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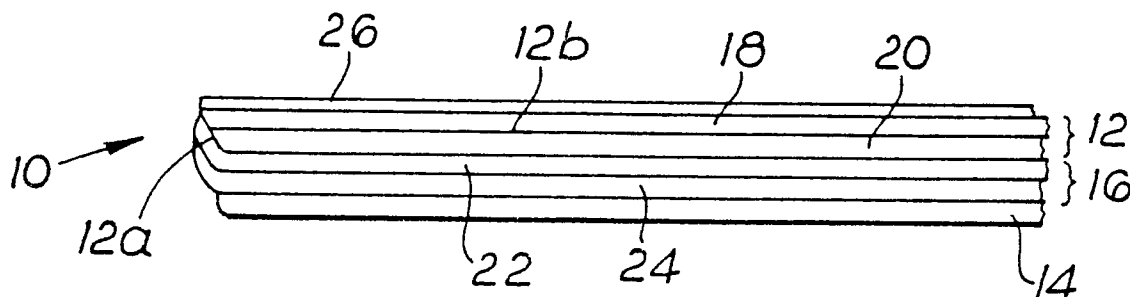
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⑬ **Decorative structure.**

⑭ A decorative structure (10) comprises a holographic material (12), an activatable adhesive (14), and a first water impermeable material (16) disposed between the holographic material (12) and the activatable adhesive (14).

A method of making the decorative structure is also disclosed, together with a transfer (40), and a decorated fabric structure (60).



*Fig. 1*

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## DECORATIVE STRUCTURE

This invention relates to a decorative structure. The invention also relates to a method of making a decorative structure, and to a method of making a composite transfer. The invention particularly relates to a decorative structure which produces a holographic effect.

There are many forms of holograms available. Such holograms usually comprise a two layered material. Three of the most common are as follows.

Firstly the so-called "embossed hologram" comprises a material having a polyester layer vacuum formed on a metallic layer, with the hologram "shot" into the metallic layer

Secondly, the so-called "PVC embossed hologram" comprises a material having a PVC layer vacuum formed on a metallic layer, with the hologram "shot" into the metallic layer.

Thirdly, the so-called "reflection hologram" comprises a polyester layer vacuum formed on a gelatin layer. The hologram is encapsulated within the gelatin layer.

There have been problems in applying holograms to garments, particularly holograms in the form of transfers, because they have not been washable. When the holograms are washed the layers of the material have a tendency to separate.

According to one aspect of the invention there is provided a decorative structure comprising a holographic material, an activatable adhesive, and a first water impermeable material disposed between the holographic material and the activatable adhesive.

Advantageously the first water impermeable material extends around the edges of the holographic material.

The holographic material typically comprises a hologram layer and a protective transparent polymer layer.

In one embodiment the first water impermeable material comprises an adhesive layer and a further layer.

The adhesive layer may serve to bond the further layer to the holographic material.

The further layer may be a water impermeable material in itself.

Alternatively, the further layer in itself may not be entirely water impermeable. In this case the adhesive layer and the further layer in combination can produce the water impermeable properties of the water impermeable material.

Preferably the further layer is a woven polyester material.

In another embodiment the first water impermeable material may comprise a layer of PVC. If desired, an adhesive layer may be provided be-

tween the PVC layer and the holographic material.

In both the above embodiments a second water impermeable material may be provided on at least part of the top surface of the holographic material.

The second water impermeable material is desirably transparent, and is preferably PVC.

Advantageously the first water impermeable material is bonded to the second water impermeable material around the edges of the holographic material.

Preferably a protective film is provided on the upper surface of the holographic material. When the second water impermeable material is provided, then the protective film may be provided over the upper surface of the second water impermeable material. Desirably the protective film is removable.

The adhesives are preferably heat activatable adhesives, more preferably hot-melt adhesives and most preferably polyester adhesives.

The decorative structure according to the invention is washable, even at a temperature of 60°C.

The decorative structure may be temporarily bonded to a release layer in order to form a transfer. The release layer is preferably temporarily bonded to the surface of the decorative structure opposite the adhesive. The release layer may be a waxed release paper.

According to another aspect of the invention there is provided a method of making a decorative structure, comprising forming an assembly of a holographic material, a water impermeable material and an adhesive, bonding at least part of the holographic material to the water impermeable material, bonding at least part of the water impermeable material to the adhesive, and cutting a decorative structure from said assembly.

Advantageously the decorative structure is cut from said assembly in such a manner that the edges of the holographic material are sealed by the water impermeable layer.

The water impermeable material and the adhesive can be the same as described above.

The cutting step may be performed with a specially shaped severing edge.

Advantageously the severing edge is a heated severing edge. This causes the water impermeable material to flow around the edges of the holographic material in order to seal said edges.

According to another aspect of the invention there is provided a method of making a decorative structure, comprising forming an assembly of a holographic material, a first water impermeable ma-

terial under the holographic material, a second water impermeable material over the holographic material, and an adhesive, bonding the first water impermeable material to the second water impermeable material around the edges of the holographic material, and bonding at least part of the first water impermeable material to the adhesive, and cutting the decorative structure from the assembly.

The first and second water impermeable materials may be bonded using the severing edge which performs the cutting. The severing edge is preferably heated.

The first and second water impermeable materials, and the adhesive may be the same as described above.

Either of the above described methods may include the step of temporarily bonding the decorative structure to a release layer in order to form a transfer. The release layer is preferably temporarily bonded to the surface of the decorative structure opposite the adhesive.

According to another aspect of the invention there is provided a method of making a composite transfer having at least one holographic decorative structure as described above and at least one non-holographic decorative structure, said method comprising forming an assembly of a release layer having the or each non-holographic decorative structure provided thereon with a respective area for receiving the or each holographic decorative structure, and temporarily bonding the or each decorative structure to the respective area.

The or each area may be provided with an adhesive coating to bond temporarily the or each decorative structure. As an alternative, the release layer may be a material having a natural tendency to stick to the or each decorative structure, for example, PVC.

Preferably the adhesive coating is a self adhesive coating, which tends to stick to the release layer rather than to the or each decorative structure.

Most preferably the adhesive coating comprises a silicone based adhesive.

According to a further aspect of the invention there is provided a decorated fabric structure comprising a layer of textile fabric, and at least one holographic decorative structure attached at its rear face to the layer of textile fabric, said decorative structure including a holographic material.

Advantageously, the decorative structure comprises a decorative structure having one or more of the features described above.

The decorative structure may be bonded directly to an extended area of fabric. Alternatively, it may be bonded to a fabric or other backing which is itself attached by bonding or otherwise, but face-

to-face, to a wider area of fabric.

It is a feature of the invention that a composite of the decorative structure may be supplied as a structure for further fabrication.

Preferably, the fabric structure is made up as part of a garment, and most preferably the chest part, for example the chest of a tee shirt or like casual or young persons wear. However, other types of garments and other regions thereof can also form attachment locations for a decorated fabric structure in accordance with the invention.

In the fabric structure according to the invention there may possibly be present only one area of decorative structure, but usually more than one is present. If there is more than one it is valuable although not essential for each area of decorative structure to be separated from its neighbour by contiguous or closely adjacent straight edges. For instance, an area composed of rectangular areas of decorative structure, or more simply a strip of adjacent rectangular areas of decorative structure, can be provided. The representation of each area of decorative structure can be essentially unrelated, but it is preferred that they manifest a common visual "background", as far as their three-dimensional appearance is concerned, possibly with separate foreground figures in each unit. They can be combined with other non-holographic decorative effects. For example, the tee shirt pattern can be colour-printed as the flight deck of a space ship, with areas of decorative structure constituting a row of windows to view a space walk, landing site, etc. against a common sky background.

Of course, the areas of decorative structure can be spaced apart and can form separate decorated units. They need not necessarily be rectangular. For example, the effect of large sequins or medals, or three-dimensional appearance on close inspection and of variable multicoloured iridescent glitter from a distance, can easily be achieved in accordance with the present invention.

There are several advantageous effects given by the invention, which exploits all of the usual holographic effects and presents them in a unique and novel combination:

(a) Glitter - the surface of the holographic material is generally reflective.

(b) Colour - the glitter has a diffraction component, whereby strong glowing iridescent colours are visible as the holographic material is viewed from different angles.

(c) Differences of such colour - diffused daylight, sunlight, disco lights, filament lamp or fluorescent lamps all have different spectral makeup and thus gives appreciably different iridescent colour appearances to different parts of the holographic material.

(d) Rapid change - the movement of the fabric layer attached to the decorative structure gives rapid three-dimensional changes in the holographic material, compared to the visual appearance of a holographic material upon a fully rigid fabric layer. Moreover, even small movements of the holographic material are significant, as giving a different appearance, although quite large movements are not destructive of the holographic effect.

(e) Relative movement - if more than one area of decorative structure is present different holographic materials can take up different orientations to the viewer because of movement of the fabric backing; this is a novel decorative effect.

The holographic three-dimensional and colour effect differs in accordance with the angle of viewing. Thus, generally speaking, it is preferred to keep the holographic material more or less planar. The thickness and rigidity of the holographic material itself and its size (and to some extent its position in relation to the garment) will therefore usually be chosen so that flexure, to an extent giving a line or band of holographic appearance only, is minimised. However, for special purposes such flexure may be valuable as giving a distinctive appearance and it is within the broad scope of the invention if the decorative structure is capable of some flexure with the fabric layer as distinct from tilting or similarly altering its orientation overall.

The production of the fabric structure as described above should usually be effected in such a way that the holographic characteristics of the holographic material are not destroyed during manufacture and are not affected by washing procedures carried out after manufacture.

Reference is now made to the accompanying drawings in which:-

Figure 1 is a cross-sectional view of one embodiment of part of a decorative structure according to the invention;

Figure 2 is a cross-sectional view of another embodiment of part of decorative structure according to the invention;

Figure 3 is a cross-sectional view of a part of a composite transfer according to the invention; and

Figure 4 is a top plan view of a decorated fabric structure according to the invention.

In Figure 1 a decorative structure 10 comprises a holographic material 12, an adhesive 14 and a first water impermeable material 16 disposed between the holographic material 12 and the adhesive 14.

The holographic material 12 can be any form of hologram. For example, in the case of a reflection hologram, the holographic material 12 comprises a polyester layer 18 and a gelatin layer 20.

The water impermeable layer 16 comprises, in

combination, an adhesive layer 22 and a woven polyester layer 24. The water impermeable material 16 prevents moisture from penetrating to the underside of the holographic material 12, or to the edges thereof, thereby preventing the layers of the holographic material 12 from separating during or after washing.

The holographic material 12 has edges 12a which are surrounded by the water impermeable material 16.

A protective polyethylene film 26 is provided on an upper surface 12b of the holographic material 12. The purpose of the film 26 will be described hereinafter.

The decorative structure 10 is formed by forming an assembly of the film 26, the holographic material 12, the water impermeable material 16 and the adhesive 14. The assembly is then bonded together, and the desired shape is cut out. These two steps can be performed simultaneously.

The cutting is performed using a shaped severing edge 50 and die 52 (only part of which is shown) and with heating, in order to cause the water impermeable material 16 to flow around and cover the edges 12a of the holographic material 12.

A further embodiment of decorative structure is generally designated 30 in Figure 2. Certain parts of the decorative structure 30 are the same as the decorative structure 10, and like parts have been designated with like reference numerals.

The first water impermeable material 16 has been replaced with a first water impermeable material 32 which comprises a PVC layer. In addition, a second water impermeable material 34 is disposed over the top of the holographic material 12; the second water impermeable material 34 is also a PVC layer.

The protective film 26 is disposed over the second water impermeable material 34.

The decorative structure 30 is formed by forming an assembly of the film 26, the second water impermeable material 34, the holographic material 12, the first water impermeable material 32 and the adhesive 14. The assembly is then bonded together and the desired shape is cut out. These two steps can be performed simultaneously.

The bonding and cutting is such that the first and second water impermeable materials 32 and 34 are bonded to one another around the edges 12a of the holographic material 12; this prevents moisture from reaching the holographic material 12, thereby preventing the layers of the holographic material 12 from separating during or after washing. It is not essential for the holographic material 12 to be bonded to the first or second water impermeable materials 32 and 34.

The holographic material 12 of the decorative structures 10 and 30 is protected from moisture

and thus is capable of being washed. This enables the decorative structures 10 and 30 to be used on articles which need to be washed, such as garments.

The decorative structures 10 and 30 may be temporarily attached to a release paper to produce a transfer. Usually, the protective film 26 would be bonded to the release paper. Although, the release paper is not illustrated in Figures 1 or 2, a suitable release paper is designated 42 in Figure 3.

Figure 3 illustrates a composite transfer 40 comprising a release paper 42, two non-holographic decorative structures 44 and a decorative structure 10 (the decorative structure 10 could be replaced by the decorative structure 30). The decorative structure 10 is disposed on the release paper 42 such that the adhesive 14 faces upwards. For clarity the individual layers of the decorative structure 10 have not been illustrated in Figure 3.

The release paper 42 is provided with an area 46 in which the decorative structure 10 is disposed.

A silicone based adhesive coating 48 is provided in the area 46 and serves to bond temporarily the decorative structure 10 to the release paper 42. The adhesive coating 48 is such that it tends to stick to the release paper 42, rather than the decorative structure 10.

The composite transfer 40 is formed as follows. First the release paper 42 is formed with the non-holographic decorative structures 44 defining the area 46 therebetween. The protective film 26 of the decorative structure 10 is then bonded to the release paper 42 by means of the adhesive coating 48.

The composite transfer 40 may subsequently be applied to an article such as a garment by placing the transfer 40 on the garment with the release paper 42 uppermost. The release paper 42 can then be heated (for example by ironing or by heated rollers) to activate the adhesive 14 (in addition, a corresponding adhesive in the non-holographic decorative structures 44 is activated). This bonds the decorative structures 10 and 44 to the garment. Since the decorative structures 10 and 44 are only temporarily bonded to the release paper 42, the release paper 42 can be peeled away leaving the decorative structures 10 and 44 on the garment.

The protective film 26 can then be removed from the decorative structure 10. Thus, any residual adhesive coating 48 attached to the decorative structure 10 is removed with the protective film 26.

Figure 4 shows a decorated fabric structure generally designated 60 which includes a fabric layer 66. The fabric layer 66 has been covered in a plurality of areas 62 by a plurality of decorative structures 10. Each area 62 is provided with a separate decorative structure 10, said decorative

structures 10 being separated by contiguous straight lines.

Areas 64 are provided with pieces of said non-holographic decorative structure 44.

Typically the decorative structure 10 is about 5 cm square and about 1 mm thick. The decorative structures 10, 30 and 44 can be applied to the fabric layer by hot pressing at a temperature of about 120°C to 180°C, preferably 160°, for a period of about 5 seconds to 20 seconds, preferably 12 seconds.

The fabric structure 60 may be part of a garment, for example the chest part of a tee-shirt. Alternatively the fabric structure 60 may be attached to a garment, for example, by sewing or by adhesive.

The fabric structure 60 may comprise, at least partially, a flocked material, or may comprise a glitter material as described in GB-A-2184399.

The decorative structures 12 and 30 are preferably provided with rounded corners in order to facilitate sealing.

## Claims

1. A decorative structure characterised by a holographic material, an activatable adhesive, and a first water impermeable material disposed between the holographic material and the activatable adhesive.

2. A decorative structure according to claim 1, characterised in that the holographic material is defined by side edges, and the first water impermeable material extends around said edges.

3. A decorative structure according to claim 1 or 2, characterised in that the first water impermeable material comprises an adhesive layer and a further layer, the adhesive layer serving to bond the further layer to the holographic material.

4. A decorative structure according to claim 1, 2 or 3, characterised in that the holographic material has an upper surface opposite the first water impermeable material, and a second water impermeable material is provided over said second surface.

5. A transfer characterised by a release layer and a decorative structure according to any preceding claim, said decorative structure being temporarily bonded to said release layer.

6. A method of making a decorative structure, characterised by forming an assembly of a holographic material, a first water impermeable material and an adhesive, bonding at least part of the holographic material to the first water impermeable material, bonding at least part of the first water impermeable material to the adhesive, and cutting a decorative structure from said assembly.

7. A method of making a decorative structure, characterised by forming an assembly of a holographic material, a first water impermeable material under the holographic material, a second water impermeable material over the holographic material, and an adhesive, bonding the first water impermeable material to the second water impermeable material around the edges of the holographic material, bonding at least part of the first water impermeable material to the adhesive, and cutting the decorative structure from the assembly.

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8. A method according to claim 6 or 7, characterised in that the decorative structure is cut from said assembly in such a manner that the edges of the holographic material are sealed by said first water impermeable material, or by said first and second water impermeable materials.

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9. A method according to claim 6, 7 or 8, characterised in that said cutting is performed with a heated severing edge.

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10. A method of making a composite transfer having at least one holographic decorative structure as described above and at least one non-holographic decorative structure, said method comprising forming an assembly characterised by a release layer having the or each non-holographic decorative structure provided thereon with a respective area for receiving the or each holographic decorative structure, and temporarily bonding the or each holographic decorative structure to the or each area.

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11. A decorated fabric structure characterised by a layer of textile fabric, and at least one decorative structure attached at its rear face to the layer of textile fabric, said decorative structure including a holographic material.

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12. A decorated fabric structure according to claim 11, characterised in that the fabric layer comprises part of a garment, or the fabric layer can be subsequently attached to a garment.

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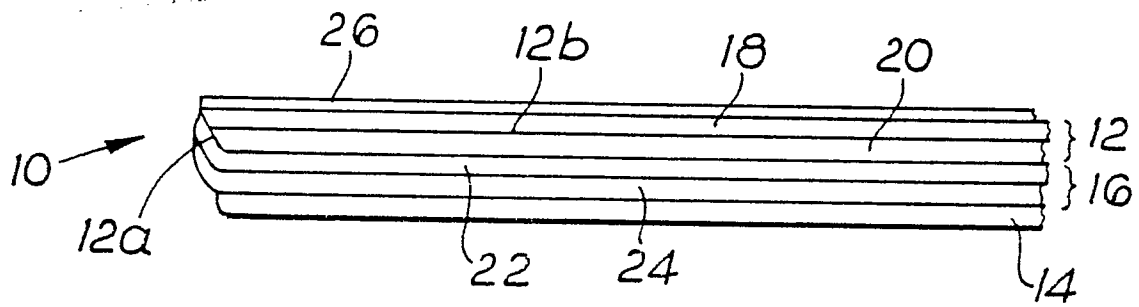


Fig. 1

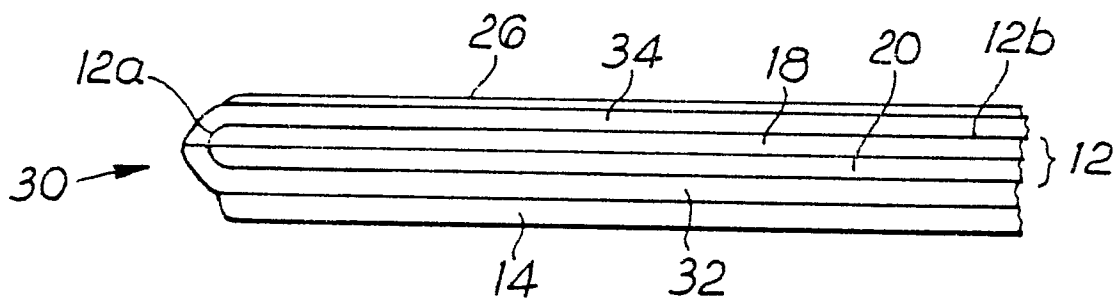


Fig. 2

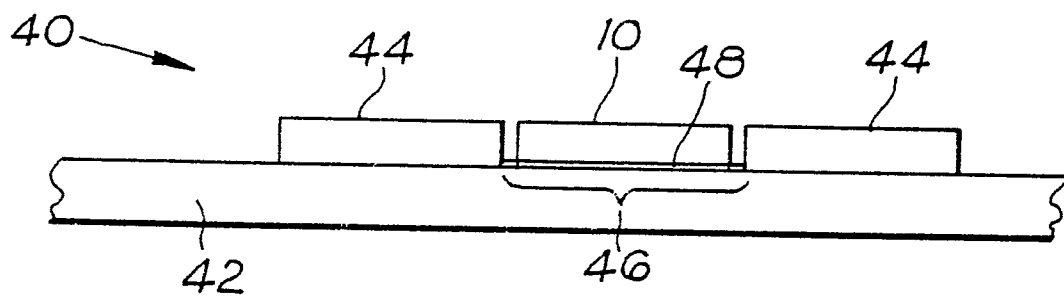


Fig. 3

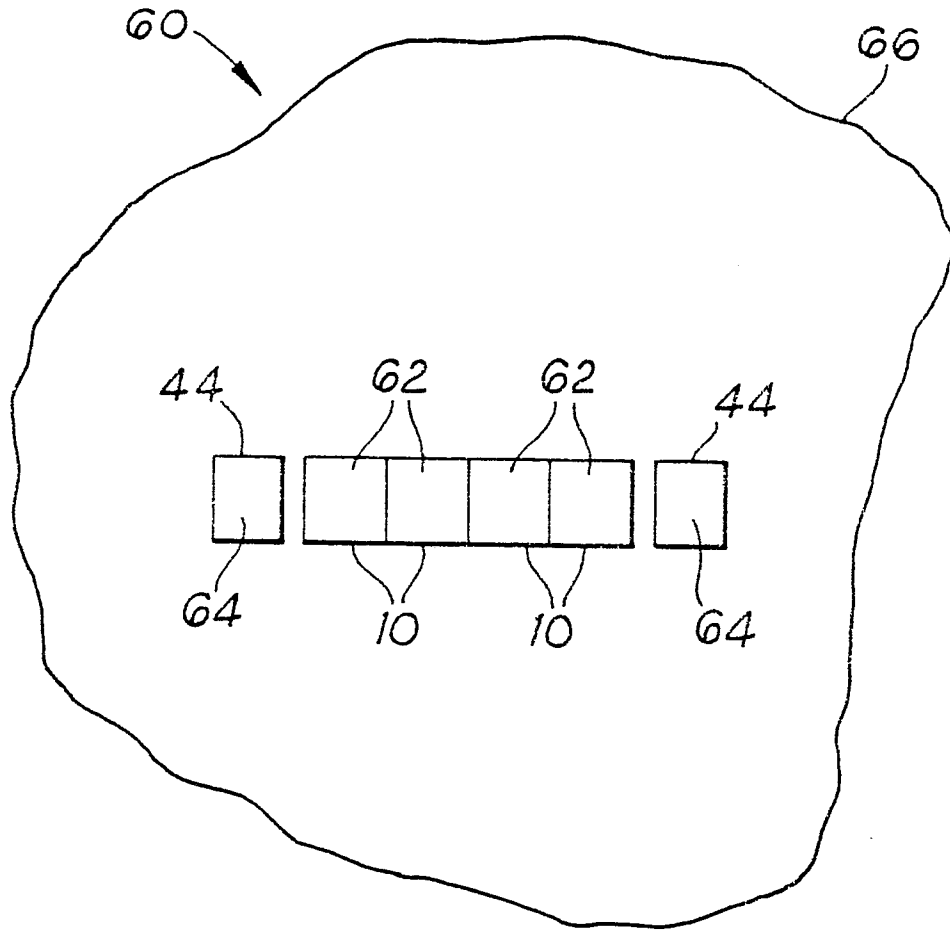


Fig. 4