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

(11) Publication number: **0 214 606**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **86112143.2**

(22) Date of filing: **02.09.86**

(51) Int. Cl.[4]: **B 44 F 1/06**
B 44 C 3/04, B 44 C 3/12

(30) Priority: **12.09.85 US 775147**

(43) Date of publication of application:
18.03.87 Bulletin 87/12

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

(71) Applicant: **Stained Glass Overlay, Inc.**
151 Kalmus Drive, Suite J4
Costa Mesa CA 92626(US)

(72) Inventor: **Butler, Donald R.**
21955 Cayuga Lane
El Toro, Calif. 92630(US)

(72) Inventor: **Butler, Delicia M.**
21955 Cayuga Lane
El Toro, Calif. 92630(US)

(74) Representative: **Hoffmann, Klaus, Dr. rer. nat. et al,**
Hoffmann . Eitle & Partner Patentanwälte Arabellastrasse 4
D-8000 München 81(DE)

(54) A method and worktable for simulation of antique colored glass.

(57) There is disclosed a method, and a work table (61), for the simulation of antique and opalescent glass, which is characterized by uneven color tonal and texture shading. The method is practiced by applying a plastic film (16) onto the center island (66) of the work table, applying a plurality of colorants (10, 12, 14), each comprising a liquid carrier and a pigment or dye, to the surface of the plastic film and dragging a wiper (34) across the surface of the film to wipe the colorants onto the film along a first, predominant direction, while oscillating the wiper in a lateral direction. Excess colorants are pushed off the center island of the table onto a surrounding frame (24). The frame can be elevated from the plastic film, thus serving as a removable mask to use during application of the colorants. The film is dried, and adhesively bonded onto a sheet of glass (50). The film (16) is preferably applied as pieces of multiple colors to complete a design pattern on the glass and adhesively backed strips of lead (60) are applied over the boundries between the adjacent pieces of film, thereby simulating a stained and leaded glass product.

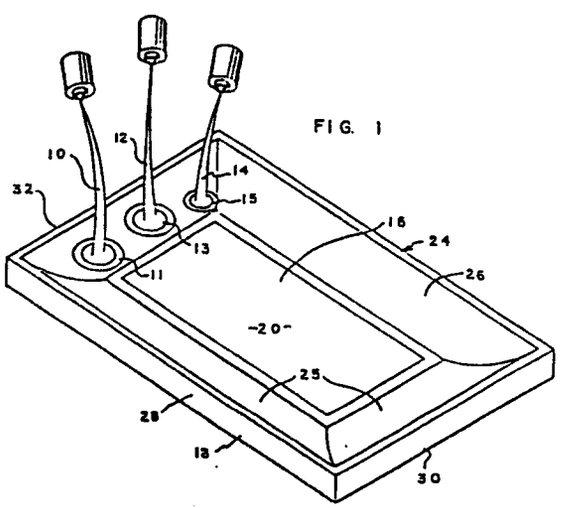

FIG. 1

EP 0 214 606 A2

0214606

A method and worktable for simulation of antique colored glass

BACKGROUND OF THE INVENTION

Field Of The Invention

This invention relates to simulated stained glass and, in particular, to simulated stained glass having a high degree of color shading and striations and tonal and texture variations, useful for simulation of stained and leaded glass.

Brief Statement Of The Prior Art

For many years, artisans have attempted to simulate stained and leaded glass using various materials and methods. While lead caming can be simulated with lead strips which are adhesively bonded to a sheet of glass, a wide variety of materials and methods have been used in attempts to simulate stained glass. Stains or paints, and a texturing resin have been coated on glass in U.S. Patent 2,713,958; a color printed polyester film has been laminated between two preformed plastic shades to simulate a Tiffany lamp shade in U. S. Patent 3,876,483; a color printed transparent paper has been laminated between translucent sheets to simulate stained glass in U.S. Patent 2,190,627; colored varnishes have been applied to the edge, and permitted to drain across a sheet of glass in an attempt to simulate art glass in U.S. Patent 2,095,402; glass has been painted using stencils and an air brush in U.S. Patent 1,800,763; and oven-cured, translucent and colored varnishes have been used in U.S. Patents 744,209 and 696,392 to simulate art glass. A

common problem with most of the prior attempts, particularly those using paint or stains applied directly onto glass is the susceptibility of the color coatings to marring and scratching. For this reason many of the aforementioned patents also include the application of a protective layer of clear glass or plastic which is laminated over the color coatings, e.g., see U.S. Patent 4,194,669 and French patent 2,486,878.

None of the aforementioned methods have been commercially successful. In two recent patents, U.S. Patent 4,438,165 and 4,335,170 a method is described in which sheets of colored polyester film corresponding to a color pattern are applied onto a sheet of glass and their boundries delineated with adhesive strips of lead to simulate stained and leaded glass. The polyester film is painted, usually with a silk screening method to simulate stained glass colors. This method has been so successful that it has been recognized as a new art form.

Stained glass, however, has an extremely varied color shading and texture. Perhaps the most exquisite is antique glass which is hand blown into a tubular shape, split and flattened into panes which have bubbles, and color imperfections that provide uneven shading with much variation in color tone and texture. There is also flash or opalescent glass which is hand blown glass obtained by dipping molten globs of colored

glass into differently colored molten glass. The multiple colored layers provide veining and an opalescent quality to the glass. Finally, there is machine rolled glass which is of constant thickness and of comparatively uniform color shading.

The painted polyester films, particularly the silk screen painted films, can quite accurately simulate the appearance of the machine rolled glass, however, heretofore, there has been no method of coloring the polyester film that achieves the degree of color shading and striations, and the tonal and texture variations of antique and flash or opalescent glass.

BRIEF DESCRIPTION OF THE INVENTION

This invention comprises a method, and apparatus used in the method, for painting plastic film with translucent and transparent colorants which achieves a high degree of variation in color tones, shading, and striations, and which also can impart texture variation to the film. The plastic film is adhesively bonded to a sheet of glass, thereby simulating stained glass. The method of the invention is practiced by the application of a plurality of colorants to a surface of the film. Each colorant comprises a liquid carrier which is compatible with the surface of the film and a pigment or dye of a color which is distinct from that of the other colorants which are used. The proportions of liquid carrier and pigment or dye can be adjusted as necessary or desired to impart any degree of translucence or

opaqueness to the plastic film. When the colorant is too concentrated, it can be applied as a wash. The colorants are wiped across the surface of said film by dragging a wiper blade across said surface of said film predominantly along one direction while oscillating the wiper in a lateral direction. The excess colorants are drained from said surface of said film and permitted to to dry; and the said plastic sheet is then adhesively bonded to the surface of a sheet of glass.

Preferably, deposits of thick colorant gums are randomly applied to the plastic film prior to wiping of the colorant washes, thereby forming opalescent color inclusions in the resultant color coating. These gums are preferably partially cured compositions of pigments in a film forming vehicle.

The apparatus of the invention comprises a table for holding the plastic film and retaining the colorant washes during the application of the colorants to the film. The table comprises a flat bed to support the film and a movable retainer which can be raised from, and lowered, to the bed with a peripheral masking strip that seals against the edges of the plastic film.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described with reference to the drawings, of which:

FIGURE 1 illustrates the step of applying the colorants to the plastic film;

FIGURE 2 illustrates the step of wiping the

colorants across the plastic film;

FIGURE 3 illustrates the application of a colorant concentrate to the plastic film;

FIGURE 4 illustrates a typical application of the colored plastic films to a glass pane to simulate stained and leaded glass;

FIGURE 5 is an elevational side view of the table used to apply the colorants;

FIGURE 6 is a top view of the table; and

FIGURE 7 is an elevational end view of the table.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to **FIGURE 1**, the invention is practiced by applying a plurality of colorants, 10, 12 and 14, to the surface of a plastic film 16. The film 16 is of a suitable transparent or translucent plastic such as polyester, polyvinyl chloride, polyvinyledene chloride, cellulose acetate, polyvinyl alcohol, polyvinyl acetate, etc. The preferred plastic for the application to glass to simulate stained glass is polyester, because it is significantly more compatible as a film coating on glass than are the other plastic materials. The film should have a thickness from 0.5 to about 5 mils, and preferably is completely flexible.

The colorants comprise a film former vehicle or carrier in which organic dyes are dissolved or in which inorganic pigments are suspended, together with sufficient solvent to achieve the desired viscosity. Preferably, a polyester vehicle is used when the

colorants are to be applied to a polyester film, and suitable polyester film formers which can be used for this purpose are terephthalate esters of polyols such as ethylene glycol, propylene glycol, etc. A preferred film former is ethylene glycol terephthalate. These colorants are commercially available as as polyester inks and stains concentrates, and typically contain from 35 to 65 weight percent solids. In some instances, the colorant concentrate will render the plastic film opaque, and in such instances, the colorant is applied as a wash and is obtained from its concentrate by the addition of thinner, or let down base, in proportions of from 1 to 10 parts thinner per part of concentrate.

The pigments which can be employed in the liquid colorant compositions can be organic or inorganic finely subdivided solids. The inorganic pigments include oxides and salts of metals such as titanium, iron, lead, zinc, cadmium, mercury, chrominum, molybdenum, etc. Titanium dioxide in both anatase and rutle crystal form is the predominant white pigment. Iron oxides are used for red, brown and tan colors; lead chromate is used for yellow, lead molybdates for orange, red and related colors, and mixtures can be prepared for varied shades of orange. Lead chromate is also combined with iron blue (ferric ferrocyanide) to prepare green colorants. The cadmium salts and oxides are used for red, maroon and yellow shades and other salts include the aluminates such as cobalt aluminate or titanates such as chromium

titanate.

Organic pigments or dyes which can be used include azo compounds which have one or two azo linkages to provide orange, yellow and red colorants. The azo groups are typically in aromatic compounds which include naphthol, or toluidine groups. Some of the azo pigments include chelate metals, e.g., chelated nickel yellow. Another class of organic colorants are the phthalocyanine greens and blues. Colors of red, maroon, and violet can be obtained with the quinacridone pigments. The isoindolinones are a group of pigments in the red to yellow range which can be used. The anthraquinones such anthraquinone red, indathrone blue, anthra pyrimidine yellows are also suitable for use.

Special color effects can also be imparted to the colorants. These effects include the metallics in which finely subdivided metal powders such as aluminum and aluminum alloys are used to product brilliant blue-white highlights and copper and copper alloys with zinc are used to produce gold and bronze highlights. These can be admixed with the dyes or organic or inorganic pigments to impart a metallic luster to the plastic film. The pigments and dyes are used in effective amounts, depending on the particular pigment or dye which is employed. When dilute washes are used, particularly in combination with the use of colorant gums, hereinafter described, the pigment or dye can be used in low concentration, typically from about 0.1 to

about 10 weight percent. In most other applications, however, the colorant is used in more concentrated colorants, typically at concentrations from 5 to about 55 weight percent.

The film 16 is laid onto a supporting surface, such as table 18, and the colorants are applied to its exposed surface 20 in excess amounts. In the preferred method, a retainer frame 24 having sidewalls 26 and 28, and end walls 30 and 32. is seated over the peripheral edges of the film 16 and sealed thereto to provide retention of the liquid colorants. At each end, and preferably also along each side, the frame 24 has a wide, flat web 25 to receive the colorants. A plurality of colorants 10, 12 and 14 are applied, preferably to the flat web 25 of the frame, usually at points such as 11, 13, and 15 which are laterally offset along the width of film 16. It is preferred to apply the colorant concentrates to the frame 24, rather than directly to the plastic film, to avoid any undesired stain pattern on the film. The colorants are contained within the general area of the film by the retainer frame 24 and the flat perimeter web 25 receives the excess colorants. The concentration of the pigment or dye in each colorant is determined by separate application of the colorant to test strips of the plastic film. When the concentrate as commercially obtained renders the plastic film too opaque, it can be thinned by the addition of let down base.

Referring now to **FIGURE 2**, the colorants are then wiped across the surface of the film 16 with a wiper means such as a squeegee 34 having a wiper blade 36 formed of a flexible plastic or rubber and a handle 38 for grasping by the operator. The squeegee 34 is moved along a first, predominant direction, indicated by arrow headed line 40 while it is oscillated laterally, from side to side, thereby obtaining undulating striations of colorant on the surface of the film 16. The colorants blend together at their interfaces, as represented by the broken lines, producing areas such as 33 and 35 of blended colors of varying intensity, separated by thin bands such as 37 which are mostly of the respective colorant, such as 12. The resulting pattern of the colorants will be mostly veined along the predominant direction of the squeegee 34. The colorants will be most intense at the positions closest to their application to the film 16 and the intensity will fade as they are dragged across the film. The operator also controls the texture of the film by variation of the angle of repose of the wiper blade 36 to the surface of film 16; as this angle is lessened, the thickness of the colorant layer increases, while minimum color intensity and thickness of the colorant layer is achieved when the wiper blade 36 is nearly vertical to the surface of film 16.

The excess amounts of the colorants are wiped from the surface of the film 16 and deposited on the peripheral ledge 25 which surrounds the film 16. The

wiping across the surface of the film 16 can be practiced by the operator as many times as desired to achieve exactly the coloration and texture desired. Repeated wiping, will reduce the degree of color tonal and texture variations, and often the most desirable effects are achieved with only a single pass with the squeegee over the film 16.

The film 16 is removed from the table, and permitted to air dry, usually for a period of several hours to several days, depending on the composition of the colorants, particularly on the identity of the film former and any solvent used in the colorants. After drying, the film 16 is ready for application to a glass surface. Preferably, the film 16 which is selected for use in the invention has its undersurface coated with a continuous coating of a pressure sensitive, permanent adhesive, and this coating is protected with a removable overlay film. The plastic films which have been previously mentioned are available precoated with suitable permanent adhesives from their manufacturers, and these are preferably used to avoid the necessity to apply a continuous coating of adhesive to the undersurfaces of the films.

FIGURE 3 illustrates a preferred method in which at least one colorant concentrate 46 is applied to one or more spot locations of the film 16. The concentrate can be applied with a spoon 48 and the concentrate is deposited as a glob 47 and dragged across the film with

the spoon.

A preferred embodiment of the invention utilizes colorant gums of thick consistencies. The gums are partially cured colorants, in which the film formers in the colorants have been permitted to partially cure, usually by air drying or exposure. The resultant gums are subdivided into globs of concentrated colorants usually in amounts from 5 to about 100 grams, preferably from 10 to about 45 grams, each. The resultant globs can be used as the concentrate 46 shown in **FIGURE 3** and are thereby applied directly onto the surface of the film 16 at preselected locations. The globs such as 46 are included within the coatings which are formed on the film 16 during the wiping step. Because the gums are partially cured, they do not completely disperse in the liquid colorants, but remain, distinct in color and texture from the colorant coating, thereby producing opalescent effects with surface imperfections.

In the assembly of a simulated stained and leaded glass pane, the pane 50 (shown in **FIGURE 4**) is first scrupulously cleaned and a decorative design 52 is drawn directly upon the pane 50. Alternatively, a design drawn on paper may be temporarily taped to the reverse side of pane 50. Next, adhesively backed lead strips 60 are applied to the pane, to overlie the line tracing of the design. The adhesive can be applied to the lead, and for this purpose, an acrylic adhesive is preferred. The lead strips are commercially available with adhesive

coatings on their undersurfaces and these are preferably used in the simulation of lead caming. The lead may be stretched to remove any kinks and undesired bends and is then laid upon the front side 61 of the pane 50 covering the previously drawn lines of the design. A wooden tool, not shown, having a concave contour similar to the convex exposed side of the lead strips 60 is preferably utilized to urge the lead strips 60 firmly onto the pane 50 thus removing all entrapped air pockets and sealing the edges of the strips 60. Excess adhesive may be removed by wiping with a solvent, which can also remove any oxidation from the lead strips 60.

The film 16 is applied to the surface 53 of a glass pane 50 to simulate the appearance of stained glass. The sheet of film 16 must be chosen which equals or exceeds the dimensions of the design section 55 to be colored. As previously mentioned, films 16 which are precoated with a permanent, pressure sensitive adhesive are preferably used. Alternatively, however, a permanent adhesive can be sprayed, brushed or rolled onto the underside 51 of the film 16.

A lubricant, preferably a soap solution, is sprayed onto the adhesive undersurface of the film 16 to neutralize the adhesive and permit the film 16 to be slid about the surface 52 of glass pane 50 to be positioned at the appropriate design segment 55. The film can be pretrimmed, if desired; however, it is preferably trimmed on the glass pane 50 with a razor

blade or knife. The soap solution is then removed by pressing the film 16 firmly against the pane 50 with a squeegee or similar tool, and permitting the adhesive 51 to permanently bond the film 16 to the pane 50. Thereafter, lead strips 60 can be applied to the side 53 of the glass pane 50, completing the simulation of stained and leaded glass.

The coating of the film 16 with the colorant in accordance with the method of the invention is preferably practiced with the table which is illustrated in **FIGURES 5-7**. Referring to **FIGURE 5**, the table 63 has a base 69 with legs 65 at each corner, and frame 24 is moveably positioned on the table 61 with lift means which can raise and lower the frame relative to the table. A convenient lift means is a centrally positioned pnuematic or hydraulic lift cylinder 67. The base of the cylinder 67 is mounted on the base 69, and the upper end of the piston rod 68 is secured with nut 64 to a crossed arm brace 75 which is formed of metal channels 76 (shown in phantom lines in **FIGURE 6**) which extend diagonally outwardly from the center of the table. Rods 77 are vertically mounted in distal bores in each of the metal channels 76 and fasteners such as locknuts 70 and 71 are secured to the threaded ends of rods 77 to clamp against opposite sides of the metal channels, thereby firmly securing the rods.

The table legs 65 support the table 61 which has apertures at each corner in which are secured bearing

mounting plates 70. The rods 77 pass upwardly through the bearing mounting plates and linear bearings 73 are mounted about the rods and seated in the bearing mounting plates 70. The table also supports a central, raised island 66 which has the dimensions to correspond to the area of the plastic film which is to be colored.

At their upper ends, rods 77 support the masking frame 24; see also **FIGURES 1-3 amd 6**. Frame 24 has a central, square aperture 81 and an outer peripheral retainer frame 82 formed of side walls 26 and 28, and end walls 30 and 32. **FIGURE 7** illustrates the cross section of the retainer frame 82 which is formed with the outer members such as 84 having a raised outside edge 85; coextensive flat members 86, which are secured thereto by suitable means such as fastener screws 87; and a coextensive metal masking strip 91 in the form of an angle member is secured along the inside edges of the flat members 86 with screw fasteners 82. Preferably the masking strip has a downward inclination to its flat edge 92 which is from 3 to about 10 degrees off the horizontal.

Referring now to **FIGURE 6**, the flat edges 92 of the masking strips 91 extend about the inner periphery of the aperture 81 of the masking frame 24 and extend inwardly sufficiently to overlie the peripheral edges of the island 66 of table 61. When the masking frame is retracted against table 61, the flat edges 92 of masking strips 91 are pressed against the top peripheral edges

of island 66 and securely retain plastic film 16 on the island. In this position, any excess colorants wiped from the plastic film 16 will be deposited on the flat webs of the flat members 86, removed from the plastic film. The excess colorants can be again moved across the surface of the film, as desired by the operator. When the operator has completed a satisfactory color pattern on the plastic film, the masking frame is raised above the table, and the plastic film can then be lifted from the island 66 of the table and placed to dry. The raising and lowering of the masking frame can be controlled by a suitable hand lever 82 which operates a valve in the air or hydraulic fluid supply to cylinder 76.

Any other suitable means can be used to raise and lower the masking frame, such as overhead pulleys and cables. It is desirable that the frame be raised in a horizontal position, so the excess colorants on the flat web 25 do not drain onto the film 16 or the floor.

The invention provides a simple direct procedure to simulate stained glass having variations and graining in its color tones. It achieves such variations and graining without use of printer screens such as commonly used in silk screen printing. In fact, such screens, which are commonly placed over the work, and beneath the squeegee, will not function properly with this method, as the direct application of concentrated colorants to such screens will clog the

screens, resulting in uncolored areas in the areas where the concentrated colorants were applied. The method of using the masking frame provides a very convenient manner of handling the colorants, which are applied in excess, as the excess is wiped across the film and removed from the film during practice of the method. The masking frame provides areas immediately adjacent to the film to receive the application of the colorants and to receive the excess colorants. The method of applying the colorants onto the frame, rather than directly onto the film avoids color spots which could otherwise be formed at the points where the colorants are poured directly onto the film. The gums, which are partially cured colorants, have a limited solubility with the colorants, which mutes or softens their contrast to the surrounding colorants, while maintaining distinct or marked concentrations of the colorant. This closely simulates the imperfections in antique or opalescent glass.

CLAIMS

1. A method for simulation of antique colored glass which comprises:

(a) selecting a plastic film having a thickness from 0.5 to aout 5 mils;

(b) coating a continuous layer of a permanent, pressure sensitive adhesive onto one surface of said film;

(c) applying, to the opposite surface of said film, a plurality of colorants, each comprising a liquid carrier which is compatible with the surface of said film and a pigment or dye of a color distinct from that of the other colorants of said plurality of colorants;

(d) wiping said plurality of colorants across the surface of said film by placing a wiper blade directly onto the surface of said film, and dragging, generally in a first predominant direction, said wiper blade across said surface of said film, while oscillating said wiper blade in a lateral direction;

(e) draining the excess of colorants from said surface of said film and permitting said colorants to dry; and

(f) applying said plastic sheet, with its adhesive surface, against the surface of a sheet of glass.

2. The method of claim 1 including the step of applying to said other surface of said glass, in a random pattern, deposits of thick, gummy colorants prior to said wiping step.

3. The method of claim 2 wherein said deposits are partially cured compositions of pigments in a film forming vehicle.

4. The method of claim 1 wherein said plurality of colorants are applied at laterally spaced-apart locations on said film.

5. The method of claim 4 wherein said plurality of colorants are applied with a squeegee and the thickness of the colorants applied to said film is controlled by regulation of the angle of the wiper blade of said squeegee against said film.

6. The method of claim 1 wherein said colorants comprise from 35 to about 65 weight percent pigment in a film former carrier.

7. The method of claim 1 wherein said colorants comprise a wash formed of a colorant containing from 35 to about 65 weight percent pigment in a film former carrier and diluted with from 1 to 10 parts of a soluble thinner per part 5 of colorant.

8. The method of claim 1 wherein said film is placed on a work table and a frame with upright sidewalls and a masking frame is placed over the edges of said film, including the steps of pouring said colorants onto preselected areas of said masking frame and dragging said colorants from said masking frame onto said film.

9. The method of claim 8 wherein said colorants are applied in excess, and the excess amounts of colorants are dragged across said film and deposited on said masking frame.

10. A table for coloring plastic sheet material which comprises:

(a) a work table surface;

(b) a work island centrally positioned and rigidly secured onto said work table surface and raised above the level thereof;

(c) a peripheral frame having outer dimensions substantially corresponding to the outer dimensions of said work table surface, and a central aperture with dimensions substantially corresponding to the outer dimensions of said work island;

(d) lift means attached to said table with lift arms extending therefrom to said peripheral frame to support said frame above said work table surface;

(e) lift actuation means to move said peripheral frame between an elevated position above said work table surface and a lower position resting on said work table surface; and

(f) masking frame means carried by said frame peripherally about said central aperture of said frame to engage the upper peripheral edge about said work island when said frame is in its lowered position, thereby securing and masking a film or sheet material overlying said work island.

11. The table of claim 10 wherein said frame has a vertical fence surrounding a lateral horizontal masking surface.

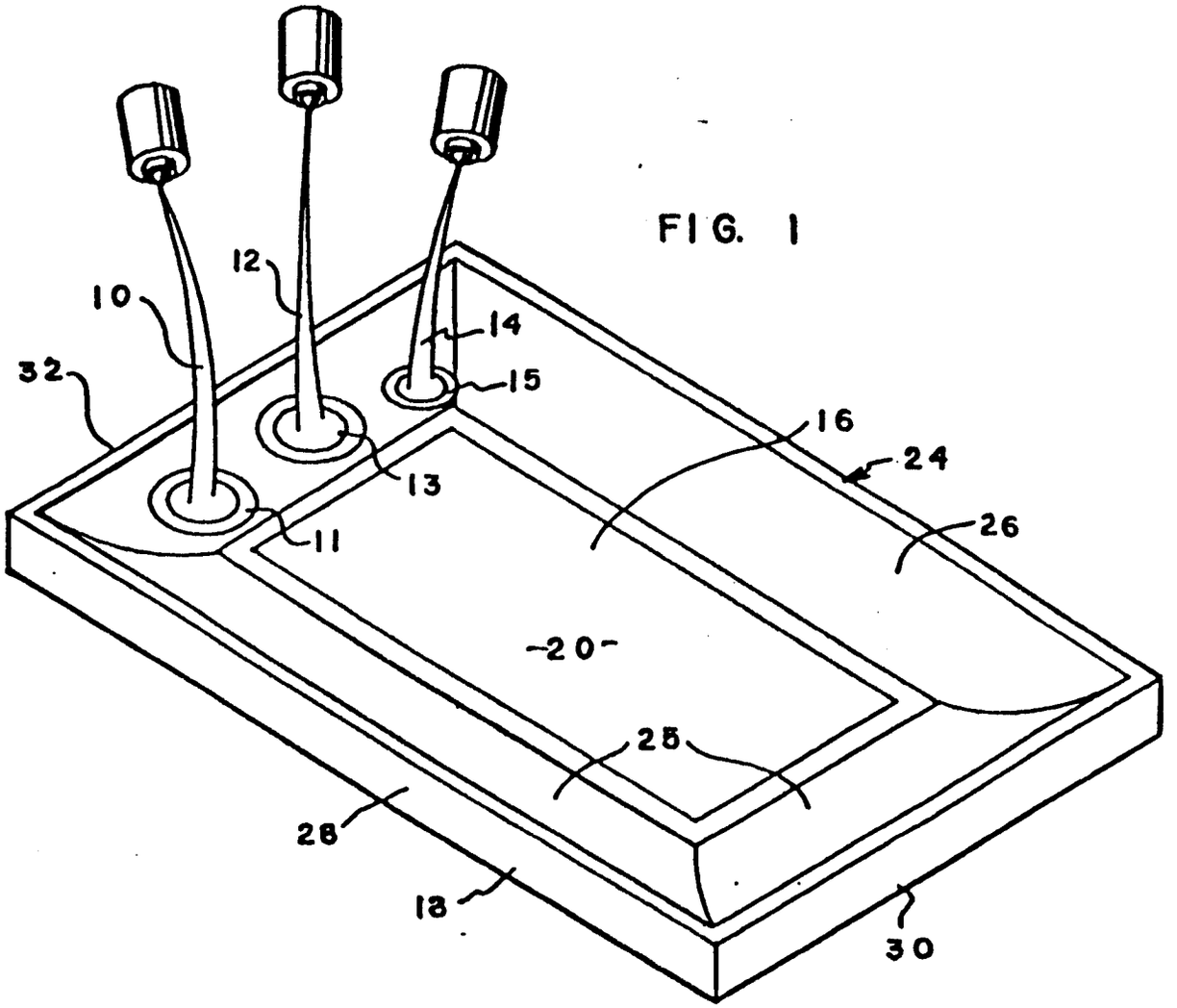
10
12
14
15
32
16
24
13
26
11
20
25
28
18
30

FIG. 1

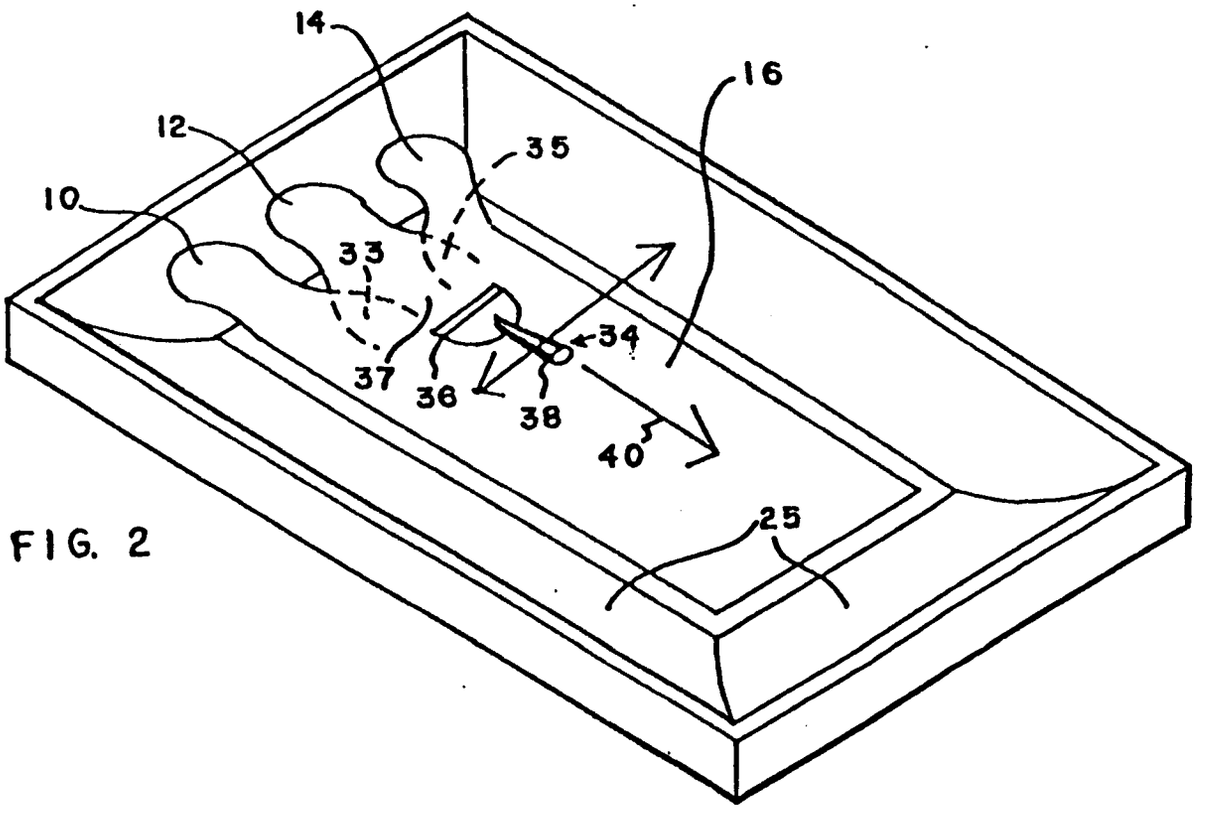
14
16
12
35
10
33
34
37
36
38
40
25

FIG. 2

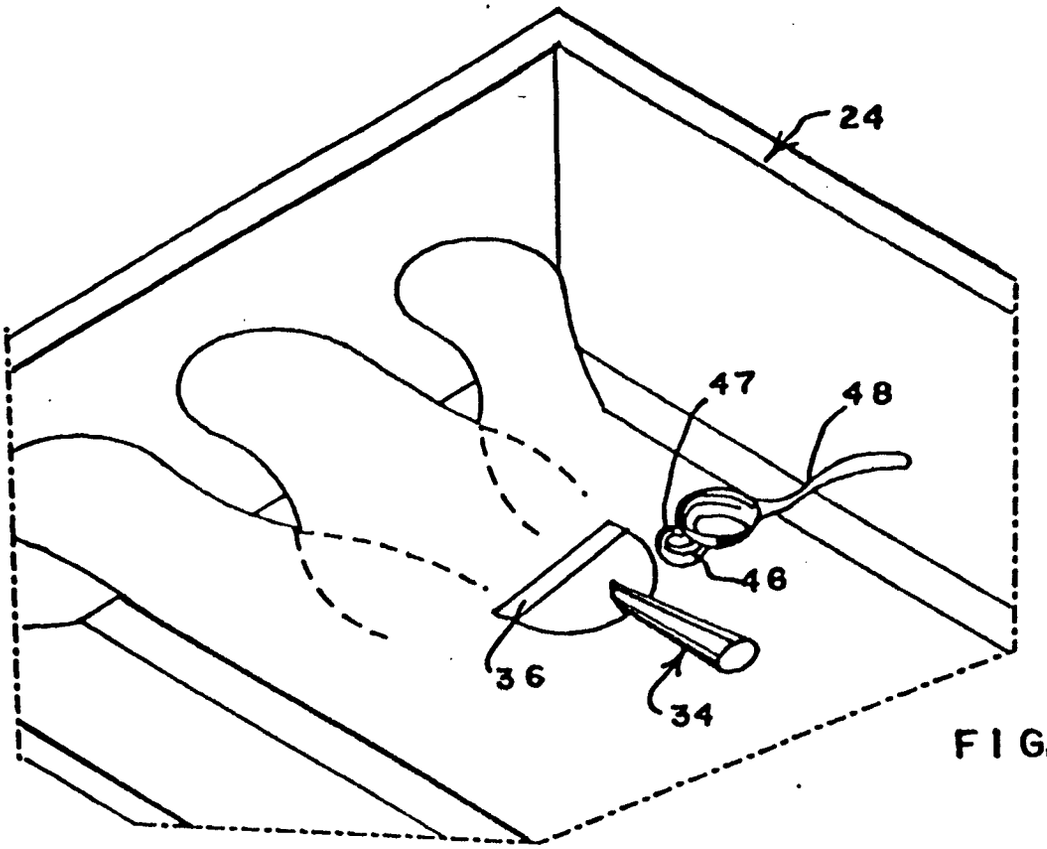

FIG. 3

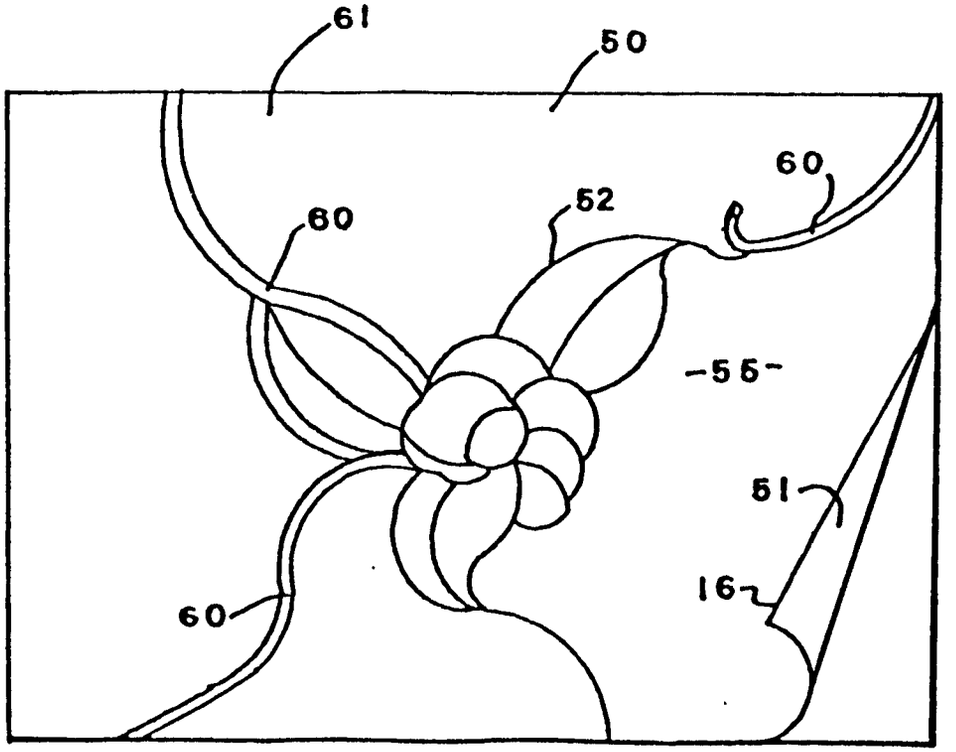

FIG. 4

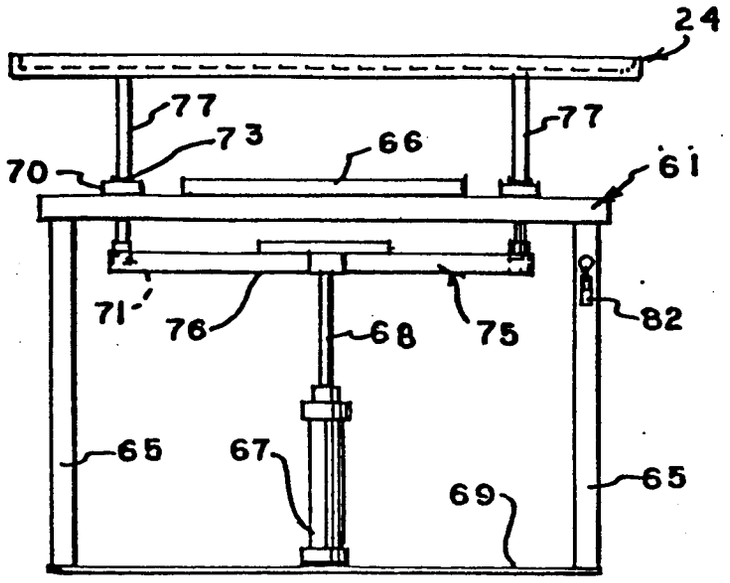

FIG. 5

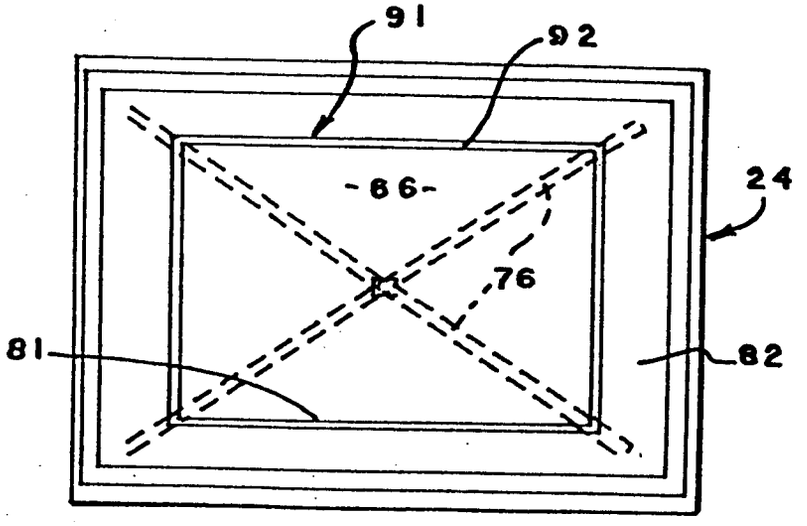

FIG. 6

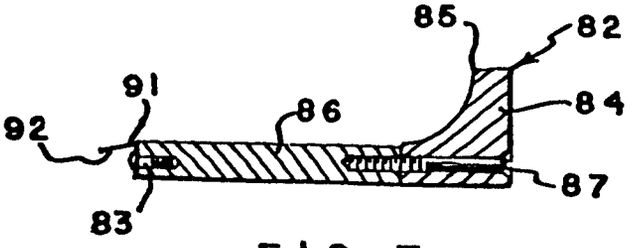

FIG. 7