Oct. 13, 1970 F. W. HARTSTEIN 3,533,893

DECORATIVE TUFTED FABRIC

Filed Nov. 22, 1966

Fig. 1

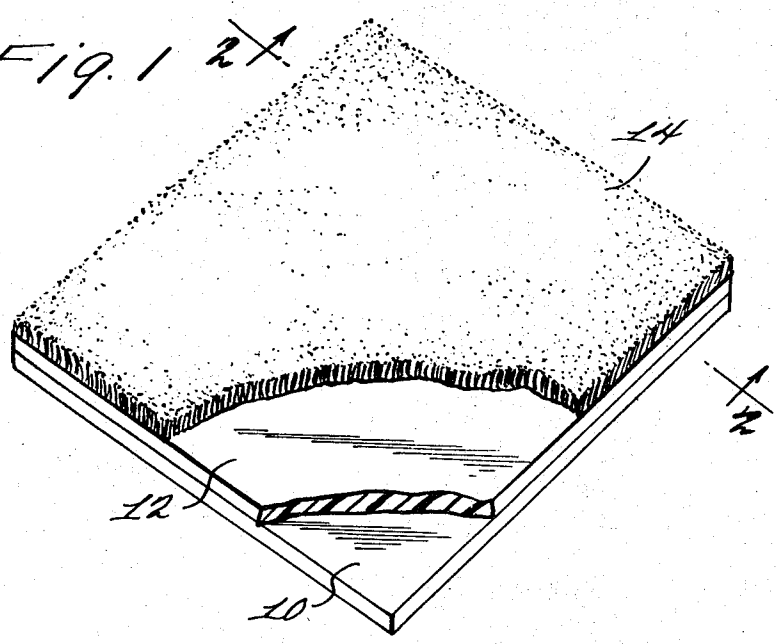


Fig. 2

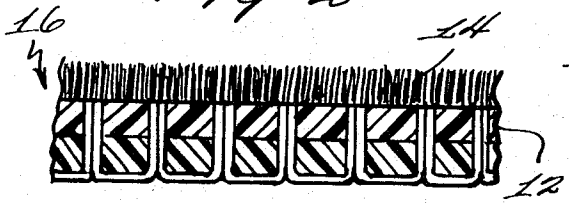


Fig. 3



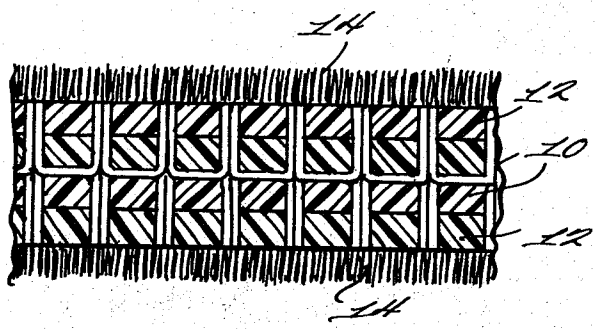


Fig. 4

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DECORATIVE TUFTED FABRIC

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ABSTRACT OF THE DISCLOSURE

A tufted fabric is disclosed in which the primary backing consists of a laminate of a relatively low melting point polymer and a relatively high melting point polymer. A secondary backing consisting of paper, woven jute, wood or a plastic laminate can be heat sealed to the primary backing. Two tufted fabrics can also be bonded in a back-to-back assembly.

This invention relates to the manufacture of tufted or pile fabrics and particularly to the manufacture of a tufted fabric exhibiting high uniformity of the gauge and stitch of the tuft or pile. The invention involves a novel and superior method of producing tufted fabrics wherein uniformly low resistance to the tufting needles is experienced and which eliminates the need of extraneous or additional adhesive materials for fabrication, from the tufted fabrics, of such decorative and useful articles as floor coverings, lamp shades, wall coverings, shower curtains or decorative wood panels.

It is known for instance, to make a tufted fabric from a normally self-supporting thermoplastic polymer film by superimposing on the film a fibrous material and thereafter passing tufting yarn back and forth through the polymer film and fibrous material so that the tufting yarn extends above the fibrous material to provide a tufted surface. It is also known to make a tufted fabric from a self-supporting layer of fibrous material such as woven jute by passing tufting yarn back and forth through the woven jute to form a tufted surface on one side thereof and subsequently laminating the resulting tufted product to a secondary backing with the use of various adhesive agents.

Tufted products of the above-described type have, however, several disadvantages. For one thing, where a fibrous backing, generally a woven yarn, is employed the tufting needles usually take the course of least resistance and often tend to circumvent the woven yarn, thus disturbing the uniformity of the gauge and stitch of the tuft or pile surface formed. It has also been found that when the tufting needles pierce irregularities in the woven yarn backing, such as slubs, or when the needles attempt to pierce two overlapping yarn strands, there is a tendency for the tufting yarn to break, thus causing the tufting machine to lose as high as sixty percent of its potential efficiency. Moreover, conventional processes for producing tufted products using a fibrous material as a backing are expensive because of the cost of such backing as well as the excessive amount of tufting yarn required to obtain a given pile height. Additionally, where a reversible tufted fabric is desired, conventional tufted jute fabrics adhered together in a back-to-back fashion are too heavy and impractical for most purposes. Also, where a fibrous material such as paper is laminated to a polymer film and thereafter tufted, the resulting product is not considered commercially acceptable due to its inability to withstand laundering or dyeing procedures. Further, such materials are often found to be too stiff for certain applications such as the manufacture of shower curtains.

The principal object of the present invention is to provide an improved tufted product which is free from

the above-mentioned disadvantages. Another object of the invention is the provision of a tufted fabric which exhibits high uniformity of the gauge and stitch of the tuft or pile surface.

Yet another object is to provide a novel method of producing a tufted fabric wherein the backing material employed exhibits a uniformly low resistance to the tufting needles.

Still a further object of the instant invention is the provision of a novel tufted fabric which can efficiently and economically be applied to a secondary backing generally without the use of extraneous or additional adhesive material while at the same time preserving the integrity of a barrier layer immediately subjacent the pile or tuft surface formed.

Other objects and advantages of the invention will be apparent from the following detailed description of the invention and the accompanying drawing.

Broadly stated, the foregoing and other objects are realized by the provision of a tufted or pile fabric comprising a backing member consisting essentially of a laminate of a layer of polymer film having a relatively low softenting or melting point with a layer of polymer film having a relatively high softening or melting point and tufting yarn passing back and forth through said backing and extending above the layer of polymer film having a relatively high softening or melting point to form the tufted surface of the fabric.

The layer of polymer having a relatively low softening or melting point employed in the laminate backing member of the tufted fabric of this invention can be, for instance, polyethylene or ethylene vinyl acetate or any other self-supporting polymer film material having a melting or softening temperature not higher than about 300° F. The layer, preferably has a thickness ranging from about 0.5–5 mils although it will be recognized that the thickness of the layer can be dependent on the end use to which the tufted fabric is put. Accordingly, a thinner or thicker layer can be employed.

The layer of polymer having a relatively high softening or melting point employed in the laminate backing member of the invention can be, for instance, polypropylene, polyethylene terephthalate, nylon, a polyester film sold under the tradename of Scotchpar by Minnesota Mining and Manufacturing Co. or any other self-supporting polymer film material having a melting or softening temperature not lower than about 325° F. The layer preferably has a thickness roughly from about 0.5–5 mils although the thickness can vary depending on the end use to which the tufted fabric is put.

The laminate can be produced in any conventional manner. For instance, the relatively low melting polymer material can be added to a film of the high melting polymer material by hot melt extrusion or by simply utilizing a discrete film layer of low melting polymer and contacting it with the high melting polymer film under appropriate conditions of temperature and pressure to form laminate. Preferably, the low melting polymer film generally should be at least about twice as thick as the high melting polymer film. Further, the layers or films can be transparent, translucent, opaque or colored.

The tufting yarn can be any of those normally used for this purpose. Thus, for example, cotton, rayon, wool, or nylon yarns, or mixtures thereof can be used. Mixtures of different types of yarns, e.g. wool and nylon blends, or yarns of different sizes and colors can be utilized to give pattern effects as may be desired.

Where unusually heavy tufting yarns are used, it may be desirable to insert a low melting polymer film such as polyethylene, ethylene vinyl acetate and the like, having a thickness ranging from about 1–2 mils between

the tufted laminate and a secondary backing to insure a more effective bond.

The tufted laminate of this invention can be made on the conventional type of tufting machine wherein the tufting yarn is, in essence, sewed through the laminate primary backing material. In one embodiment of the invention the polymer film of relatively low softening or melting point is superposed upon a polymer film of relatively high softening or melting point and the resulting laminate is suitably fed into the tufting needles.

In accordance with another embodiment of the instant invention, the tufted laminate can be applied to a secondary backing without need of extraneous or additional adhesive agents. Among the secondary backings usefully employed are glass fibers, woven or nonwoven, paper, woven jute, plywood and a laminate of polypropylene and vinyl acetate. It has also been found that two tufted laminates of this invention can be assembled back-to-back, thus providing a reversible fabric. In such a case, the laminates can be the same or can differ in texture, color, pattern, type of tuft or other variations as desired. In asembling the tufted laminate primary backing to any secondary backing or to another tufted laminate primary backing, the lower melting point plastic side is merely placed in contact with the secondary backing member and appropriate heat and pressure are used to effect the bond therebetween. Obviously, the amount of heat and pressure utilized will depend, for instance, on the particular choice of low melting or softening polymer film used. In any event, however, the amount of heat should not exceed the melting or softening temperature of the particular polymer film used.

If desired, after the primary laminate backing member of this invention has emerged from the tufting machines, the tufting yarns can be dyed with considerable efficiency since substantially no dye material will be absorbed by the polymeric primary laminate backing material.

The invention, and its advantages, are illustrated by the following examples:

EXAMPLE 1

A film of ethylene vinyl acetate two mils thick sold by Milprint Inc. and having a melting or softening point of about 300° F. was superposed on a conventional biaxial film of polypropylene, one mil thick and having a melting or softening point about 400° F. The ethylene vinyle acetate layer was applied to the polypropylene film by extrusion at 400° F. to form a laminate.

The resulting laminate was fed into a conventional tufting machine (i.e. Model 20 Ten-Tex tufting machine) and tufted with the tufting needles penetrating first through the ethylene vinyl acetate so that the pile was set up on the polypropylene side of the laminate. A wool tufting yarn was used. The gauge was 3/16 inch and the stitch was 5/32 inch.

EXAMPLE 2

The tufted laminate of Example 1 was bonded to a secondary backing member comprising a sheet of woven glass fibers 15 mils thick to provide a fabric adaptable for use as a lamp shade material. The secondary glass fiber backing and the tufted laminate were passed between a pair of rolls heated to about 260° F. with the ethylene vinyl acetate side of the tufted laminate facing the secondary backing member. Under moderate pressure of about 20 lbs./in.^{2}, the tufted laminate was effectively bonded to the glass fiber backing without the need for extraneous or additional adhesive agents.

EXAMPLE 3

A similar fabric adaptable for use as a lamp shade material was also produced in a manner substantially the same as that outlined in Example 2 but using as the secondary backing member a sheet of paper 15 mils thick.

EXAMPLE 4

The tufted laminate of Example 1 was also bonded in the manner outlined in Example 2 to a conventional wallpaper to provide a fabric textured wall covering.

EXAMPLE 5

The tufted laminate of Example 1 was further bonded in the manner set forth in Example 2 to a secondary backing member comprising a laminate consisting of a layer of conventional polypropylene, one mil thick, and a layer of ethylene vinyl acetate, one mil thick, the ethylene vinyl acetate side of the secondary backing member being bonded to the ethylene vinyl acetate side of the tufted laminate to provide a fabric suitably adapted as a shower curtain material.

EXAMPLE 6

The process of Example 2 was repeated using a woven jute fabric as the secondary backing material to provide a floor covering exhibiting highly desirable loop lock without the use of extraneous or additional adhesive agent to effect the bond therebetween. Further, the floor covering provides a highly commercial item since dirt and grit ar prevented from becoming embedded in the fibrous secondary backing by virtue of the barrier film of the primary backing material.

EXAMPLE 7

The process of Example 2 was again repeated using, however, as a secondary backing member, a tufted laminate made essentially as outlined in Example 1. The tufted laminates were thus assembled back-to-back, i.e. the ethylene vinyl acetate sides were bonded together to provide a reversible fabric having a tufted pile surface on both sides.

EXAMPLE 8

The tufted laminate of Example 1 was bonded to plywood in a bed press heated at 260° F. under a pressure of about 2 lbs/in.^{2} to provide a decorative panel.

The tufted product of the invention is illustrated in the accompanying drawing wherein FIG. 1 is a perspective view of the tufted laminate of the invention; FIG. 2 is a vertical sectional view of the laminate taken along the line **2—2** of FIG. 1; FIG. 3 is a vertical sectional view of a tufted laminate of the invention bonded to a secondary backing member; and FIG. 4 is a vertical sectional view of a tufted laminate of this invention bonded to a similar tufted laminate made in accordance with the invention. Briefly, the numeral **10** represents the polymer film of low melting or softening point; **12**, the polymer film of high melting or softening point and **14**, the tufted yarn, to provide the tufted laminate **16** of this invention. In FIG. 3 there is shown the laminate **16** bonded to a secondary backing material which can be any of those described above in detail while FIG. 4 shows a back-to-back assembly of tufted laminates made in accordance with the above-described procedures.

Obviously, various modifications can be made in the tufted fabric described herein and therefore the description is not intended to limit the invention, the scope of which is defined in the attached claims.

What is claimed is:

1. An improved tufted fabric comprising a backing member consisting essentially of a laminate of a layer of a polymer having a relatively low melting point and a layer of a polymer having a relatively high melting point and tufting yarn passing back and forth through said backing member and extending above the layer of polymer having a relatively high melting point to form the tufted surface of said fabric.

2. The fabric of claim **1** wherein said layer of polymer having a relatively low melting point is selected from the group consisting of polyethylene and ethylene vinyl acetate.

3. The fabric of claim 1 wherein said layer of polymer having a relatively high melting point is selected from the group consisting of polypropylene, polyethylene terephthalate and nylon.

4. The fabric of claim 2 wherein said layer of polymer has a melting point less than about 300° F.

5. The fabric of claim 3 wherein said layer of polymer has a melting point at least about 325° F.

6. The fabric of claim 4 wherein said layer is about 0.5–5 mils thick.

7. The fabric of claim 5 wherein said layer is about 0.5–5 mils thick.

8. An improved tufted fabric comprising a primary backing member consisting essentially of a laminate of a layer of a polymer having a melting point less than about 300° F. and a layer of a polymer having a melting point at least about 325° F., tufting yarn passing back and forth through said backing member and extending above the layer of polymer having a melting point at least about 325° F. and a secondary backing member heat sealed to said layer having a melting point less than about 300° F.

9. The fabric of claim 8 wherein each of the layers of said primary backing member is about 0.5–5 mils thick.

10. The fabric of claim 8 wherein the layer of polymer having a melting point less than about 300° F. is selected from the group consisting of polyethylene and ethylene vinyl acetate.

11. The fabric of claim 8 wherein the layer of polymer having a melting point at least about 325° F. is selected from the group consisting of polypropylene, polyethylene terephthalate and nylon.

12. The fabric of claim 8 wherein the secondary backing member is paper.

13. The fabric of claim 8 wherein the secondary backing member is glass fibers.

14. The fabric of claim 8 wherein the secondary backing member is woven jute.

15. The fabric of claim 8 wherein the secondary backing member is wood.

16. The fabric of claim 8 wherein the secondary backing member is a laminate of a layer of polypropylene and a layer of ethylene vinyl acetate, the layers of ethylene vinyl acetate of the primary and secondary backing members being bonded together.

17. The fabric of claim 8 wherein the secondary backing member is the same as the primary backing member, the layers of polymer having a melting point less than about 300° F. of the primary and secondary backing members being bonded together to provide a fabric having a tufted surface on both sides thereof.

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