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(54) Abstract Title
Appliqué

(57) A garment appliqué comprises a first layer of polymeric material which is optionally flocked at its upper surface. Its lower surface is secured to the top of a thermoplastic cellular layer, the lower side of which is secured to the top of a thermoplastic polymeric layer that is free from plasticisers. In use this plasticiser-free layer is secured to a garment. The cellular layer is formed by heating a thermoplastic which contains a chemical blowing agent.

For preference, the first layer is either PVC, polyurethane or an acrylic polymer; the second and third layers are preferably PVC.

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APPLIQUÉS

The present invention relates to appliqués and to a method of manufacturing appliqués.

Appliqués consist of decorative appliqué material often in the form of patches, emblems, motifs, and symbols such as lettering which is fixed to a base material such as a garment fabric. Commonly appliqué materials comprise thermoplastic materials on which a design may be printed. Conventionally these thermoplastic materials are secured to a garment of clothing by heat or high frequency welding.

The appliqués generally provide a decorative adornment on the garment. One known appliqué is formed by first providing a layer of thermoplastic polymeric cellular material on the garment. A flocked thermoplastic polymeric film is then located on the cellular layer. These separate layered materials are subsequently bonded to the garment by way of high frequency welding. This procedure requires that the welded adornment displays good "tear-seal" properties, that is the ability of the surplus material to be separated easily and cleanly from the garment after the welding process so as to produce an aesthetically pleasing effect. The use of low density cellular material and lightweight films is essential to achieve good "tear-seal".

This method of forming an appliqué on a garment is time consuming in that at least two separate layers of material need to be separately applied to the garment. Thus the procedure for applying the appliqué is labour intensive and consequently costly.

It is further noted that these known appliqués are prone to discolouration, particularly on washing due to migration of the pigment dyestuff from the garment fabric to the motif. It has been the case that a further film of thermoplastic polymeric material containing plasticisers has been incorporated between the garment and polymeric cellular layer in an attempt to slow down the inevitable migration of colourants from the garment fabric to the appliqué. This has not proven wholly successful.

The present invention has been made from a consideration of these problems.

According to a first aspect of the present invention there is provided a method of manufacturing an appliqué material for later fixing to a desired base material comprising the steps of providing a first layer of thermoplastic polymeric material, providing on the said first layer a second layer of thermoplastic polymeric material containing a chemical blowing agent, heating the said first and second layers, providing a third

layer of thermoplastic polymeric material on the said second layer, on the remote side of the second layer to the first layer, and heating the said layers, the said heating steps either alone or in combination resulting in the heat setting of the said layers and the activation of the chemical blowing agent in the second layer so as to provide an appliqué material comprising a first thermoplastic polymer layer, a second cellular thermoplastic polymer layer and a third thermoplastic polymer layer, wherein at least one of said first and third layer contains 5% or less by weight of its constituent polymer of plasticiser.

Ideally the first heating step merely heat sets the first and second layers and the second heating step heat sets the third layer and activates the chemical blowing agent in the second layer.

According to a second aspect of the present invention there is provided an appliqué material comprising a first thermoplastic polymeric layer bonded on one side thereof to a first side of a second cellular thermoplastic polymer layer, the second side of the second cellular thermoplastic polymer layer being bonded to one side of a third thermoplastic polymer layer, wherein at least one of the first and third layers contains 5% or less by weight of its constituent polymer of plasticiser.

It is noted that the appliqué material has a composite layered structure prior to fixing to a desired base material, such as a clothing garment.

Preferably only one of the first and third layers, and ideally the first layer contains 5% by weight or less and preferably 2% by weight or less, of its constituent polymer of plasticiser. Ideally no plasticiser is present in one of the first or third layers and ideally the first layer. It is this plasticiser-free layer which in practice is located adjacent to the flexible base fabric, such as a garment fabric and acts as a barrier to dyestuff migration. It is the provision of the plasticiser which has surprisingly been found to promote dyestuff migration. The composite nature of the integral layered structure of the appliqué prior to its application to the base material, such as a garment fabric provides the reduction in manufacturing costs to the end user such as a garment manufacturer. It is noted that the first layer is ideally substantially uniformly bonded to the second layer and that the second layer is ideally substantially uniformly bonded to the third layer.

The thermoplastic materials of the said three layers are preferably based on the same polymer. Polyvinyl chloride (PVC) is preferred. Preferably the second thermoplastic polymeric layer comprises at least one plasticiser. At least one, and preferably all of the thermoplastic

polymeric layers comprise at least one stabiliser. At least one and preferably all of the thermoplastic polymer layers comprise at least one filler material so as to provide a cost saving.

Preferably the third polymeric layer is, when heat set, non-permeable.

The chemical foaming agent would typically be a conventional blowing agent.

The various layers are ideally essentially of uniform thickness. The blowing agent is preferably essentially uniformly distributed in the second layer, which provides for substantially uniform foaming. It is noted that although each layer is of uniform thickness, the thickness of the respective layers may differ.

The method of the invention further preferably provides for the flocking of the heat-set polymeric layer which in use is remote from the base material. Generally this would be the third layer as previously discussed. Flocking involves the adhesion of flocked material.

The aforementioned composite appliqué is then ready to be fixed to a base material, such as a garment by way of high frequency welding

so as to form a garment adornment.

The layered structure of the invention is generally formed on a substrate for release therefrom. Example substrates include silicone coated release paper or polyester film. It is noted that the components of the layered structure are set and bonded together prior to application of the garment.

The layered structure of the invention is ideally essentially flexible in that it has a bending length of between 2cm and 8cm and ideally substantially 5cm using the test set out in British Standard BS 3356.1990.

Ideally the thickness of the first layer of polymeric material is in the range from 0.001mm to 0.02mm and ideally is substantially 0.01mm.

Ideally the thickness of the second layer of polymeric material is in the range from 0.5mm to 5.0mm and ideally is substantially 2mm. The foam layer density of the second layer is ideally in the range from 70 to 350 kg/m^3 and is ideally substantially 200 kg/m^3.

Ideally the thickness of the third layer is in the range from 0.05mm to 0.5mm and is ideally substantially 0.2mm.

Example formulations for the polymer layer materials are set out below.

First Layer

Alternatives include any of the following:

(a) PVC

(b) Solvent based acrylic

(c) Water based polyurethane

(d) Water based acrylic

Second layer (PVC plastisol with chemical blowing agent).

Polymer PVC	100 php
Primary plasticiser	30 to 70 php
Secondary plasticiser	0 to 25 php
Stabiliser/kicker	1 to 8 php
Chemical blowing agent	5 to 20 php

All of the above figures are expressed as php (parts per hundred parts of polymer).

Primary plasticiser	- Di octyl phthalate;
	- Di iso octyl phthalate; and/or
	- Di iso nonyl phthalate.
Secondary plasticiser	- Butyl benzyl phthalate; and/or
	- Di butyl phthalate

Third layer (PVC Plastisol without blowing agents).

Polymer PVC (1)	50 php
Polymer PVC (2)	50 php
Primary plasticiser	30 to 70 php
Secondary plasticiser	0 to 25 php
Stabiliser (1)	1 to 5 php
Stabiliser (2)	1 to 5 php
Filler	0 to 30 php

All of the above figures are expressed as php (parts per hundred parts of polymer).

Primary plasticiser
- Di iso octyl phthalate; and/or
- Di iso nonyl phthalate.

Preferred operating conditions for the method of manufacture are set out below.

Oven temperatures

First layer - Range from 70 to 150 degrees C, ideally 100.

Second layer - Range from 110 to 150 degrees C, ideally 130.

Third layer - Range from 170 to 230 degrees C, ideally 200.

Oven residence times

First layer - Range from 1.0 to 3.0 minutes, ideally 2.0.

Second layer - Range from 0.5 to 5.0 minutes, ideally 1.5.

Third layer - Range from 0.5 to 5.0 minutes, ideally 1.5.

In order that the invention may be more readily understood, the invention will now be described with reference to the following specific example.

A solvent based polyurethane system (A) is applied by direct knife coating to a silicone coated release paper (B) and dried by passing through an air circulating oven, operating between 120 to 130 degrees Centigrade, to remove the solvent thereby producing a thin thermoplastic polyurethane film on the casting paper.

A PVC plastisol (C) containing a chemical blowing agent is then applied over the polyurethane film by direct knife coating to a coating weight of 200 gm/square metre and passed through the air circulating ovens at a temperature of 130 degrees centigrade. This converts the PVC plastisol into the dry gelled state but does not activate the blowing agent.

The next state is to apply a 200 gm/square metre of PVC plastisol

(D) which does not contain blowing agent by direct knife coating on top of the gelled second coating. The composite layer is then passed through the air circulating oven at a temperature of 200 degrees Centigrade. The blowing agent is activated and the middle coating is converted into a cellular layer. The thickness of the cellular layer is governed by the speed of the composite through the oven.

On exiting the oven, the composite (i.e. paper, polyurethane film, PVC cellular layer and PVC solid layer) is cooled before separating the paper from the polymeric material.

The final stage is for the polymeric material to be electrostatically flocked with a viscose, 1.7 dtex, 0.33mm long fibre, using a water based acrylic adhesive, which is dried at 130 degrees centigrade.

Ingredients for example

(A) Solvent Based Polyurethane

Available from Stahl (UK) Ltd as U4818.

(B) Silicone Coated Release Paper

Available from SAPPI as Stripkote EHR.

(C) PVC Plastisol with chemical blowing agent

Polymer PVC - available from European Vinyls Corporation as 100

Evipol MP7076 -

Primary plasticiser - Di iso decyl phthalate - available from Exon Chemicals Ltd 52

Secondary plasticiser - Di octyl adipate - available from Brenntage (UK) Ltd 5

Stabiliser/Kicker - available from Akcros Chemicals as Lankromark LZK187 3

Chemical blowing agent - available from Bayer as Porofor ADC 12

(D) PVC Plastisol without blowing agents

Polymer PVC - available from European Vinyls Corporation as Evipol 6852	50
Polymer PVC - available from Elf Atochem as Lucocyl PB1302	50
Primary plasticiser - available from ICI Chlor-Chemicals as Cerechlor S45	6
Stabiliser - available from Akcros Ltd as Lankromark LZB767	3
Stabiliser - available from Akcros Ltd as Lankroflex ED6	3
Filler - available from Croxton and Gary as Britomya S	20

CLAIMS

1. A method of manufacturing an appliqué material for later fixing to a desired base material comprising the steps of providing a first layer of thermoplastic polymeric material, providing on the said first layer a second layer of thermoplastic polymeric material containing a chemical blowing agent, heating the said first and second layers, providing a third layer of thermoplastic polymeric material on the said second layer, on the remote side of the second layer to the first layer, and heating the said layers, the said heating steps either alone or in combination resulting in the heat setting of the said layers and the activation of the chemical blowing agent in the second layer so as to provide an appliqué material comprising a first thermoplastic polymer layer, a second cellular thermoplastic polymer layer and a third thermoplastic polymer layer, wherein at least one of said first and third layer contains 5% or less by weight of its constituent polymer of plasticiser.

2. A method of manufacturing an appliqué material as claimed in claim 1, wherein the method further comprises the step of flocking the appliqué material.

3. A method of manufacturing an appliqué material as claimed in claim 1 or claim 2, wherein the said appliqué material is formed on a substrate for release therefrom.

4. A method of manufacturing an appliqué material as claimed in any of claims 1 to 3, wherein the said appliqué material is flexible.

5. An appliqué material as claimed in any preceding claim, wherein the thickness of the first layer is in the range from 0.001 mm to 0.02 mm.

6. An appliqué material as claimed in any preceding claim, wherein the thickness of the second layer is in the range from 0.5 mm to 5.0 mm.

7. An appliqué material as claimed in any preceding claim, wherein the thickness of the third layer is in the range from 0.05 mm to 0.5 mm.

8. A method of manufacturing an appliqué material as claimed in any preceding claim, wherein at least one of the said first and third layers is free of plasticiser.

9. A method of manufacturing an appliqué material as claimed in any preceding claim, wherein the first layer is free of plasticiser.

10. An appliqué material comprising a first thermoplastic polymeric layer bonded on one side thereof to a first side of a second cellular thermoplastic polymer layer, the second side of the second cellular thermoplastic polymer layer being bonded to one side of a third

thermoplastic polymer layer, wherein at least one of the first and third layers contains 5% or less by weight of its constituent polymer of plasticiser.

11. An appliqué material as claimed in claim 10, wherein the first and second layers are substantially uniformly bonded together.

12. An appliqué material as claimed in claim 10 or claim 11, wherein the second and third layers are substantially uniformly bonded together.

13. An appliqué material as claimed in any of claims 10 to 12, wherein the appliqué material is flocked.

14. An appliqué material as claimed in any of claims 10 to 13, wherein the said appliqué material is flexible.

15. An appliqué material as claimed in any of claims 10 to 14, wherein the thickness of the first layer is in the range from 0.001 mm to 0.02 mm.

16. An appliqué material as claimed in any of claims 10 to 15, wherein the thickness of the second layer is in the range from 0.5 mm to 5.0 mm.

17. An appliqué material as claimed in any of claims 10 to 16, wherein the thickness of the third layer is in the range from 0.05 mm to 0.5 mm.

18. An appliqué material as claimed in any of claims 10 to 17, wherein at least one of the said first and third layers is free of plasticiser.

19. An appliqué material as claimed in any of claims 10 to 18, wherein the first layer is free of plasticiser.

The Patent Office

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Claims searched:	1-19	**Date of search:**	30 November 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): B2E; B6C (GAA, GBA, GBB, GBC, GBD); B6G (GE)

Int Cl (Ed.6): B32B (5/20); B44C (3/02)

Other: Online: WPI, JAPIO, IFIPAT

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	DE 3938082 A BMW See abstract, and page 2, paragraph 3.	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.