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(54) Method of applying design to article, involving printing process.

(57) The invention provides a method of applying a design by a printing process to an expanse of material [18] which is dimensionally unstable, in particular genuine tanned leather and synthetic leather, which method includes the steps of adhesively applying the material to a rigid backing plate [20] to define a pictorial area [18.1] where the material adheres to the backing plate [20] ; providing adjustable key means [22, 24] on a print table [10] of a stencil or screen printing apparatus, to demarcate a selected position for the backing plate [20] where a print plate [12.1, 12.2, 12.3, 12.4] of the printing apparatus will produce a printed image [36, 42] in a desired location on the pictorial area [18.1] ; positioning the backing plate [20] in the demarcated position with reference to the key means [22, 24] ; and printing a printed image [36, 42] in the desired locality on the pictorial area.

The key means is preferably a displaceable base plate [22] which can be placed in a desired position on the print table [10]. The base plate [22] has keying pins [24] to engage with keying apertures [26] in a backing plate [20].

To achieve an accurate placement of successive images [36, 42] where a multi-colour design is to be printed, a transparent overlay sheet [30] is provided over the pictorial area [18.1], and a trial image [34, 40] is printed on the overlay sheet [30], whereupon the position of the base plate [20] is adjusted with reference to the trial image.

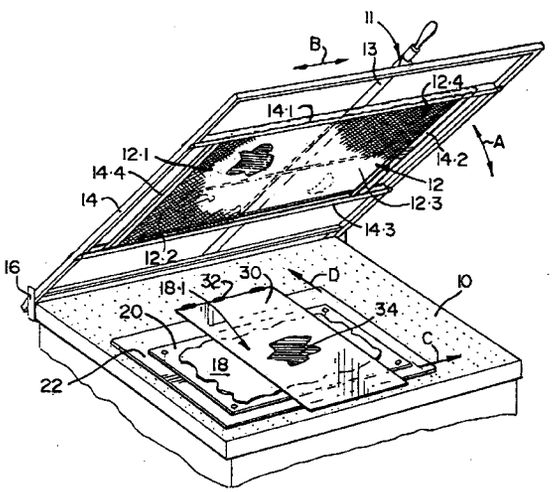

FIG 1

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THIS INVENTION relates to a method of applying a design, in particular a multi-colour design, to a material which is dimensionally unstable and which has an irregular or grained surface, by way of a printing process, and to products produced by the method. In a particular application the invention relates to a method of so applying a design, particularly a multi-colour design, to leather or synthetic leather, and to leather and synthetic leather products produced by the method.

The invention relates also to a decorative device or decorative article and to a method of manufacturing such a decorative device or article. In one application the invention relates to a decorative article of the nature of a wall hanging, and to a method of manufacturing such a wall hanging. In another application the invention relates to a method of decorating an article or object, such as a garment, or an accessory of apparel such as a hat or handbag, or a domestic accessory or ornament such as a lampshade, bookjacket, cushion, or the like by applying to such an article or object a decorative device according to the invention, and to articles and objects so decorated. In yet another application the invention relates to articles or objects, such as items of furniture, or accessories such as handbags, shoes, bookjackets, wallets, purses, and the like, which are made of or covered with leather or synthetic leather decorated by the method of the invention.

According to the invention there is provided a method of applying a design by a printing process to an expanse of material which is dimensionally unstable, in particular a material selected from the group comprised of genuine tanned leather and synthetic leather, which method includes the steps of

applying the expanse of material to a rigid backing plate to define a pictorial area where the material adheres to the backing plate;

providing key means on a print table of a stencil or screen printing apparatus, the key means being adjustable to demarcate a predetermined position on the print table for the backing plate where a print plate of the printing apparatus will produce a printed image in a desired location on the pictorial area;

positioning the backing plate on the print table in the demarcated predetermined position with reference to the key means; and

printing a printed image in the desired locality on the pictorial area by means of the print plate.

More particularly according to the invention there is provided a method of applying a design to a pictorial area provided on an expanse of material which is dimensionally unstable, in particular a material selected from the group comprised of genuine tanned leather and synthetic leather, by a printing process, which method includes the steps of

providing an expanse of selected material which is dimensionally unstable and which has a surface to receive a design by a printing process;

applying the expanse of selected material to a rigid backing plate so that a pictorial area is defined where the selected material adheres to the backing plate;

providing a print plate selected from stencil-print plates and screen-print plates on which an image of the desired design is applied, the print plate being arranged to produce a printed image of the design in a predetermined position relative to a print table;

providing a print table on which the rigid backing plate carrying the expanse of selected material may be supported in the predetermined position for the pictorial area to receive the printed image in a desired location by means of the print plate;

providing key means on the backing plate to register with corresponding adjustable key means provided on the print table;

adjusting the key means on the print table to demarcate the predetermined position for the backing plate with reference to the print plate;

positioning the backing plate carrying the expanse of selected material in the predetermined position on the print table with reference to the key means;

providing a printing ink on the print plate, the ink being of a consistency selected to adhere to the surface of the material of the pictorial area; and

printing the image of the design in the desired location on the pictorial area while the backing plate carrying the selected material is held in the predetermined position relative to the print plate.

In one embodiment, the pictorial area may be provided on an expanse of synthetic leather, the synthetic leather being selected to present as smooth as possible a surface to be printed on. It should be understood, however, that even where a synthetic leather has been selected to have such as smooth a surface as possible, the surface would usually still have small irregularities which may make it difficult to achieve a clear printed image thereon, with sharp and well-defined edges and an even colour distribution. If desired, the expanse of synthetic leather may have irregularly shaped or formed edges, so as to resemble for example an animal skin.

In another embodiment, the pictorial area may be provided on an expanse of genuine tanned leather, the surface of which has preferably been rendered as smooth as possible, ie substantially untextured, to receive a design by way of a printing process. Again it should be borne in mind that even with a surface rendered as smooth as possible, the leather would usually still have small irregularities (ie a natural grain), which may make it difficult to achieve a printed image thereon with sharp and clear outlines and an even and true colour tone. It should be understood, therefore, that both suitably prepared genuine leather and selected synthetic leather may be used in accor-

dance with the invention, and the term "leather" when used in the specification should be interpreted accordingly.

The design applied to the pictorial area may be of any suitable or desired nature, for example a design portraying animals, birds, trees, flowers or any wild life theme, or ethnic figures, or a geometric or abstract design or the like, and the design is applied to the pictorial area by a printing process. Instead of a wild life or ethnic or other artistic theme, the design may comprise a logo, a company or family crest, a trade or sports emblem, or the like, again applied to the pictorial area by a printing process. The features of the invention described herein, namely the use of synthetic or genuine leather as a background material and the application of the design by a printing process, make it possible for decorated leather and a variety of articles and objects made thereof, to be made by an industrial process and to be supplied to the market in adequate quantities and at reduced costs.

The method of the invention as will be described in more detail below, has been found to give particularly good results when used for the printing of a multicolour design on a dimensionally unstable, stretchable material such as leather, including genuine and synthetic leather, and it makes possible the printing of high quality multi-colour designs on leather and synthetic leather, which previously could not be done.

At this point it may be explained that it has been found to be extremely difficult to provide a good quality, sharply defined and true colour-registered multicolour printed image on a dimensionally unstable material such as leather, especially by way of a screenprinting procedure. In the first place, it is extremely difficult to hold an expanse of dimensionally unstable material such as leather in a stationary and immobilised condition during the printing step. The Applicant has found that by applying such a material to a rigid backing plate, conveniently with an adhesive, the material may be immobilised and stabilised, and the backing plate carrying the material can be positioned more accurately to achieve proper registration for the second and subsequent colour runs.

Thus, according to the invention there is provided a method of applying a multi-colour design to a pictorial area provided on an expanse of leather, including genuine and synthetic leather, which includes the further steps of

providing a plurality of colour-separated print plates selected from stencil-print plates and screenprint plates, representing colour-separated images of the desired design so that superimposed images printed by the plates together will provide a desired multi-colour design;

providing on the different print plates different printing inks of the desired colours to correspond with the colour-separated print plates and of a consistency to permit the ink to adhere to the surface of the material of the pictorial area;

consecutively adjusting the key marks on the print table to demarcate a plurality of predetermined positions for the backing plate with reference to the plurality of print plates, so that a colour-separated image will be printed in a desired locality on the pictorial area;

consecutively positioning the backing plate carrying the expanse of material in the different predetermined positions with reference to the key means;

consecutively printing colour-separated images of the design in the desired location on the pictorial area with the different print plates while the backing plate is held in the predetermined position relative to the print plate for each colour;

allowing the ink applied to the pictorial area to dry after each colour image and before applying a subsequent colour image; and

removing the expanse of material from the rigid backing plate once the multi-colour design is complete.

It has already been mentioned above, that it is difficult to work with an expanse of material which is stretchable, eg in the form of leather or synthetic leather or certain textile fabrics. This difficulty is exacerbated when such a material is to be used for carrying out a method for the mass application of a multicolour design, for the mass production of articles. In a multi-colour printing process as set out above, it is necessary that the material of the pictorial area should be kept absolutely still dig the various colourseparated printing runs, so that the images applied in the different colours will be perfectly in register, and furthermore, where a plurality of pictorial areas are to be printed, that consecutive pictorial areas should be accurately placed in the correct position relative to the different print plates.

As explained above, the Applicant has found that this difficulty may at least partially be overcome if the expanse of synthetic or genuine leather or other stretchable fabric, which is to form the pictorial area, is first applied to a rigid backing plate and is allowed to remain on the plate during the entire printing process. Accordingly, the expanse of synthetic or genie leather is prepared for printing by removably applying it, preferably with the aid of a pressure sensitive adhesive, to a rigid backing plate. The backing plate may be a metal plate or a plate of a synthetic plastics material, eg acrylonitrile butadiene styrene (ABS). The backing plate may be coated with a pressure sensitive adhesive, eg a conventional textile adhesive, to provide a tacky surface to which the expanse of synthetic or genuine leather may be applied. The provision of key means on the print table and on the backing plate provides assistance in this regard, that the pictorial area can be positioned and held accurately and statically in register with the print plate, in order

to obtain a clear and sharply defined print of the right colouration.

The backing plate bearing the pictorial area may thus be placed on a printing table with reference to the key means on the printing table, and so that the key means on the backing plate are in register with those on the print table. Thereupon the consecutive printing runs may be carried out, substantially in the conventional manner, to print the design in the consecutive separated colours so as to obtain the final multi-colour printed product. Once the printing ink has dried, the expanse of material bearing the completed printed design is poled from the backing plate. The backing plate, which retains its tacky surface, is reusable with the next expanse of material to be printed.

The pressure sensitive may thus preferably be selected to retain its tacky surface for several consecutive runs. The pressure sensitive adhesive is further preferably selected so as to contain no ingredients which would seep through the leather to adversely affect the printing or the printing inks, or the printed image once applied.

Once the key means on the printing table has been adjusted to demarcate the exact position on the print table for a backing plate to be placed, to provide the printed image in the desired locality on the pictorial area, a plurality of prepared backing plates may be positioned and printed consecutively, with a design which will be applied on each in a predetermined accurately positioned locality.

Even though such key means by be positioned with care and may consistently be adhered to, the Applicant has nevertheless found that the different colour images do not always appear on the pictorial area in precisely the right locality. It is believed that the reason is to be found in the fact that setting of the key means by way of a visual observation of the relative positioning of the print plate and the pictorial area, is not sufficient to ensure true registration of consecutive printed image. The Applicant has found that much improved results may be achieved by printing first a dummy or trial image to obtain a better indication of how the key means are to be adjusted. The Applicant accordingly makes use of a transparent overlay print sheet, which is placed over the pictorial area and onto which a primary image is printed by way of a dummy or trial printing step. Adjustments in the positioning of the key means on the print table, and consequently of the prepared backing plate, carrying the expanse of leather material applied to it, may then take place with reference to the position of the primary image created on the transparent overlay by the trial printing step.

The invention accordingly provides a method of applying to a pictorial area a multi-colour design of enhanced accuracy and colour registration, which includes the further steps of

placing a removable transparent overlay sheet over the pictorial area prior to printing an image thereon;

printing a primary image onto the transparent overlay sheet;

adjusting the key means with reference to the position of the primary image on the transparent overlay;

adjusting the position of the backing plate carrying the expanse of material with reference to the key means;

removing the transparent overlay sheet;

printing a colour image onto the pictorial area; and

repeating the foregoing steps using a transparent overlay sheet for a primary image prior to a colour image on the pictorial area in respect of each subsequent colour run.

The use of a transparent overlay sheet also enables a multi-colour design to the applied to a plurality of consecutive pictorial areas provided upon a plurality of backing plates, with improved results as to colour registry, definition and colour toning.

The invention thus provided a method for applying a multi-colour design to a plurality of consecutive pictorial areas provided on a plurality of prepared backing plates, which includes the further steps of

providing a plurality of rigid backing plates each with an expanse of material, preferably selected from the group comprised of genuine tanned leather and synthetic leather, applied thereto;

providing a plurality of colour-separated print plates on which colour-separated images of the design are applied;

positioning a first prepared backing plate on a print table and placing a transparent overlay sheet over the pictorial area;

printing a primary image with a first colour-separated print plate on the overlay sheet;

if necessary adjusting the position of the key means on the print table and the position of the first backing plate, with reference to the position of the primary image on the overlay sheet;

removing the overlay sheet and printing a final image with the first colour-separated print plate on the pictorial area of the first backing plate;

removing the backing plate from the print table and allowing the ink to dry;

positioning a second and subsequent prepared backing plates consecutively on the print table with reference to the key means on the print table;

printing final image with the first colour-separated print plate on the pictorial areas of the second and subsequent backing plates;

allowing the ink to dry on the pictorial areas of the second and subsequent backing plates;

positioning the first prepared backing plate again on the print table and placing a transparent overlay sheet over the pictorial area and printing a pri-

mary image with the second colour-separated print plate on the overlay sheet;

if necessary adjusting the position of the key means on the print table and the position of the first backing plate with reference to the position of the primary image on the overlay sheet;

removing the overlay sheet and printing a final image with the second colour-separated print plate on the pictorial area of the first backing plate;

removing the first backing plate from the print table and allowing the ink to dry;

positioning the second and subsequent backing plates consecutively on the print table with reference to the key means on the print table;

printing final images with the second colour-separated print plate on the pictorial areas of the second and subsequent backing plates and allowing the ink to dry on each one;

repeating the procedure with the third and further colour-separated print plates until a full colour image of the desired design has been printed on each of the plurality of prepared backing plates; and

finally removing each expanse of material from its backing plate.

The transparent overlay sheet may be a sheet of a transparent synthetic resin or celluloid with substantial rigidity and a smooth surface from which applied printing inks may readily be removed. The overlay sheet should preferably be inert to the printing ink. Preferably an ink of dark colour is used for printing the primary image on the transparent overlay sheet, so that the outlines may be observed clearly, so as to enable accurate adjustment of the key means on the print table and of the position of the backing plates may be achieved.

It will be evident that these features make the method particularly suitable to be used in an industrial manufacturing process, ie to make large numbers of multi-colour prints on genuine or synthetic leather, in a predetermined desired locality within a pictorial area and with clear and accurate placement of the various colours. Before each first colour run, the transparent overlay is positioned over the first prepared print plate and a first primary print executed. With reference to the resultant print, the position of the key means is adjusted. If desired, the primary trial print may also be in the colour-separated colour tone, so that the colour tone of the ink may be adjusted, with reference to the primary trial print. Thereupon a plurality of images in the correct colour and in the correct position may be printed consecutively.

The same procedure is followed with the next colour, and so forth until the complete multi-colour print has been created.

Before applying the first colour, particularly where the leather has been dyed a deep or strong colour, it is desirable, so as to ensure that white and other light colours will print with the correct colour toning, to provide the pictorial area first with a white or other selected neutral colour background, preferably having the silhouette outlines of the desired final pictorial design. The pictorial design may then be printed onto the white or neutral background by way of consecutive colour runs, as explained above.

The Applicant has found that it is particularly advantageous to use a screen-printing process in the method according to the invention. Even though the material, eg silk, of the screen-print plate may itself stretch slightly during the printing procedure, ie when a conventional rubber squeegee is moved across the screen plate, thereby slightly displacing the printed image, this slight displacement is reflected on the transparent overlay sheet. The key means and the corresponding position of the backing plate may be adjusted with reference to the displaced image on the transparent overlay sheet, to compensate for the stretching of the silk screen. When use is made of a print screen of large dimensions, on which different print zones are defined, care should be taken that a uniform directional orientation of the colour-separated images is maintained. Because the silk screen will stretch in the direction in which the squeezee operates, it is important that the different colour-separated images all be orientated so that the stretching will occur in the same direction for each one.

The adjustable key means provided on the print table may conveniently include a base plate which may be positioned on the print table in a selected position determined with reference to a print plate, to permit an image printed by the print plate to be printed in a desired locality on the base plate. The base plate may be secured to the print table in the selected position, eg by means of adhesive strips. The base plate may carry one or more keying pins, indicating a predetermined position on the base plate in which a backing plate may be mounted with the aid of corresponding keying apertures provided in the backing plate.

In practice, the base plate may thus be positioned and secured on the print table in a position selected with reference to the position of an image printed by a print plate, and a backing plate may in turn be placed in a predetermined position on the base plate with the aid of the corresponding keying pins and apertures provided on the base plate and backing plate respectively. When a transparent overlay sheet is used, as described above, on which a primary trial image can be printed, the position of the base plate is determined with reference to the position of the primary trial image.

In selecting the printing inks, the Applicant has found conventional matt or no-gloss printing inks to provide a good adherence to the leather surface, but that an adjustment in the colour toning has to be made in order to obtain the desired colour shade on the leather material. For reasons not fully understood

by the Applicant, the printing inks, once applied to the leather surface, do not display exactly the same colour shade as prior to application. The printing inks used should thus be selected to provide good adherence to the leather surface to which the design is applied, and to produce a pliable product, and furthermore the colour toning may have to be adjusted. Inks with a matt finish are preferred, since the glossy inks often contain a varnish which may cause cracking of the printed design when the leather article is handled. The ink should further be rendered to a consistency to pass freely through the screen-print plates without clogging the screen, but should not be so runny as to smudge on the leather surface. The ink should also not dry too quickly; it should preferably penetrate into the surface layers of the leather material.

According to a further feature of the invention, the drying of the ink of the printed image applied to the pictorial area may be accelerated or enhanced to speed up the overall printing process. Accelerated drying may be achieved by directing an air flow over the printed surface, or preferably by moving an entire backing plate with the expanse of leather applied thereto, through a drying tunnel with one or more batteries of infrared lamps, preferably provided in combination with air flow means, to accelerate the drying of the printed ink. The printed products may conveniently be conveyed through the drying tunnel on a conveyor belt; the infrared lamps may be provided in batteries above the conveyor belt; and an air extraction fan may be provided to provide with air flow through the tunnel.

Once the final and full colour print has been achieved and dried, a clear protective or fixative coating may be applied over the pictorial design, or if desired over the entire pictorial area, to protect the printed design. The protective layer, which serves as a fixative, should preferably be pliable and resistant to water and conventional organic solvents and cleaners.

According to a further feature of the invention there is provided a decorative device or article which includes a pictorial area provided on an expanse of a material selected from the group comprised of genuine tanned leather and synthetic leather with a surface suitable for the application of a design by a printing process, the pictorial area bearing a design applied thereon by a printing process and with the use of printing ink, by a method according to the invention.

The design may preferably be a multi-colour pictorial design.

If desired, the decorative device may have a decorative surround extending at least partially around the pictorial area and made up of randomly shaped and positioned pieces of material selected from the group comprised of genuine tanned leather and synthetic leather, optionally in combination with other materials selected from the group comprising cloth including woven, non-woven and knitted fabric, feathers, beads, fur, plant material and stones.

If desired, the design applied to the pictorial area may be enhanced or extended by the addition of related items or materials, such as feathers, seeds, grass, pieces of wood or bark, fur, beads (particularly of wood or clay), stones (particularly semi-precious stones), etc.

Once the printed design has been applied, the expanse of leather may be mounted onto a backing layer which may preferably be pliant, eg of canvas. Such a backing layer does not only provide reinforcement, but also provides a neatly finished-off appearance. Furthermore, the materials forming the surround may also partly be applied onto the backing material. The expanse of leather may be applied to the backing layer by bonding with a suitable adhesive. Before applying the expanse of leather material to the backing layer, the rear side of the leather may preferably be coated with a protective layer to prevent solvent or other harmful components of the adhesive from seeping through the leather and discolouring or dislodging or otherwise affecting the printed design.

As mentioned above, a decorative surround may be provided, which may be made up of irregularly shaped pieces of genuine or synthetic leather, which may be applied, such as by means of adhesive, to extend in a random arrangement partially or wholly around the expanse of material bearing the pictorial design. The pieces of leather may be applied, such as by means of an adhesive or by stitching, to the backing layer, or to the expanse of leather, or both. If desired, pieces of textile or other materials, such as feathers, fur, beads, etc may be applied as part of the surround.

The decorative article may be of the nature of a wall hanging, and may have suspension means for suspending it such as against a wall.

At or near the upper end of the collated decorative article, means may be provided for suspending the article from a suspension means. For example, a folded-back seam may be provided at the upper end, or a series of loops, through which a rod may be threaded to suspend the article from a hook or nail on a wall, to form a decorative wall hanging.

The decorative device may instead be applied to another object or article, such as a garment, or an accessory of apparel such as a hat or handbag or a domestic accessory such as a lampshade or cushion, etc so as to decorate the object or article. The decorative device may thus be of dimensions selected in accordance with the object or article to be decorated. For example, if it is intended to decorate a garment such as a T-shirt, shirt or blouse, the decorative device may be of such dimensions as to permit the device to be applied to the front of the T-shirt, shirt or blouse. The decorative device may be applied to the garment by stitching or by means of an adhesive, or in any other suitable manner.

Instead of a shirt or blouse, any other garment may likewise be decorated by the application of such a decorative device, eg sweaters or jerseys, jackets particularly leather jackets, handbags, hats, etc. Such a decorative device may also be applied to photo albums, or to lampshades or cushions or other domestic articles. Again the dimensions of the decorative device would be selected to suit its ultimate application.

In another application of the invention the decorative device according to the invention may be made in miniature size to enable it to be used as a brooch or as a pendant on a necklace or on earrings. Thus, a decorative device according to the invention but in miniature size may be provided with a pin on its rear side, to be used as a brooch; or it may be provided with suspension means such as an eyelet to be suspended from a leather thong or a chain to serve as a necklace; or it may be provided with hooks or clips to serve as earrings; or with clips or pins to serve as hair clips or pins.

The invention also extends to garments or other objects and articles whenever decorated by the application of a decorative device in accordance with the invention. Instead of making a separate decorative device as hereinbefore described, and applying the device to the object or garment to be decorated, a garment or other article may be decorated directly, by creating a decorative device in accordance with the invention directly on the fabric of the garment or other article. Thus, a design may be applied by a printing process onto the fabric of a garment or other article, and a decorative surround may be provided on the fabric to extend at least partially around the design to define a pictorial area, the surround being made up of randomly shaped and positioned pieces of leather or fabric or other material.

The decorative surround may be applied to the fabric of the garment or other article by stitching the pieces onto the fabric, or by bonding the pieces to the fabric with a suitable adhesive, to form the surround. As explained above, pieces of other materials, such as textile, feathers, fur, or beads, etc may be incorporated in the decorative surround.

The invention accordingly includes within its scope garments such as T-shirts, shirts, blouses, skirts, etc and other articles, such as cushions, lampshades, etc which have been decorated by a design printed directly onto the fabric of the garment or article, and a decorative surround applied around the design as described above.

Instead of providing an expanse of material comprising leather or synthetic leather, the expanse of material may be any other suitable fabric, for example provided by the fabric of the garment or other article to be decorated. In this case, the printing process will take place on the fabric of the garment or other article itself. This may take place either before or after the garment or other article is manufactured.

It should be appreciated that the decorative article or device according to the invention is suitable to be manufactured by way of an industrial process, with the pictorial design being applied by a printing process, as set out above.

The method lends itself to industrial manufacture of the decorative articles or devices according to the invention on a commercial scale. As explained above, it has been found convenient in practice to prepare a plurality of backing plates with synthetic or genie leather, pre-cut in suitable sheet sizes, removably applied thereto. As the individual colour-separated printing runs are carried out consecutively on the prepared printing plates, the early ones are allowed to dry, eg by moving them through a drying tunnel, so that when the last units are completed, the next colour run may commence on the dry units. The printed units may instead be placed on drying racks to dry.

Once the final full colour pictorial design has been printed and the product is dry, the sheet of genuine or synthetic leather or other fabric bearing the design is removed from the backing plate, it is cut to the desired shape, and if desired this is applied to a backing layer. Thereafter the decorative surround is created by applying at random irregularly shaped pieces of leather and/or other materials as explained above.

The invention and the manner in which it may be carried out in practice will now be described by way of example with reference to the accompanying diagrammatic drawings

In the drawings

Figures 1 to 5 illustrate, schematically, the various steps when the method according to the invention is carried out on a conventional screen-printing apparatus;

Figure 6 is a diagrammatic three-dimensional representation of a drying tunnel that may be used in combination with a conventional printing apparatus, for drying the printed material;

Figure 7 is a diagrammatic front view of a decorative article manufactured in accordance with the invention, in the form of a wall hanging;

Figure 8 is a rear view of the article of Figure 7; and

Figure 9 is a sectional side elevation of the article of Figures 7 and 8, taken along line IX - IX in Figure 7.

Referring to Figures 1 to 5, a method according to the invention for applying a design to an expanse of material which is dimensionally unstable, may be carried out on a conventional scree-printing apparatus, as illustrated in these Figures.

The apparatus comprises a print table 10 and a silk print screen 12. The silk screen 12 is mounted between frame members 14.1, 14.2, 14.3 and 14.4 of a frame structure 14. The frame structure 14 is pivotally

mounted to the print table 10, as shown at 16, to permit pivotal displacement of the print screen 12 in the direction of the arrows A, as shown in Figures 1 and 3, to enable the frame 14 carrying the print screen 12 to be brought from a raised position (as depicted in Figures 1 and 3) to a printing position (not shown) in which an image applied to the print screen can be printed on a print surface supported on the print table 10.

It will be observed that the print screen 12 is of comparatively large dimensions, and is divided into four print zones or print plates 12.1, 12.2, 12.3 and 12.4. The four print plates are particularly suitable to be used for printing the four colour runs where a four-colour colour separation of a multi-colour design has taken place, in accordance with conventional colour printing technology. In such a colour-separation, a multi-colour design is separated into for example four basic colour tones (conventionally cyan, yellow, magenta and black), and four colour-separated print plates are provided, each plate designed to print an image of the design in one of the basic colours, so that the images when they are superimposed will represent the true colours of the multi-colour design.

On the side of the print screen 12 remote from the print table 10, a squeegee tool 11 is mounted. The squeegee 11 is of conventional construction and operation, being displaceable from side to side across the print screen 12 in the direction of the arrows B shown in Figures 1 and 3. In accordance with IPS conventional design, the squeegee 11 has a rubber blade 13 which is drawn across the remote surface of the print screen 12, when the print screen 12 is in the printing position, to force printing ink supplied on that surface of the print screen 12 through the screen 12 to print an image on a print surface provided on the print table 10, in conventional manner.

The use of the printing apparatus in the method according to the invention, for printing a multi-colour design on an expanse of material 18 which is dimensionally unstable, such as genuine tanned leather or synthetic leather, will now be described in more detail. The main problems encountered when it is attempted to print a design on leather, ate twofold: in the first place it is difficult to hold the expanse of leather material in a taut and stationary condition while the printing operation is carried out; and secondly, it is difficult to position the expanse of leather material accurately and in the correct position to permit an image to be printed thereon in the desired locality. Furthermore, if a multi-colour design is to be printed, it is extremely difficult to align the expanse of material properly, so that a subsequent colour-separated image will be accurately superimposed upon an already printed colour-separated image to produce a sharply defined true colour image.

By the method according to the invention, these problems can be overcome in the following manner: As depicted in Figure 1, the expanse of material 18 is applied to a rigid backing plate 20. The backing plate is an acrylonitrile butadiene styrene plate, and the expanse of leather is applied thereto by means of an adhesive (not shown), eg a conventional textile adhesive, so that a pictorial area 18.1 is defined where the leather adheres to the backing plate 20. It will be appreciated that the leather 18 is held taut and stationary over the area of the pictorial area 18.1.

The backing plate 20 is in turn mounted on a base plate 22, which is also a synthetic plastics plate of substantial rigidity. The base plate 22 has key pins 24, while the backing plate 20 has corresponding keying apertures 26 to enable the backing plate 20 to be mounted accurately in a predetermined position on the base plate 22. The base plate 22 is displaceable on the print table 10, as is evident from the Figures 1 to 4, and can be secured to the print table 10 in a selected position, eg by means of adhesive strips 28. It should be understood that any other releasable securing means may be provided instead of the adhesive strips 28.

The base plate 22 thus serves as a key means to demarcate a selected position on the print table 10, where a backing plate 20 carrying an expanse of leather material 18 must be positioned, in order to allow a print plate 12.1, 12.2, 12.3 or 12.4 to print an image in a desired locality on the pictorial area 18.1 defined on the leather material 18.

In determining the correct position for the key means, ie the base plate 22, on the print table 10, use is made of a transparent overlay sheet 30, as explained more fully below.

Assuming that a first colour-separated image is to be printed on the pictorial area 18.1 by means of the first print plate 12.1, the base plate 22 is placed is a preliminary position on the print table 10, more or less in alignment with the print plate 12.1, as depicted in Figure 1. The backing plate 20 is then placed in a keyed position on the base plate 22. The expanse of leather 18 (or other dimensionally unstable material) is held in position on the backing plate 20, being bended thereto by the adhesive. A transparent overlay sheet 30, eg of a transparent synthetic resin, is placed over the leather material, and is held in place eg with adhesive putty 32.

Printing ink in a dark colour is provided on the print plate 12.1, and a trial-image 34 is printed on the transparent overlay 30 (as shown in Figure 1). With reference to this image 34, the base plate 22, carrying the backing plate 20 and the leather material 18, is displaced on the print table 10, as indicated by the arrows C and D in Figure 1, while the overlay sheet 30 remains stationary. Once the leather material 18 is so positioned that the trial image 34 is aligned with a desired locality on the pictorial area 18.1, the base plate 22 is secured to the print table 10, eg by the adhesive strips 28 (as shown in Figure 2). The transpar-

ent overlay sheet 30 is removed; the dark colour ink is removed from the print plate 12.1 and the correct colour ink is applied to the plate 12.1; and a colour image 36 is printed on the leather material 18, in the desired locality within the pictorial area 18.1 and in the desired colour shade.

A colour image identical in colour and position to the image 36 is then printed onto the pictorial area of the leather material supported on the backing plate 20.2. In similar fashion,, the plate 20.2 is then removed and replaced by a subsequent backing plate (not shown) and the procedure repeated until all of the plurality of pieces of leather have been printed with the first colour-separated image corresponding to the image 36.

At this point it may be mentioned that each backing plate carrying an expanse of leather imprinted with an image 36 is subjected to a drying stage, to permit the ink of the image 36 to dry before the next image is printed thereon. Drying may be achieved in a drying tunnel schematically depicted in Figure 6 and generally indicated as 50. The drying tunnel comprises an enclosed chamber 52 through which a conveyor belt 54 moves in the direction of the arrow G, on which belt 54 the backing plates carrying the printed leather may be transported through the chamber 52. Infrared lamps 56 are arranged in transverse rows above the conveyor belt 54, and an air extraction fan schematically shown as 58 is provided to cause an air flow through the chamber 52. When the backing plates reach the exit end 52.2 of the chamber 52, the ink of the printed image printed on the leather is dry.

Reverting again to Figures 3 and 4, when the second colour-separated colour image is to be printed on an expanse of leather carried on the backing plate 20 (after the ink of the image 36 has been dried), the backing plate 20 is keyed onto the base plate 22, and the base plate 20 displaced to a new position on the print table 10, more or less aligned with the print plate 12-2, as depicted in Figure 3.

A clean transparent overlay sheet 30 is again placed over the pictorial area 18.1 of the leather 18, and secured with adhesive putty 32; an ink in a dark colour is applied to the print plate 12.2; and a trial image 40 is printed on the overlay sheet 30, as shown in Figure 3. Thereupon the base plate 22 is adjusted in the direction of the arrows E and F in Figure 3, until the image 40 is exactly and accurately registered with the desired locality of such image 40 in the pictorial area 18.1. If desired, a positive specimen of the complete design (not shown) may be placed over the pictorial area 18.1 to assist with the lining-up of the images.

Once the base plate 22 is in the correct position, as depicted in Figure 4, it is secured in that position, eg with the adhesive strips 28; the transparent overlay sheet 30 is removed; and the final image 42 is printed onto the pictorial area 18.1.

In this manner, with the use of a transparent overlay sheet receiving a first trial image, and the subsequent adjustment of the base plate 22, which provides a keying means, the Applicant achieve a true and accurate alignment of the different colour images.

Again, as explained above in regard to Figure 5, a plurality of successive backing plates may then be keyed onto the base plate 22, to receive the printed image 40 in the correct desired locality within the pictorial area.

If a plurality of pieces of leather are to be printed with the same design, the backing plate 20 carrying the expanse of leather with the image 36 is removed, and another backing plate 20.2 carrying an expanse of leather 18 is positioned on the base plate 22, and keyed in position by the key pins 24, as depicted schematically in Figure 5.

Referring to Figures 7 to 9, a decorative article in accordance with the invention, suitable to be suspended against a wall as a wall hanging, comprises an expanse of a synthetic or genuine tanned leather material indicated by the numeral 110, presenting a pictorial area 110.1 bearing a decorative design 112, being in this case by way of example a pictorial represention of a leopard. The design 112 has been applied to the pictorial area by a printing process, eg a screen-printing process, in accordance with the method described herein. For this reason the surface of the expanse of material 110 has been selected to be suitable to receive a pictorial representation by printing, eg it must be a surface as smooth and regular as possible.

The edges 110.2 of the expanse of material, eg synthetic or genuine tanned leather 110 is formed to present uneven outlines, and the entire expanse of material 110 is surrounded by a decorative surround 114 comprised of a plurality of pieces of synthetic or genuine leather 114.1, 114.2, 114.3 etc of irregular shape and randomly arranged around the material 110. The pieces of leather 114.1, 114.2, 114.3 are attached such as with an adhesive. Further items, such as leather thong tassels 116 are applied to the surround 114 and/or the expanse of material 110, to enhance the appearance of the article.

At the upper end, a folded back seam 118 is provided, through which a rod 120 may extend, by means of which the article may be hung on a wall (not shown), to serve as a decorative wall hanging.

As shown in Figures 8 and 9, the expanse of material 110 is applied to a backing layer 122, eg by means of adhesive. The backing layer may be of canvas. The pieces of leather forming the decorative surround 114 may be attached onto the expanse of material, eg synthetic leather 110 or the backing layer 122, in any desired position.

A decorative device similar to the decorative article depicted in Figures 7 and 8 but of smaller dimen-

sions (not shown), may be provided and may be applied to a garment, eg a jacket or T-shirt, or to another article, such as a bag or cushion, to decorate such garment or article. The decorative article may be so applied by way of stitching, or with the aid of an adhesive.

As set out above, instead of printing the design 112 on an expanse of genuine or synthetic leather 110, the design 112 may be printed on another material which is dimensionally unstable, eg directly onto the fabric of a garment or other article. If desired, a decorative surround may be applied around the design in a manner similar to that explained with reference to Figures 7 and 8. In other words, a plurality of pieces of leather of irregular shape and size may be applied eg to the garment, by stitching or gluing, in a random arrangement to surround the printed design.

Claims

1. A method of applying a design by a printing process to an expanse of material which is dimensionally unstable, characterised in that the method includes the steps of

applying the expanse of material [18] to a rigid backing plate [20] to define a pictorial area [18.1] where the material adheres to the backing plate [20];

providing key means on a print table [10] of a printing apparatus selected from the group comprised of a stencil and screen printing apparatus, the key means being adjustable to demarcate a selected position on the print table [10] for the backing plate [20] where a print plate [12.1, 12.2, 12.3, 12.4] of the printing apparatus will produce a printed image [36, 42] in a desired location on the pictorial area;

positioning the backing plate [20] on the print table [10] in the demarcated selected position with reference to the key means; and

printing a printed image [36, 42] in the desired location on the pictorial area [18.1] by means of the print plate [12.1, 12.2, 12.3, 12.4].

2. A method as claimed in claim 1, for applying a design by a printing process to a pictorial area on an expanse of material, characterised in that it includes the steps of

providing an expanse of selected material [18] which is dimensionally unstable and which has a surface to receive a design by a printing process;

applying the expanse of selected material [18] to a rigid backing plate [20] to define a pictorial area [18.1] where the selected material adheres to the backing plate [20];

providing a print plate [12.1, 12.2, 12.3, 12.4] selected from stencil-print plates and screen-print plates bearing an image of the desired design, the print plate being arranged to produce a printed image [36, 42]in a predetermined position relative to a print table [10];

providing a print table [10] for supporting the rigid backing plate [20] carrying the expanse of selected material [18] in the predetermined position for the pictorial area [18.1] to receive the printed image [36, 42] in a desired location by means of the print plate [12.1, 12.2, 12.3, 12.4];

providing adjustable key means [24] on the print table and corresponding key means [26] on the backing plate [20] to register with the adjustable key means on the print table;

adjusting the key means [24] on the print table to demarcate the predetermined position for the backing plate [20] with reference to the print plate;

positioning the backing plate [20] carrying the expanse of selected material [18] in the predetermined position on the print table [10] with reference to the key means [24];

providing a printing ink on the print plate, the ink being of a consistency to adhere to the surface of the material of the pictorial area [18.1]; and

printing the image [36, 42] of the design in the desired location on the pictorial area [18.1] while the backing plate [20] carrying the selected material is held in the predetermined position relative to the print plate [12.1, 12.2, 12.3, 12.4].

3. A method as claimed in claim 2, in which the design is a multi-colour design, characterised in that the method includes the further steps of

providing a plurality of colour-separated print plates [12.1, 12.2, 12.3, 12.4] selected from stencil-print plates and screen-print plates, bearing colour-separated images of the desired design so that superimposed images printed by the plates will together provide a desired multi-colour design;

providing on the different print plates different printing inks of the desired colours to correspond with the colour-separated print plates and of a consistency to adhere to the surface of the material of the pictorial area [18.1];

consecutively adjusting the key means [24] on the print table [10] to demarcate a plurality of predetermined positions for the backing plate [20] with reference to the plurality of print plates, for a plurality of colour-separated images [36, 42] to be printed in a desired location on the pictorial area [18.1];

consecutively positioning the backing plate [20] carrying the expanse of material [18] in the different predetermined positions with refer-

ence to the key means;

consecutively printing colour-separated images [36, 42] of the design in the desired location on the pictorial area [18.1] with the different print plates [12.1, 12.2, 12.3, 12.4] while the backing plate [20] is held in the predetermined position relative to the print plate for each colour;

allowing the ink applied to the pictorial area to dry after each colour image and before applying a subsequent colour image; and

removing the expanse of material [18] from the rigid backing plate [20] once the multi-colour design is complete.

4. A method as claimed in claim 3, characterised in that it includes the further steps of

placing a removable transparent overlay sheet [30] over the pictorial area [18.1] prior to printing an image thereon;

printing a primary image [34] onto the transparent overlay sheet [30];

adjusting the key means with reference to the position of the primary image [34] on the transparent overlay sheet [30];

adjusting the position of the backing plate [20] carrying the expanse of material [18] with reference to the key means;

removing the transparent overlay sheet [30];

printing a colour image [36, 42] onto the pictorial area; and

repeating the foregoing steps using a transparent overlay sheet for a primary image prior to a colour image on the pictorial area in respect of each subsequent colour run.

5. A method as claimed in claim 3 or claim 4 for applying a multi-colour design to a plurality of consecutive pictorial areas, characterised in that it includes the further steps of

providing a plurality of rigid backing plates [20] each with an expanse of material [18] applied thereto;

providing a plurality of colour-separated print plates [12.1, 12.2, 12.3, 12.4] bearing colour-separated images of the design;

positioning a first prepared backing plate [20] on a print table [10] in a suitable position relative to a first print plate [12.1] and placing a transparent overlay sheet [30] over the pictorial area [18.1];

printing a primary image [34] with the first colour-separated print plate on the overlay sheet [30];

if necessary adjusting the position of the key means on the print table [10] and the position of the first backing plate [20], to a selected position with reference to the position of the primary image on the overlay sheet;

removing the overlay sheet [30] and printing a final image [36] with the first colour-separated print plate on the pictorial area of the first backing plate;

removing the backing plate [20] from the print table and allowing the ink to dry;

positioning a second and subsequent prepared backing plates consecutively on the print table in the selected position with reference to the key means on the print table;

printing final images with the first colour-separated print plate on the pictorial areas of the second and subsequent backing plates;

allowing the ink to dry on the pictorial areas of the second and subsequent backing plates;

positioning the first prepared backing plate [20] on the print table in a suitable position relative to a second print [12.2] plate and placing a transparent overlay sheet [30] over the pictorial area [18.1] and printing a primary image [40] with the second colour-separated print plate on the overlay sheet;

if necessary adjusting the position of the key means on the print table and the position of the first backing plate to a selected position with reference to the position of the primary image [40] on the overlay sheet [30];

removing the overlay sheet and printing a final image [42] with the second colour-separated print plate on the pictorial area [18.1] of the first backing plate [20];

removing the first backing plate from the print table and allowing the ink to dry;

positioning the second and subsequent backing plates consecutively on the print table in the selected position with reference to the key means on the print table;

printing final images with the second colour-separated print plate on the pictorial areas of the second and subsequent backing plates and allowing the ink to dry on each one;

repeating the procedure with a third and further colour-separated print plates [12.3, 12.4] uni a full multi-colour image of the desired desired has been printed on each of the plurality of prepared backing plates; and

finally removing each expanse of material from its backing plate.

6. A method as claimed in claim 4 or claim 5, characterised in that the transparent overlay sheet [30] is a sheet of a transparent synthetic resin with substantial rigidity and a smooth surface, and in that the primary image [34, 40] is printed on the transparent overlay sheet with an ink of dark colour.

7. A method as claimed in any one of the preceding claims, characterised in that the rigid backing plate [20] is made of a synthetic plastics material, and in that the expanse of material [18] is applied to the backing plate with an adhesive.

8. A method as claimed in any one of the preceding claims, characterised in that the adjustable key means provided on the print table includes a base plate [22] to be positioned on the print table [10] in a selected position determined with reference to a print plate, to permit an image printed by the print plate to be printed in a desired locality relative to the area of the base plate [22].

9. A method as claimed in claim 8, characterised in that the base plate is secured to the print table in a selected position by adhesive means [28], and in that the base plate carries at least one keying pin [24], and in that the backing plates [20] have corresponding keying apertures [26].

10. A method as claimed in any one of the preceding claims, characterised in that the dimensionally unstable material [18] is selected from the group comprising genuine tanned leather and synthetic leather, the leather having a surface suitable to receive a printed image.

11. A method as claimed in claim 10, characterised in that a background layer of a neutral colour ink is applied to a pictorial area prior to applying a colour image, the neutral background layer corresponding in silhouette to the outlines of the desired design.

12. A method as claimed in claim 10 or claim 11, characterised in that the print plate is a screen-print plate, and in that the ink is a matt printing ink selected to provide good adherence to a leather surface and selected to have a consistency to pass through the screen of the screen-print plate with the aid of a squeegee tool [11, 13] and to adhere to the surface of the material of the pictorial area without smudging.

13. A method as claimed in any one of the preceding claims, characterised in that the ink of a printed image on an expanse of material is dried by moving a backing plate [20] carrying the expanse of material [18] through a drying to tunnel [50, 52] provided with at least one infrared lamp [56] and air flow means [58].

14. A decorative device characterised in that it includes a pictorial area [110.1] provided by an expanse of a material [110] selected from the group comprised of genuine tanned leather and synthetic leather with a surface suitable for the application of a design by a printing process, the pictorial area bearing a design [112] applied thereon by a printing method as claimed in any one of the preceding claims.

15. A decorative device as claimed in claim 14, characterised in that the design is a multi-colour pictorial design.

16. A decorative device as claimed in claim 14 or claim 15, characterised in that it has a decorative surround [114] extending at least partially around the pictorial area [110.1] and made up of randomly shaped and positioned pieces of material [114.1, 114.2, 114,3] selected from the group comprised of genuine tanned leather and synthetic leather, optionally in combination with other material selected from the group comprising cloth including woven, non-woven and knitted fabric, feathers, beads, fur, plant material and stones.

17. A decorative device as claimed in any one of claims 14 to 16, characterised in that it is in the form of a decorative article of the nature of a wall hanging and which has suspension means [118, 120] for suspending it against an upright surface.

18. An expanse of material characterised in that it is provided with a printed design by a method as claimed in any one of claims 1 to 13.

19. An article characterised in that it is made of or covered by an expanse of material as claimed in claim 18.

20. Apparatus for carrying out the method as claimed in the preceding claims, comprising a printing apparatus selected from stencil and screen printing apparatus having a print table [10] and at least one print plate [20], [12.1, 12.2, 12.3, 12.4] characterised in that it includes

a rigid backing plate [20] on which an expanse of material [18] which is dimensionally unstable may be applied in a manner to define a pictorial area [18.1] where the material adheres to the backing plate;

a key means [22, 24] for the print table, the key means being adjustable to demarcate a variable position on the print table where the pictorial area [18.1] is to be located to permit the print plate to produce a printed image in a desired locality in the pictorial area;

the backing plate being locatable on the print table [10] in relation to the key means [22, 24] in such a manner that the printed image [36, 42] will be printed in the desired locality.

21. Apparatus as claimed in claim 20, characterised in that the adjustable key means includes a displaceable base plate [22] to be positioned on the print table in a selected position determined with reference to a print plate, to permit an image to be printed by the print plate in a desired locality relative to the area of the base plate.

22. Apparatus as claimed in claim 21, characterised in that securing means [28] is provided to secure the base plate [22] to the print table in the selected position, and in that the base plate carries at least one keying pin [24], and the backing plate [20] has a corresponding keying aperture [26].

23. Apparatus as claimed in any one of claims 20 to 22, characterised in that a transparent overlay sheet [30] is provided to be positioned over the base plate and a backing plate located on the base plate, to receive a printed image from the print plate.

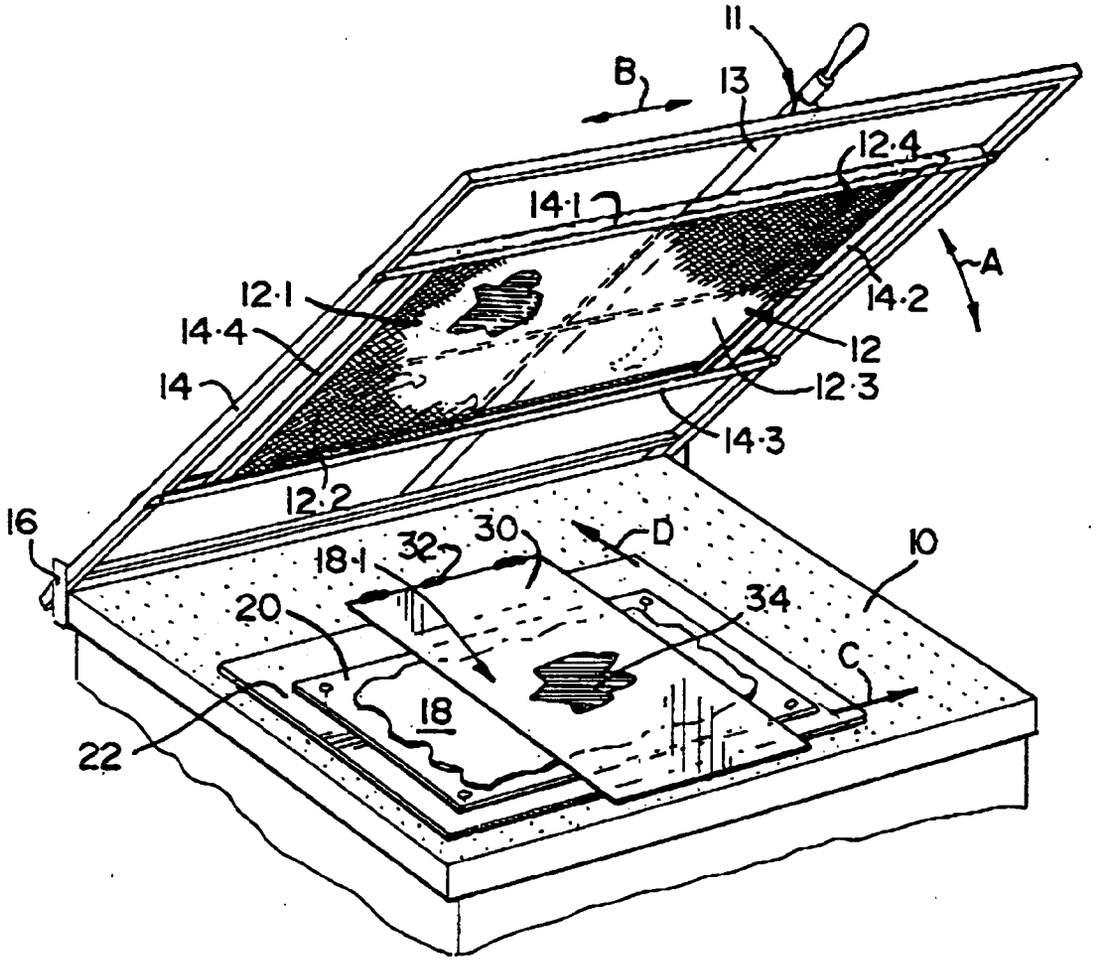
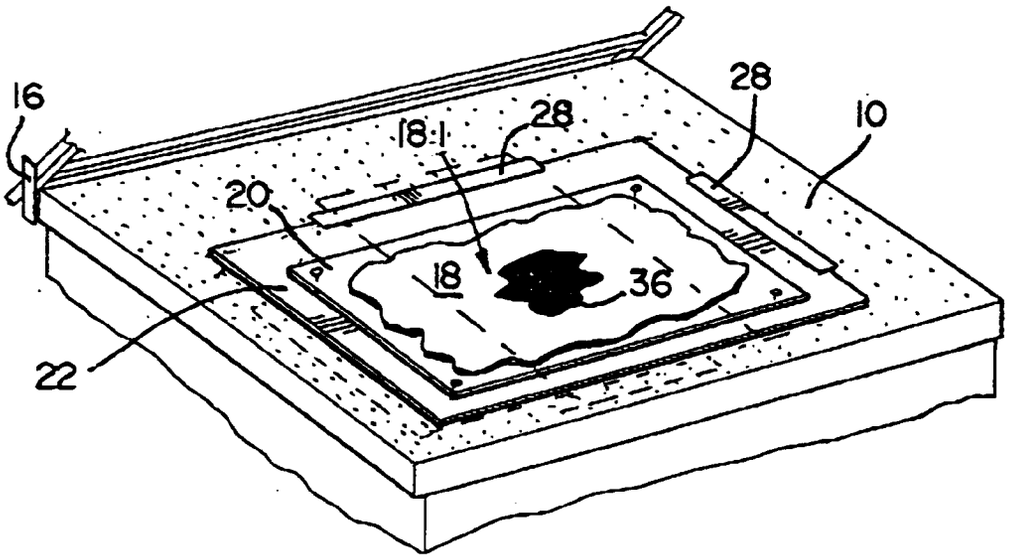

11
B
13
12.4
14.1
A
14.2
12.1
14.4
12
14
12.3
14.3
12.2
16
30
D
10
18.1
32
34
20
C
18
22

FIG 1


16
28
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18.1
20
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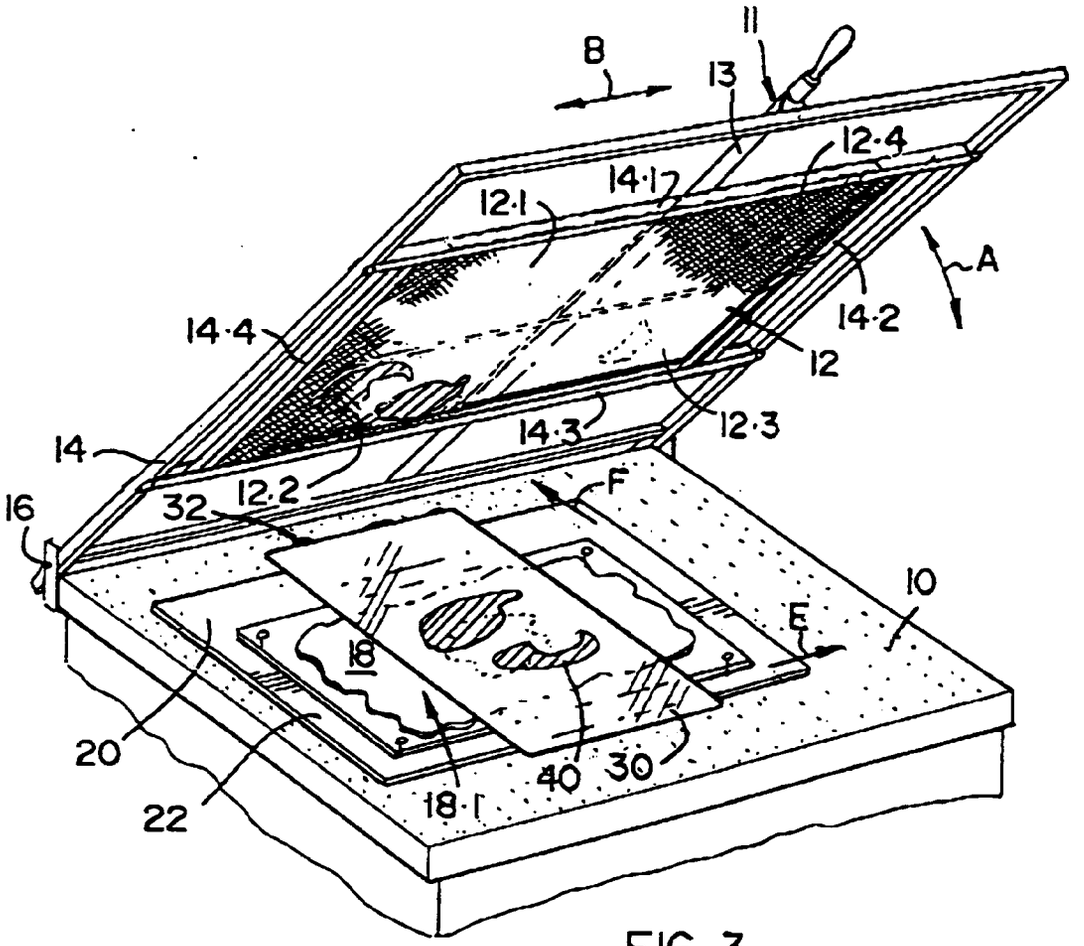
36
22

FIG 2


11
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12.4
14.17
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14.2
14.4
12
14.3
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14
12.2
F
16
32
10
E
18
20
40
30
18.1
22

FIG 3

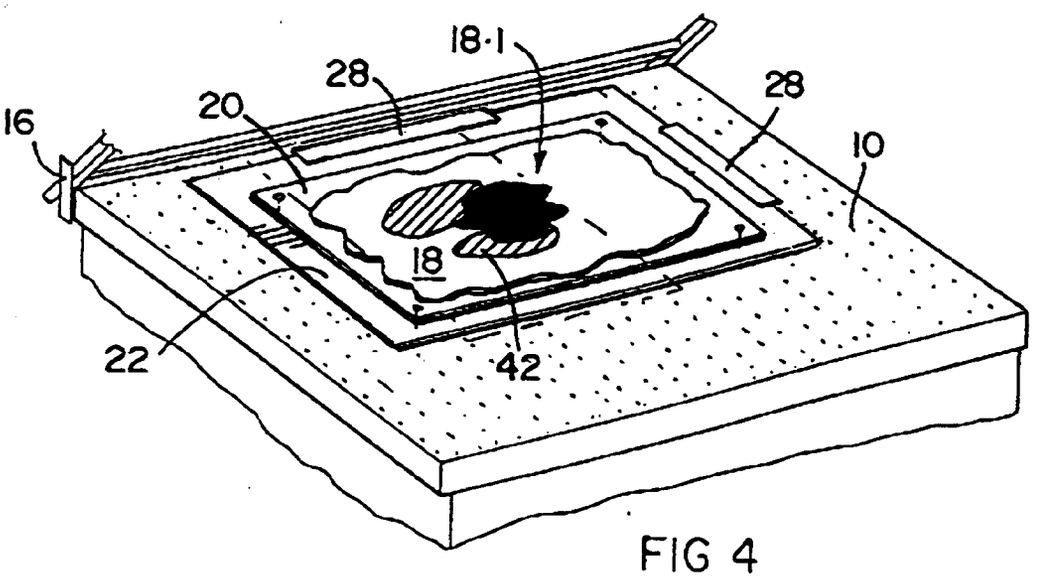
18.1
28
28
20
16
10
18
22
42

FIG 4

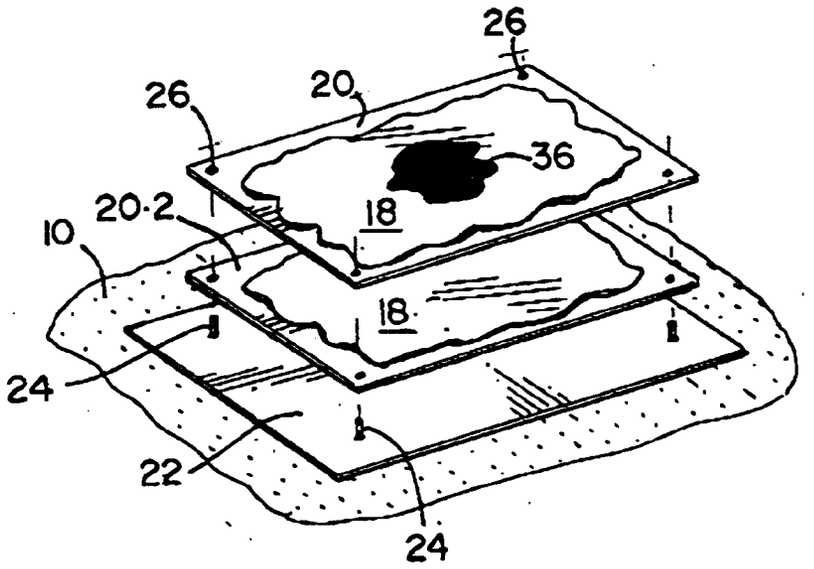

FIG 5

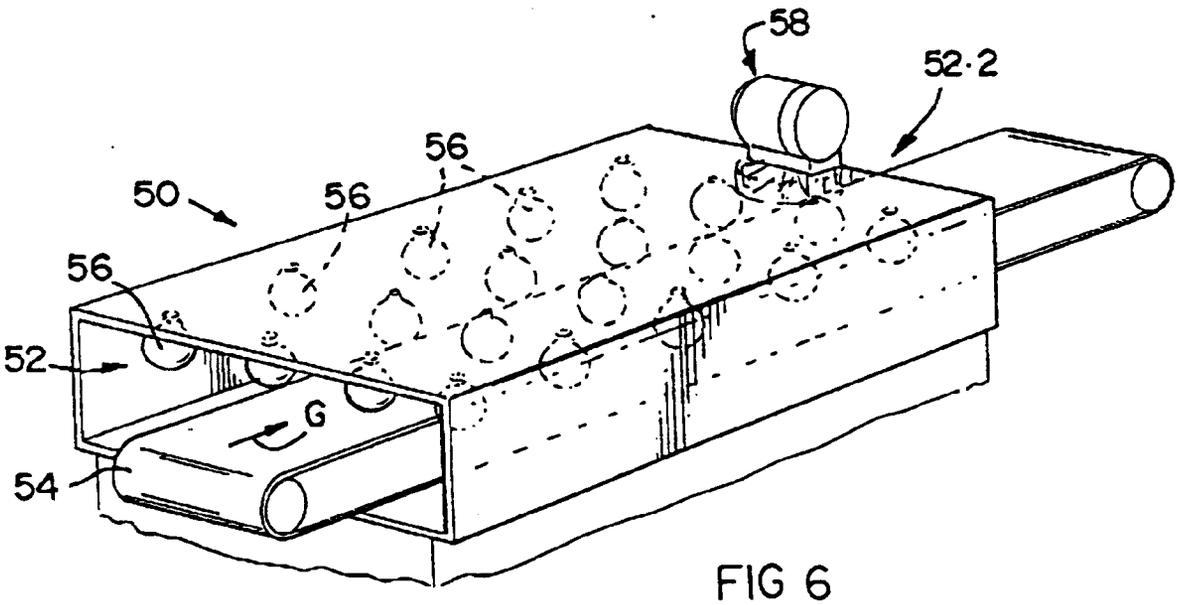

FIG 6

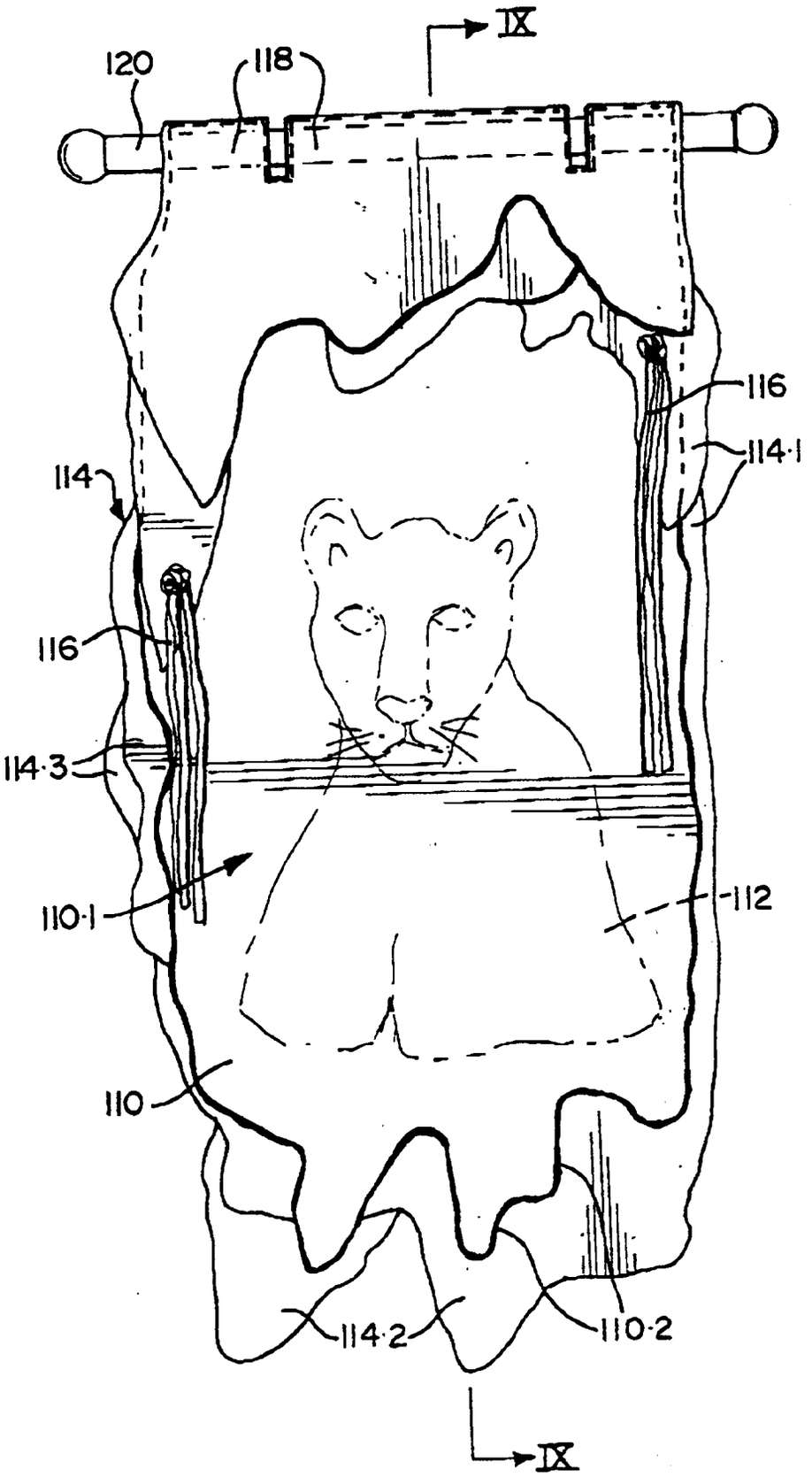

FIG 7

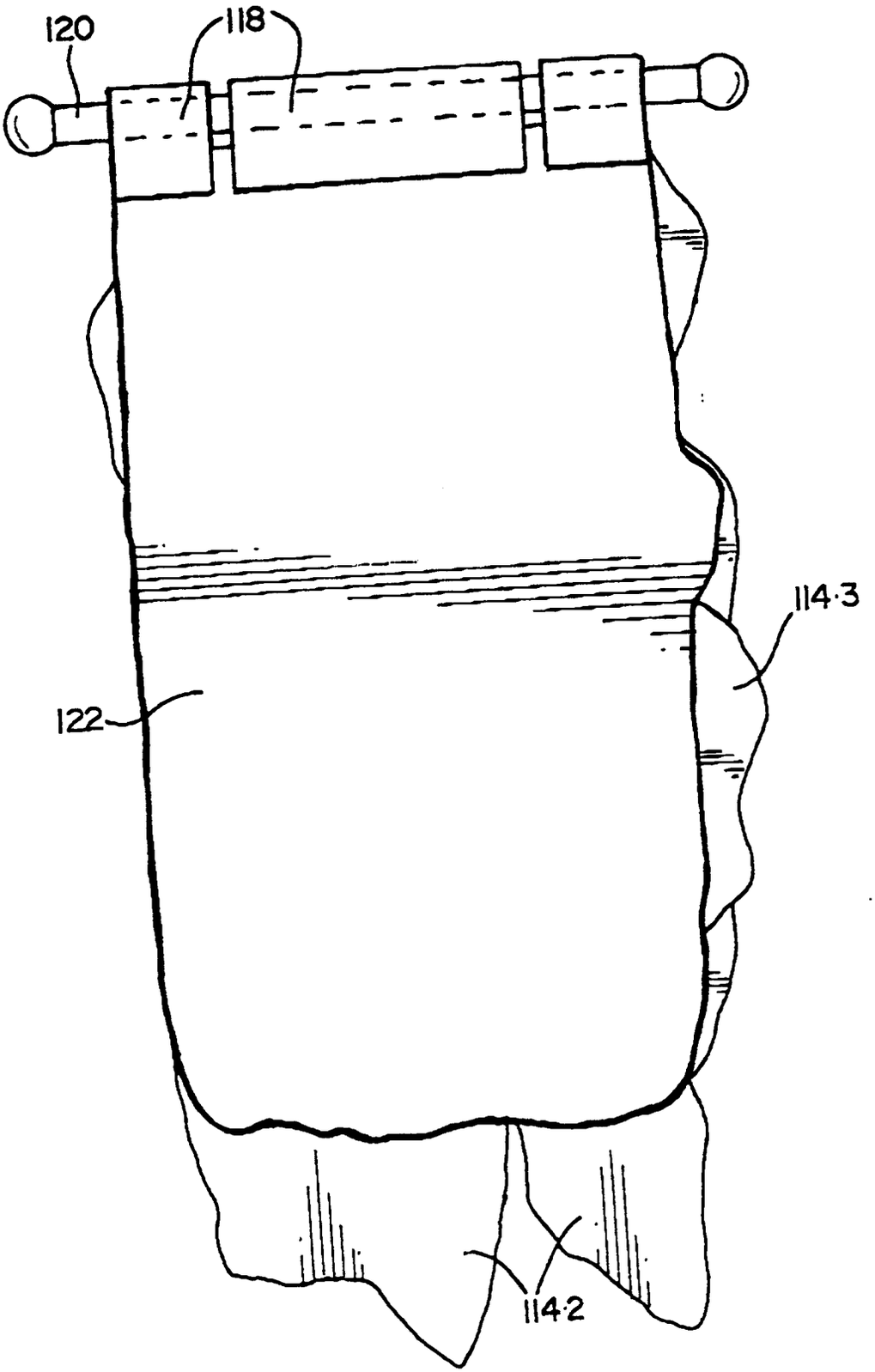

FIG 8

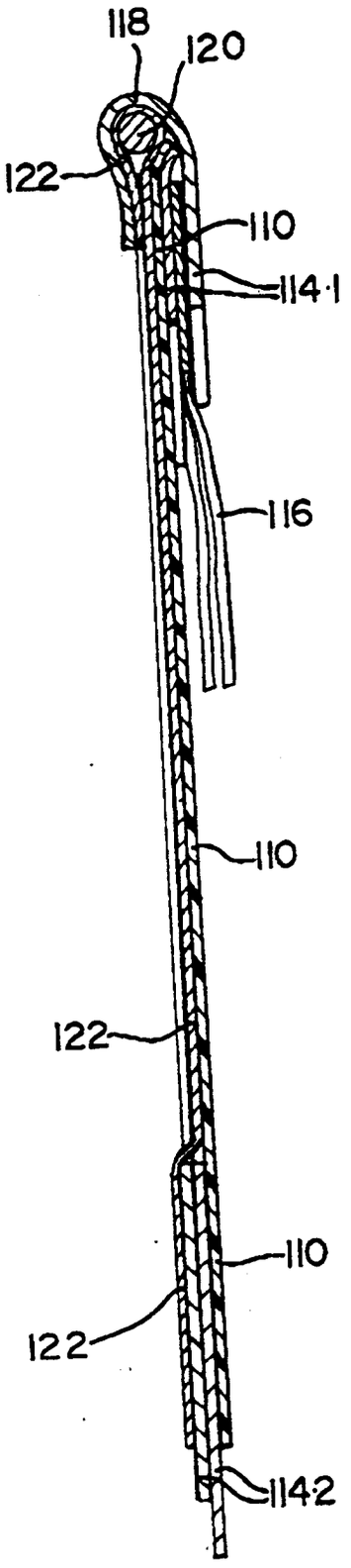

FIG 9

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 30 0945

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.5)
X	FR-A-2 036 862 (M. M. CHAPIRA ET. AL.) * the whole document *	1,2,7, 10,12, 14,15, 18-20	B41M1/38 B41F15/10 B41F15/08 D06P3/32
Y		3-6,8, 21-23	
Y	EP-A-0 446 839 (RISO KAGAKU CORPORATION) * column 1, line 1 - column 6, line 53 *	3-6,8, 21-23	
A	US-A-4 738 909 (ROGER L. JENNINGS) * column 1, line 1 - column 7, line 40 *	1-3, 18-20	
A	FR-A-2 661 131 (C.M.S.S.R.L.) * page 1, line 1 - page 6, line 34 *	1,3,13	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
B44C B41M D06P B41F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 MAY 1993	DOOLAN G.J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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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

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