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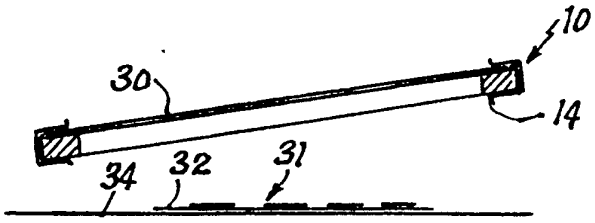
(71)(72) Applicant and Inventor: COPLAN, Jay, E. [US/US]; 2614 Jacaranda Avenue, Carlsbad, CA 92009 (US).

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(57) Abstract



An open rectangular frame (10) is covered on one side with a transfer substrate comprising transparent film (30) having releasable adhesive on the side toward the frame (10). In one embodiment the film is held in place on the frame with elongated clips (18) which slip over the four sides (12) of the frame to releasibly and adjustably capture the replaceable film (30). In use the frame (10) is laid over weeded vinyl graphic art and the transfer film (30) is pressed down onto the graphics, which stick to the film. The release paper (32) is peeled from the graphics, which are then positioned and pressed into place on the target signboard and the applicator removed. In one embodiment (fig. 13-21), the frame (10) is left in place until a stretcher bar (38) carrying the leading edge of the film is drawn back across the face of the signboard, peeling the film from the board-mounted graphics.

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GRAPHICS TRANSFER APPLICATOR

BACKGROUND OF THE INVENTION

Signs and other graphics displays which used to be universally painted by sign artists and the like are now increasingly created from graphics composed on a computer which outputs through a plotter which drives a stylus. The stylus cuts through a thin colored sheet of vinyl or similar material down to the release paper bonded to the back of the vinyl, stopping short of cutting through the release paper. The result is an outlined graphic image or images in the vinyl sheet which appears when the surrounding areas of the sheet are peeled away, leaving the "weeded" graphics in isolation on the release paper.

Vinyl graphics are computer-generated and therefore words come out with the letters in order and properly spaced, as opposed to sheets of pre-printed rub-on letters which must be ordered into words and individually spaced. Vinyl letters are also coherent and relatively tough, compared to the letters of other processes such as rub-ons and decals wherein the letters themselves are aggregates of ink particles that cannot exist independently of a substrate. These distinctions should be kept in mind in discussions of vinyl graphics transfer systems, since processes for ink-aggregate transfers generally do not translate to vinyl.

In order to get the graphics from weeded form to the final display panel such as a sign board, traditionally strips of masking-tape-like transfer tape are cut to the appropriate lengths and pressed onto the upper face of the weeded graphics to hold them in their proper orientation. The transfer tape bonds to the graphics stronger than the graphics bond to the underlying release paper, so that when it is peeled back the graphics stick to the transfer tape.

The transfer tape with the adhered graphics still on the release paper is then aligned properly on the display panel and the transfer tape is indexed to the panel with pencil marks. The release paper is stripped off, the graphics are re-aligned at the index marks and burnished into final position on the display panel.

Transfer of the graphics with transfer tape is a very established practice. It is for all practical purposes the only way weeded graphics are transferred to the sign board or other display. But this technique nonetheless has its disadvantages.

For example, the opaque release paper covers the entire area of the graphics and beyond, making it difficult to accurately position the graphics on the underlying panel. When tiling or laying down a second color, pinpoint accuracy is required, but precision registry is impeded absent direct visual registry, which is impossible because of the release paper, which cannot be removed until the graphics have been preliminarily positioned and marked; once the unmasked graphics adhesive touches the panel, there is no more adjustment.

Another disadvantage of the transfer tape technique lies in the fact that the transfer tape is cut into the appropriate lengths for specific graphics and is discarded after each use. It is so large and ungainly it inevitably sticks to itself and cannot be re-used. Currently costing ten cents per foot, a busy sign shop such as applicant's will go through $20 to $40 worth of transfer tape a day. The sheer volume of used tape creates a disposal nuisance.

Since the graphics are floppy, as they need to be to go through the plotter, they must be stretched tight when lined up with the alignment marks on the signboard. This means either cutting the graphics into two-foot lengths manageable by a worker working alone, or having two people on the job even though most of the work can more efficiently be done by one. In the competitive world of small business in which almost all graphics shops operate, the added labor expense is generally a substantial burden.

There is a need for a graphics transfer applicator which permits direct graphics registry on the display panel before final placement, and eliminates the waste and cost of disposing of transfer tape after every transfer. Similarly it would be an improvement in

the art to relieve the worker of the tedium imposed by transfer tape while enabling a single person to transfer graphics longer than two feet.

SUMMARY OF THE DISCLOSURE

The invention fulfills the above stated need by providing an entirely new system for accomplishing the transfer operation. The hardware of the system comprises an open rectangular frame having a transparent film sheet stretched semi-tautly against face, spanning the central area defined interiorly of the frame. The film can be fixed to the frame with side clips or other suitable means and has a releasable adhesive on the frame side. The tautness of the film is coordinated with the thickness of the frame sidebars such that when the frame is laid on a flat surface with the film side up, the film remains spaced from the underlying surface without touching it but will touch when pressed down.

The frame is laid in this fashion over weeded graphics, with the film pressed down onto the graphics to bond to the upper surface of the graphics (or conversely the weeded graphics can be applied to the transfer film). When the frame is removed, carrying the weeded graphics on the film underside, the release paper is then peeled off so that only the graphics remain on the transparent film, not covered by an opaque layer.

The frame is then moved to the final display panel, where it can be moved around freely over the display until the graphics are exactly positioned. This can be accomplished easily by direct registry of the graphics with the underlying display simply by looking through the film.

Once the graphics are positioned, the film is pressed down onto the underlying display panel. The graphics themselves have adhesive on the side which is now opposite the film side, and this adhesive is stronger in its attachment to the display panel than is the bond between the graphics and the film, so when the frame is lifted, the graphics remain in place on the display panel. In a modification, the film is peeled back with a stretcher bar attached to the leading edge of the film, enabling 180° "peel-back" removal rather than

vertical lift-off, so that the balancing of adhesives is significantly changed.

Tiling and second color overlays can be transferred quickly and accurately by direct visual registry. The applicator can be used many times, on the order of 20 times, before the film must be replaced, reducing the cost of transfer materials, and trash volume is reduced to 5% of discarded transfer tape volume. One person can now transfer an eight-foot (or longer) length of graphics, eliminating the need to either cut it into two-foot lengths or assign two workers.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of the rear side of the applicator;

Figure 2 is a section taken along line 2-2 of Figure 1;

Figure 3 is a fragmentary plan view of a modification of the invention in which a the frame is hinged to an underlying surface;

Figure 4 is a sectional detail of the modification of Figure 3 taken along line 4-4 of Figure 3;

Figure 5 illustrates a typical configuration of weeded vinyl graphics which comprise alphabet letters;

Figure 6 illustrates the positioning of the frame over the weeded graphics;

Figure 7 illustrates the rolling of the back side of the film down onto the weeded graphics to bond the film to the graphics surface;

Figure 8 illustrates the removal of the frame from the underlying surface to peel the release paper from the backside of the graphics, with the frame being shown as the hinged embodiment;

Figure 9 illustrates the lowering of the frame over a sign blank or display panel;

Figure 10 illustrates the frame resting on the underlying surface so that it can be moved around freely in the horizontal plane to position the graphics properly;

Figure 11 illustrates the application of a roller against the back side of the film to press the underlying graphics onto the display panel;

Figure 12 illustrates the final product, with the graphics being attached to the underlying display panel in exactly the same configuration as they appeared when attached to the release paper of Figure 5;

Figure 13 is a plan view of a modification of the invention illustrated in the remaining drawings, in which the transfer film has a leading edge attached to a releasible stretcher bar to permit peel-back removal of the film;

Figure 14 is a plan view of the other side of the modification of Figure 13;

Figure 15 is a section taken along line 15-15 of Figure 14;

Figure 16 is a section taken along ling 16-16 of Figure 13;

Figure 17 illustrates an overlay grid for aligning graphics on the transfer frame with a target sign board;

Figure 18 is a section taken along line 18-18 of Figure 14 and also illustrating the releasible feature of the stretcher bar;

Figure 19 illustrates the initiation of the peeling action of the bar and transfer sheet;

Figure 20 illustrates details of construction of the frame as seen from the rear; and,

Figure 21 illustrates an over-the-center stretcher bar and block arrangement in side elevation in which the stretcher bar is shown stretching the transfer film taut.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in Figure 1, the invention is based on an open frame 10 which is shown as being rectangular, and ordinarily would be rectangular, although other shapes are conceivable and intended to be within the scope of the claims. Several different-sized frames would ordinarily be used in a sign shop, with the height of the frame, taken from the orientation of Figure 1, being controlled by the width of the plotter which cuts the graphics from the graphics paper. For a 20" wide graphics strip, a 28" high frame would be used in order to be able to see the other elements of the display panel such as its edges and corners and previously applied graphics. The width of the frame is arbitrary and would vary, for example in 2 foot increments from two feet to eight feet to accommodate long banner-

like graphics. Graphics longer than the widest frame would have to be transferred in segments using appropriately sized frames.

The rectangular frame that is illustrated has four sidebars 12 which in the simplest form could be wood, but are preferably extruded aluminum as illustrated in Figures 2 & 4. Any conventional jointing techniques could be used to join adjacent bars.

The frame could be as simple as that just described, with nothing more than four sidebars defining a rectangle. One face of the frame forms a plane-defining face 14, with the other side defining a film-mounting face 16. The film can be pulled across the film-mounting face 16 and stapled or tacked into place. Double-sticky tape could be used instead of staples or tacks. These represent simple forms of the invention which will work, although being less than optimal, as film tension adjustability once the film is engaged on the frame is lacking.

To overcome this limitation of the simplest embodiments, the form illustrated in Figures 1-12 uses mounting clips 18 which are defined in the claims as part of the frame itself, which together with the film makes up the applicator.

The clips are elongated resilient channels which could be aluminum, very light steel or plastic. They are dimensioned to slip onto the sidebars with light pressure. One of the clips can be split as indicated at 20 to permit the attachment of a hinge 22.

The film sheet 30 is attached to the frame by laying it over the frame with the clips removed, with the side of the film which is coated with releasable adhesive toward the frame sidebars. The clips are then slipped over the film and the sidebars, capturing the film against the face 16 of the frame. The film can be stretched or loosened or otherwise adjusted to remove wrinkles and take up slack and each side can be independently adjusted. The film must be taut enough to be spaced from the underlying surface to permit horizontal adjustment of the frame over the sign panel while carrying graphics sticky-side-down. Once this degree of film tautness is established, the applicator is ready to transfer graphics from their weeded form on the release paper to the final sign panel.

Figure 5 illustrates a typical weeded graphics display 31 of the letters "A, B, C and E". These letters have been cut on a plotter, with the stylus only cutting through the colorful vinyl layer and not through the release paper 32. The adjacent vinyl has been peeled

off, leaving the graphics in weeded form, adhered to the underlying release paper.

The weeded graphics 31 are placed on a flat surface 34, and the applicator is positioned over the graphics 31 as shown in Figure 6. Laid flat on the underlying surface, the frame supports the film which is spaced just above the graphics. To bring the film into adhering contact, it is burnished (pressed or rolled) down against the artwork as shown in Figure 7.

The applicator is then lifted, carrying with it the weeded graphics 31, and the release paper 32 is then pulled from the graphics as shown in Figure 8. This leaves the graphics sticky-side-down and bonded to the sticky underside of the film as shown in Figure 9.

Because the film is transparent, when the applicator is positioned over a sign blank or other display panel as illustrated in Figures 9 and 10, alignment of the graphics 31 with the panel 34 is done by simple visual registry of the graphics and any benchmark on the display panel. This can be done quickly and accurately, especially with the reticulated overlay grid 48 shown in Figure 17.

Once properly aligned, a roller or burnishing tool again is applied against the back surface of the film as shown in Figure 11, as in Figure 7. The final product, illustrated in Figure 12, comprises the graphics 31 in their final position on the display panel 34 as shown in Figure 12.

The same frames can be used innumerable times before the sheet of film must be replaced. The sheet material is a fairly tough 5-mil polyethethylene and a number of transfers may be made before it starts opacifying and the adhesive coating begins losing its tackiness. This represents a substantial materials cost reduction over the one-use-only transfer tape.

Figures 3, 4 & 8 show a slight variation in which the frame is hinged at 22 to the surface of an underlying platform such as a tabletop. This would be convenient for using a large frame, especially when producing a batch of forty or fifty identical signs. The underlying surface could also be defined by a rigid panel so that the frame and panel comprised a portable unit. Other variations are possible within the scope of the appended claims. No doubt a wide variety of film sheet attaching techniques could be used. However,

those mentioned above are effective, simple and inexpensive to create.

The adhesive strength of the three different surface-to-surface adhesive interfaces encountered in this process are controlled so that the two releases, and the final bonding, contemplated by the process, execute properly. The graphics tack has to yield to the substrate when being removed from the release paper but overpower the substrate when applied to a sign board.

The difficulty comes when releasing the graphics to the sign board. Because the frame holds the film taut, it cannot be peeled back. Almost any tack ratio can be compensated for when peeling back. Instead, the graphics must be lifted straight off the board, at a 90° angle from the surface, causing a tug-of-war between the tack on the graphics, which is supposed to win, and the film adhesive. Many efforts were made to get this right. The final workable solution involved spraying a dilute mixture of a commercial adhesive onto the film until it built up to the right tack.

A second embodiment is disclosed in Figures 13 through 21. The same frame 10 is used, but instead of attaching the film to the four sides with clips, it is clipped at one edge only, and the other sides are not attached directly, but interfaced with a quick-release mechanism that permits the film to be released from all but one edge and peeled back off the graphics rather than lifted straight up from the signboard. The illustrated quick-release mechanism comprises a stretcher bar 38 clamped onto edge opposite the hinge edge 44 with clips 19, identical to clips 18 except with a narrower span, as best seen in Figure 18. Hook-and-loop fastener material is mounted on the frame at 40 and engages mating hook-and-loop material 42 on the stretcher bar. Once the hinge end 44 of the film is clipped into place the stretcher bar can be drawn taut and attached at the hook-and-loop interface under the appropriate tension.

Optional bar stops 46 may be mounted on the frame to enable the film tension to be set once at the hinge end and be replicated every time the stretcher bar is rolled into place. The blocks, or any other fastener with positive stop action such as in the over-the-center arrangement of Figure 21, could replace the Velcro® entirely, or be used in conjunction with it as shown. A positive latch-action fastener gains speed and repeatability over the Velcro® arrangement but sacrifices the ability inherent in Velcro® to adjust

the film tension on the fly without having to re-mount the hinge end of the film.

The stretcher bar 38 is actually a planar slat. This shape makes it easy to peel back the film as shown in Figure 19. The slat is pulled directly back, pulling the film at very close to a 180° angle. No matter how weak the vinyl tack and how strong the film adhesive the operator will be able to separate film and graphics.

While the bar is being pulled back, it is rotated clockwise in Figure 19 so that it does not double over and stick to itself tack-to-tack. When finished, rolling the film back out and re-attaching the bar for the next job is quick and easy.

In any embodiment, the applicator is easiest to use when used with and overlay grid 38 shown in Figure 17. The reticulated grid lines on the transparent grid sheet are used to align the graphics to benchmarks on the sign board. The grid is placed on top of the clear film after the graphics have been adhered to the underside of the film. The grid is first aligned to the graphics, then the frame orientation is adjusted until the grid aligns with the display panel. The graphics would not ordinarily be precisely rectilinearly oriented in the frame since there is no need.

Applicant, along with others, has used these applicators with great success and anticipates that soon they will largely replace the transfer tape technique in a great many applications and in a great many shops. This seems inevitable, as the applicator makes the work easier and faster, and saves money on materials at the same time. For many jobs there would be no point in doing it any other way.

What is claimed is

1. A graphics transfer applicator comprising:

(a) a peripheral frame having a substantially plane-defining face and defining an open area encompassed by said frame;

(b) a transparent flexible film spanning across said open area and being attached to said frame such that said film is spaced from and substantially parallel to said plane-defining face;

(c) a releasable adhesive film coating substantially covering the side of said film towards said plane-defining face such that said frame can be laid with the plane-defining face down on an underlying surface supporting weeded graphics to permit said film to be pressed down onto said weeded graphics to adhere to same.

2. An applicator according to Claim 1 wherein said frame includes peripheral sidebars and releasable attachment means for attaching said film thereto to permit removal and replacement of said film.

3. An applicator according to Claim 2 wherein said frame defines a film-mounting face parallel to, and substantially on the opposite side of said frame from, said plane-defining face, and said releasable attachment means comprises a plurality of clips releasibly engageable on said sidebars such that said film can be captured between said film-mounting face and said clips.

4. An applicator according to Claim 3 wherein said frame is rectangular with four sidebars and said clips are elongated and at least four in number and together substantially span a substantial portion of the combined lengths of the respective sidebars.

5. An applicator according to Claim 3 wherein each of said clips comprises a resilient channel dimensioned to slip over one of said sidebars to capture said film therebetween.

6. An applicator according to Claim 1 wherein said releasible adhesive layer is an adhesive designed to bond and release with a vinyl surface at least twenty times without substantial tack loss.

7. An applicator according to Claim 1 wherein said weeded graphics are comprised of graphics bonded to an underlying release paper with a releasable adhesive which adheres said graphics to said release

paper with a bonding strength less than the bonding strength of said adhesive film coating which bonds said film to said graphics when same are compressed together.

8. An applicator according to Claim 1 wherein said frame is hinged to an underlying surface.

9. An applicator according to Claim 1 and including a platform defining a substantially planar, horizontal surface and said frame is hinged to said platform at one edge thereof to permit said frame to be pivoted up substantially clear of said platform and swung down onto said platform to transfer graphics on said film to a display panel lying on said platform.

10. An applicator according to Claim 1 and including a quick-release mechanism interfacing between said film and said frame wherein one edge of said film is mounted on said frame the rest of said film quick-releases to permit same to be peeled back to release graphics adhered thereto.

11. An applicator according to Claim 10 wherein said frame and film are substantially quadrilateral, said film is attached to said frame along one quadrilateral edge of both film and frame, and said quick-release mechanism comprises a stretcher bar attached to an edge of said film opposite said quadrilateral edge with catch means to releasibly hold said bar to said frame with said film stretched substantially taut.

12. An applicator according to Claim 11 wherein said bar is a parallel-edged flat slat to permit easy peel-off and roll-up of the film attached thereto from the underlying graphics and preserve a flat profile of said applicator.

13. An applicator according to Claim 12 wherein said catch means comprises mating hook-and-loop fastener material on said stretcher bar and said frame.

14. An applicator according to Claim 11 wherein said frame defines a pair of stops mounted thereon and positioned to support said stretcher bar against the tension of said film when same is taut.

15. An applicator according to Claim 14 wherein said bar and stops have an over-the-center relationship when said film is stretched taut and said film is slightly resilient to permit said bar to be snapped into place over said blocks and retained in place by the tension of said film.

16. A method of transferring weeded graphics to a display panel by using an open frame having a plane-defining face and a film-mounting face spaced from and being substantially parallel to said plane-defining face and substantially covered on said film-mounting face with a sheet of transparent, flexible film having releasable adhesive on the side thereof toward said plane-defining face, said frame defining an open area large enough to encompass said graphics and said film being flexible enough to be pressed through said film substantially into alignment with a plane defined by said plane-defining face, said method comprising:

(a) placing said weeded graphics on a substantially flat surface with the release paper down;

(b) placing said frame plane-defining face down over said graphics onto said substantially flat surface;

(c) pressing said film down into adhesive-bonding engagement with said graphics;

(d) peeling said release paper from said graphics, leaving the graphics adhered to said film;

(e) positioning said frame over said display panel and visually properly aligning said graphics with respect to said panel by observing said graphics and panel through said film;

(f) pressing said film, carrying said graphics on the underside thereof, down against said display panel until said graphics stick thereto; and,

(g) removing said film from said graphics.

17. Structure according to Claim 16 wherein step (e) is performed with the assistance of a transparent reticulated grid by laying said

grid over said film and aligning said graphics and said panel with grid lines on said grid.

18. A method according to Claim 16 wherein said film has a leading edge with a stretcher bar attached thereto and an opposite edge attached to said frame, and a quick-release mechanism connecting said bar to said frame, and step (g) comprises releasing said bar from said frame and drawing it toward said opposite edge to peel said film off of said graphics such that said film makes a bend approaching 180 degrees at the separation line while being peeled from said graphics.

19. A method according to Claim 18 and including the step concurrent with step (g) of rolling said film around said bar such that the top of the bar moves in the direction away from the attached edge of said film as said film is peeled up from said graphics.

20. A method of transferring weeded graphics to a display panel by using an open frame having a plane-defining face and a film-mounting face spaced from and being substantially parallel to said plane-defining face and substantially covered on said film-mounting face with a sheet of transparent, flexible film having releasable adhesive on the side thereof toward said plane-defining face, said frame defining an open area large enough to encompass said graphics and said film being flexible enough to be pressed through said film substantially into alignment with a plane defined by said plane-defining face, said method comprising:

(a) placing said weeded graphics onto said film from the plane-defining side of said frame to adhere the non-sticky side of said graphics to said film;

(b) peeling said release paper from said graphics, leaving the graphics adhered to said film;

(c) positioning said frame over said display panel and visually properly aligning said graphics with respect to said panel by observing said graphics and panel through said film;

(d) pressing said film, carrying said graphics on the underside thereof, down against said display panel until said graphics stick thereto; and,

(e) lifting said frame to pull said film free of said graphics.

21. A method according to Claim 20 wherein said film is designed to withstand at least 20 uses without substantial performance loss and steps (e) through (g) are repeated at least twenty times, and including the further step of removing said film and replacing same on said frame with a fresh sheet of film.

Fig. 1

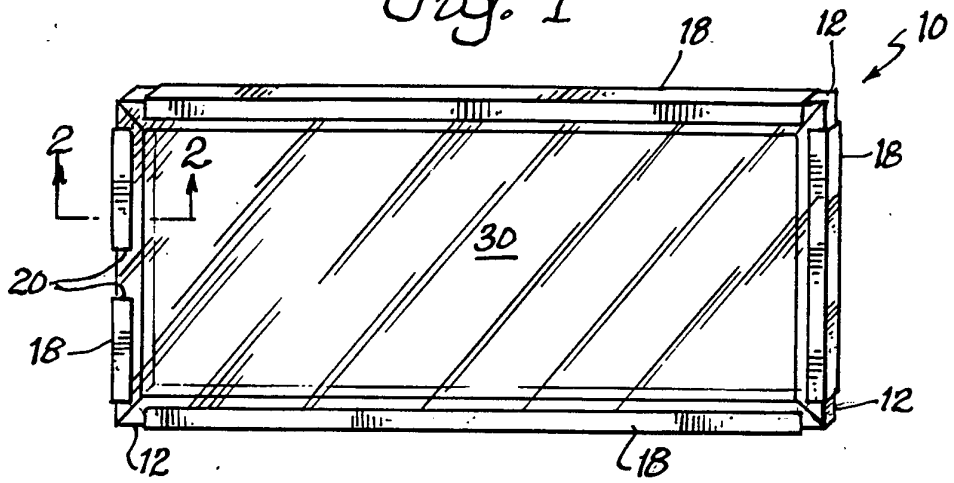


Fig. 2

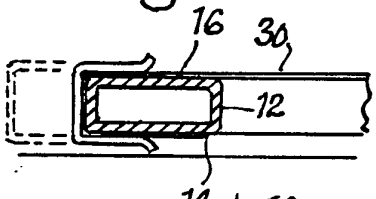


Fig. 3

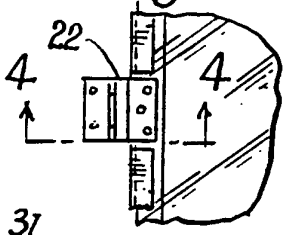


Fig. 4

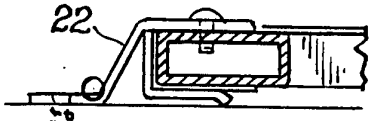


Fig. 5

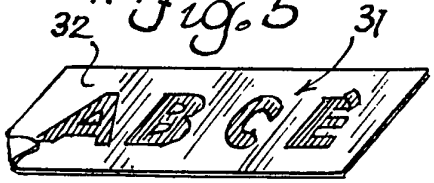


Fig. 6

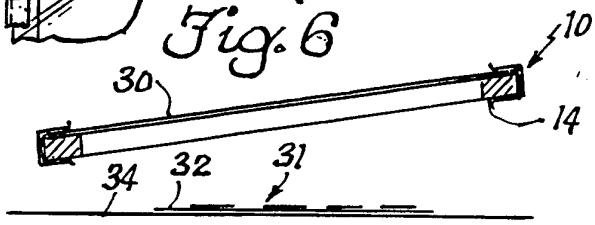


Fig. 7

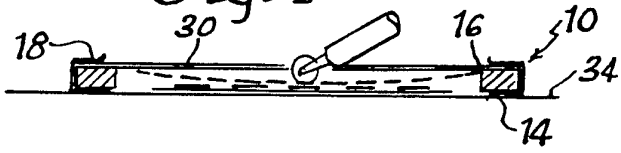


Fig. 8

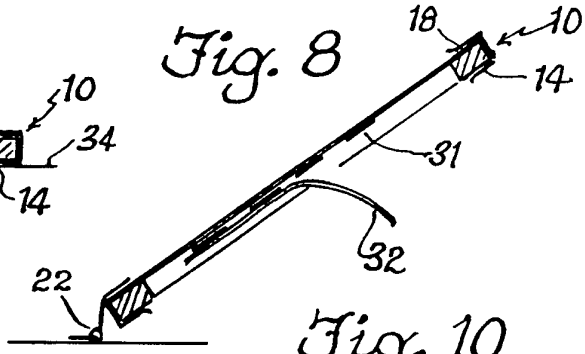


Fig. 9

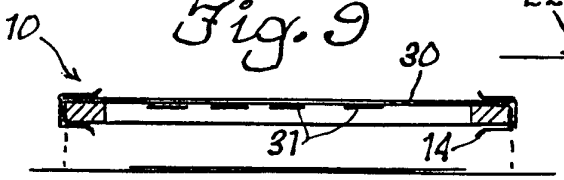
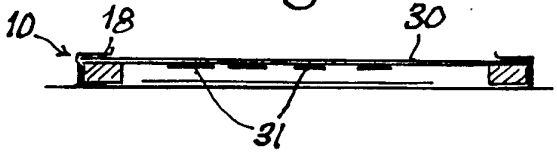


Fig. 10



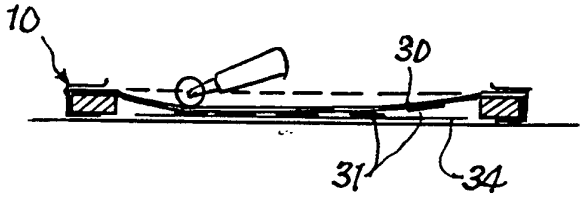


Fig. 11

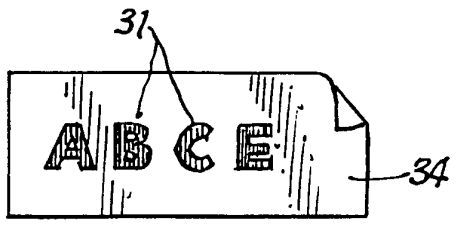


Fig. 12

FIG. 13

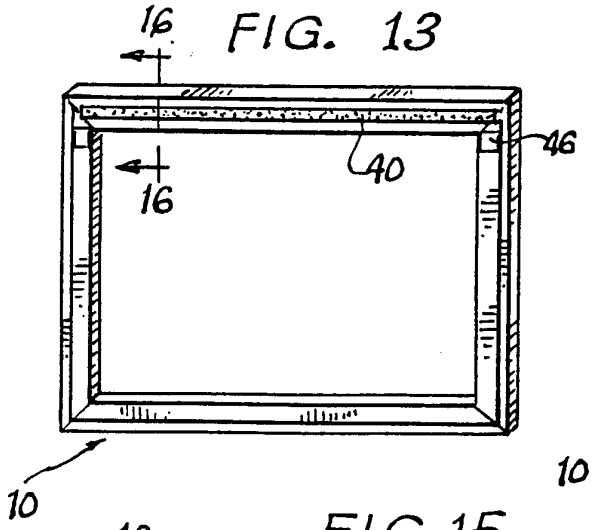


FIG. 14

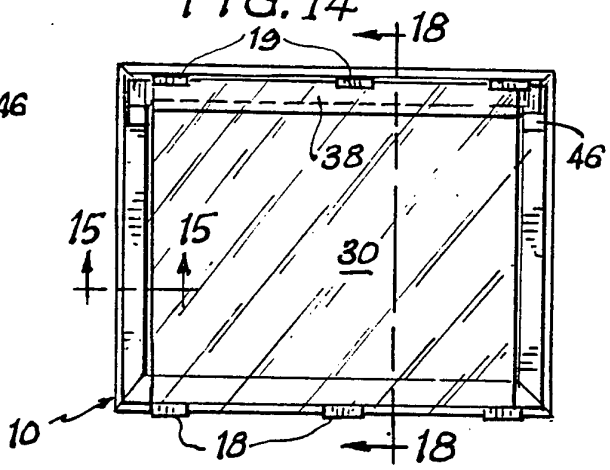


FIG. 15

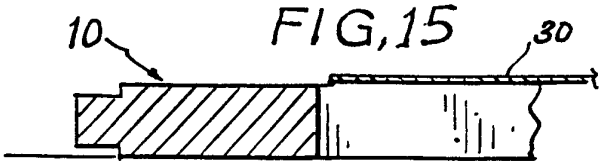


FIG. 17

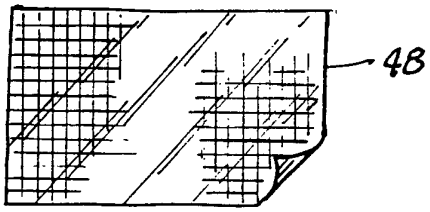


FIG. 16

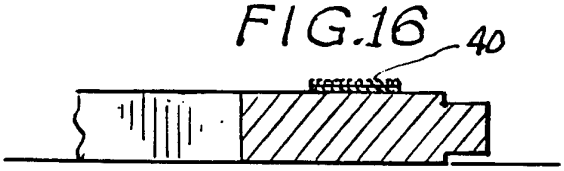


FIG. 18

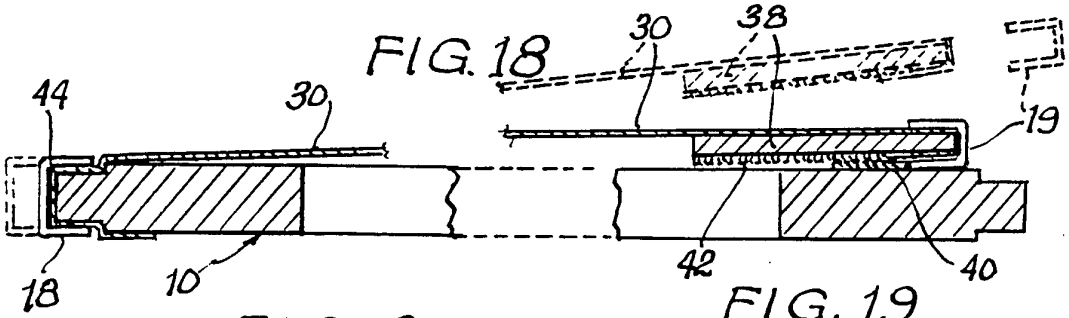


FIG. 19

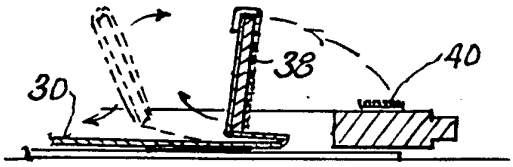


FIG. 20

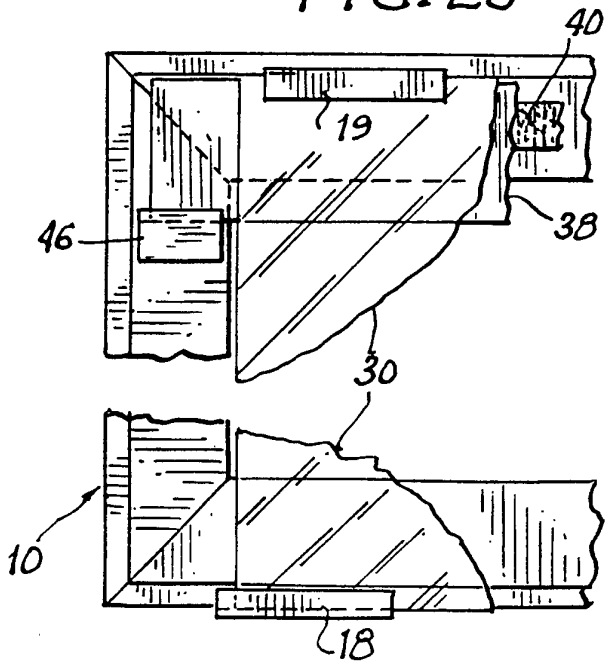
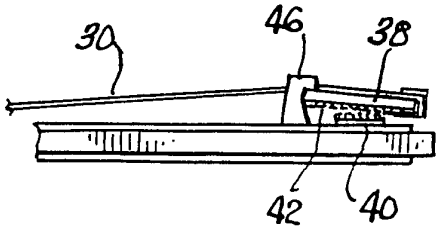


FIG. 21



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/01236

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :B44C, 1/16; 3/00; B32B 1/00
US CL :156/234, 235, 240, 246

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)

U.S. : 427/149, 156/234, 235, 240, 247, 229, 230, 236, 239, 248, 241, 156/344, 584

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 practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4,544,430 (SHEPHERD) 01 October 1985, col. 4, lines 1-12; col. 4 line 56; col. 5, line 8.	1, 2, 7, 16, 20
A	US, A, 3,376,182 (BORELL ET AL) 02 April 1968, col. 3, lines 35-45; col. 4, lines 7-23.	1, 2, 7, 16, 20
A	US, A, 3,055,787 (MACKENZIE) 25 September 1962, col. 2, lines 42-46.	8, 9
A	US, A, 3,835,773 (VASILANTONE) 17 September 1974, col. 5, lines 1-12; col. 6, lines 15-39.	11, 14, 15, 18
A	US, A, 4,328,051 (ROBINETTE) 04 May 1982, col. 1, lines 58-60.	11, 12, 13, 14, 15, 18, 19

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search
17 MAY 1994

Date of mailing of the international search report
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Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231
Facsimile No. (703) 305-3230

Authorized officer
DAVID A. SIMMONS
Telephone No. (703) 308-1972

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/01236

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4,197,151 (MUZIK) 08 April 1980, (Fig. 1 c, #23).	3, 4, 5
A	US, A, 3,607,525 (STROM) 21 September 1971, see entire document.	16, 20
A	US, A, 3,287,192 (POHLENZ) 22 November 1966, see entire document.	16, 20
A	US, A, 4,367,252 (TORDJMAN) 04 January 1993, see entire document.	16, 20
A	US, A, 3,485,696 (HAMMONDS) 23 December 1969, see entire document.	16-20