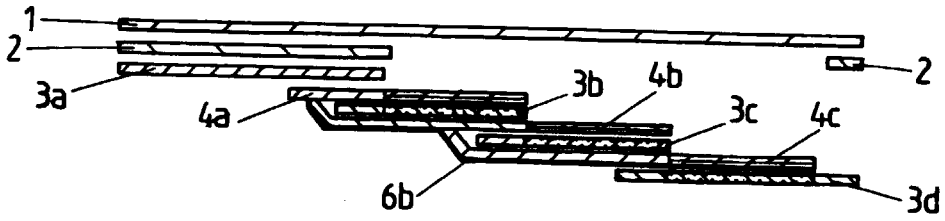


Fig. 9

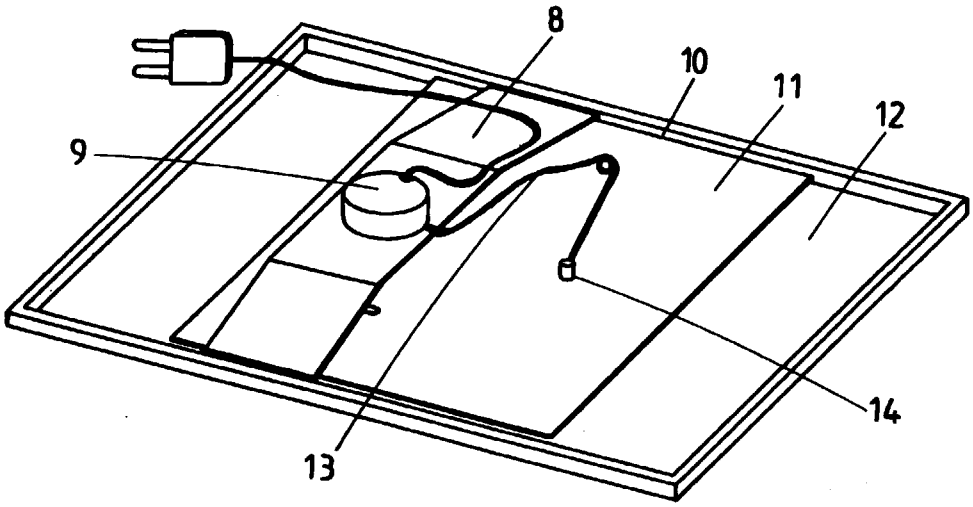


Fig. 10

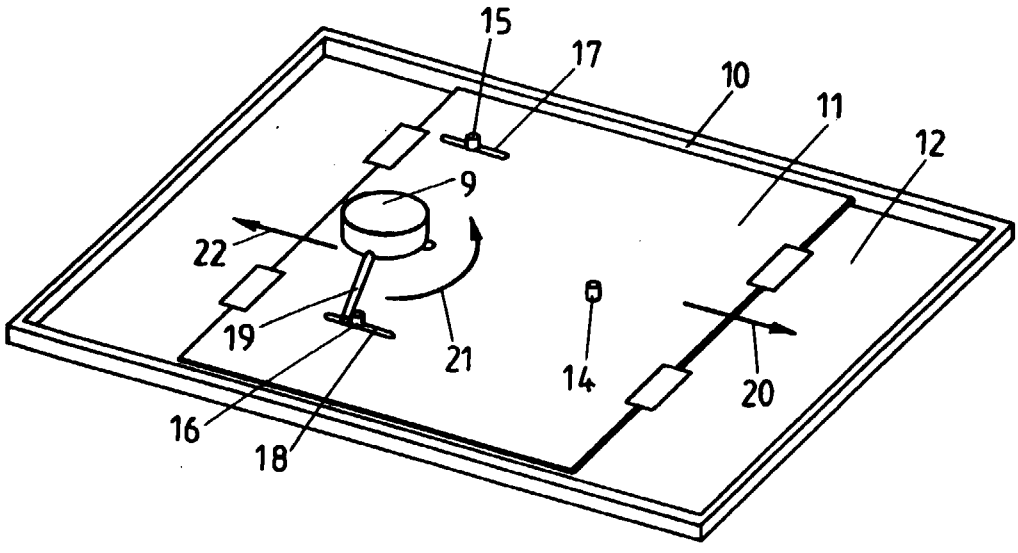


Fig. 11

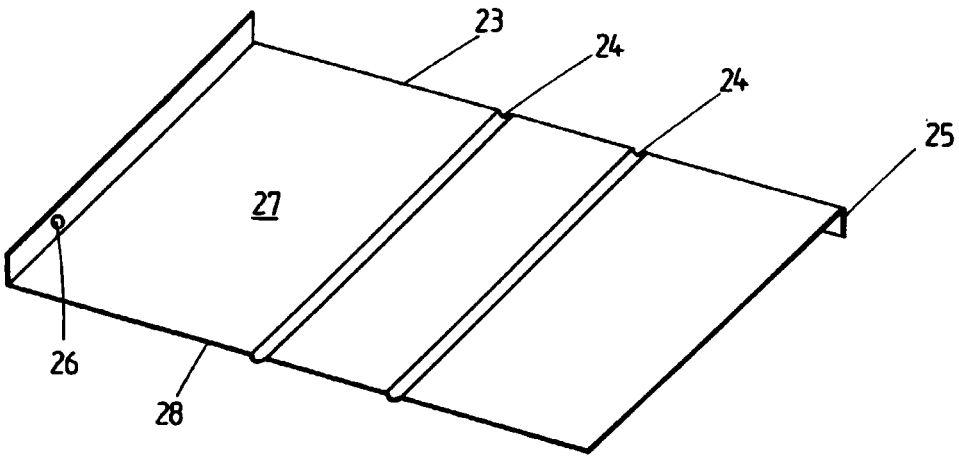


Fig. 12

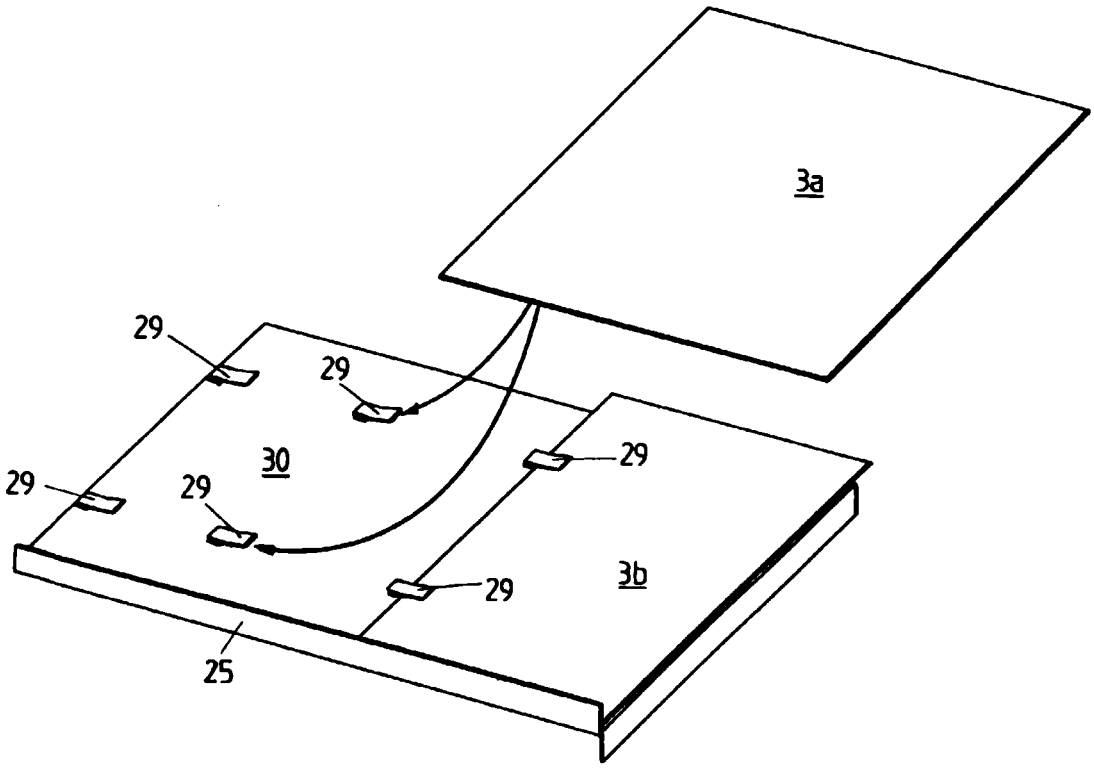


Fig. 13

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 20 3967

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
D,Y	US 3 659 367 A (YUMOTO HIROKAZU) 2 May 1972 * the whole document *	1-7	G09F11/00
Y	FR 2 729 242 A (MAUGER YVAN) 12 July 1996 * page 12, line 5-14; claims 9,10; figures 12,13 *	1-7	
A	DE 36 15 999 A (REFEKA WERBEMITTEL GMBH) 3 December 1987 * claim 1; figure 7 *	1	
A	US 4 731 944 A (HONSE JAMES J) 22 March 1988 * claim 1; figure 1 *	8.	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

G09F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	7 May 1999	Puhl, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 98 20 3967

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

07-05-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3659367 A	02-05-1972	NONE	
FR 2729242 A	12-07-1996	NONE	
DE 3615999 A	03-12-1987	NONE	
US 4731944 A	22-03-1988	DE 3639334 A	10-03-1988
		GB 2194374 A	02-03-1988
		JP 63058494 A	14-03-1988

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82