Sept. 6, 1949. H. VAN ISSUM 2,480,984

MANUFACTURE OF PILE FABRICS

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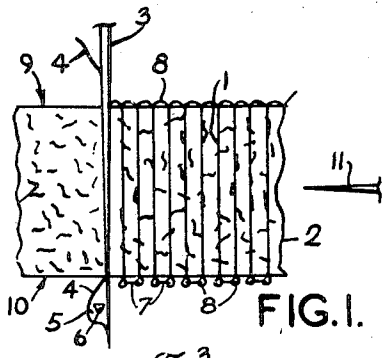

FIG.1.

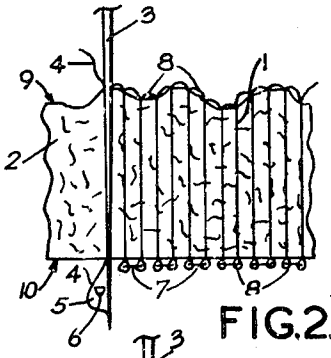

FIG.2.

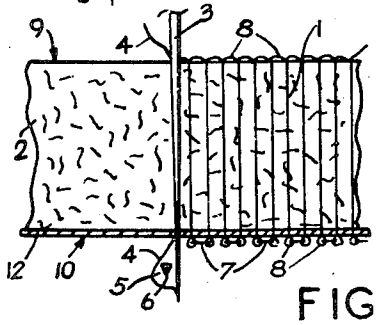

FIG.3.

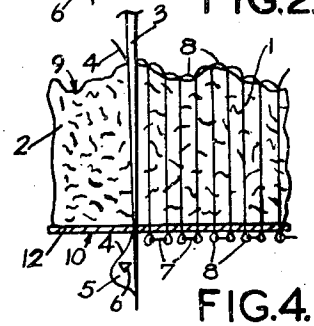

FIG.4.

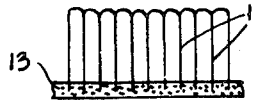

FIG.5.

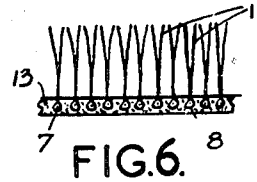

FIG.6.

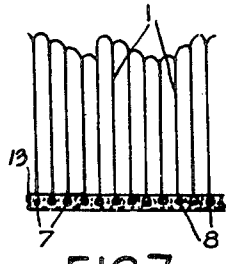

FIG.7.

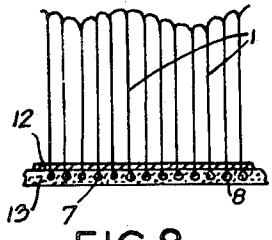

FIG.8.

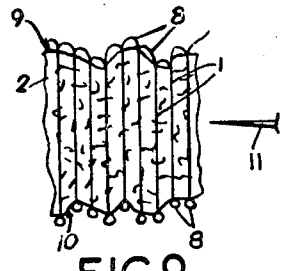

FIG.9.

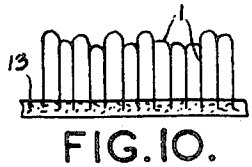

FIG.10.

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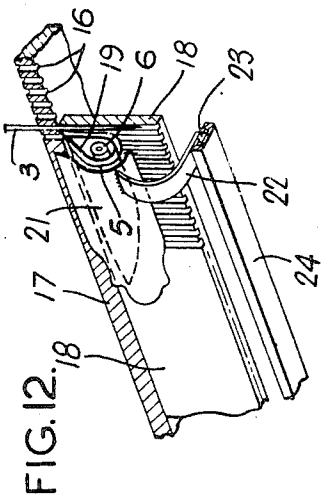

FIG. 12.

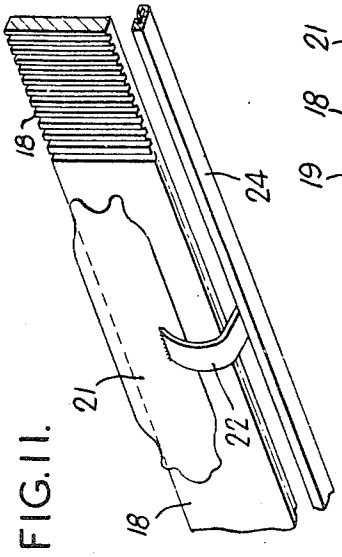

FIG. 11.

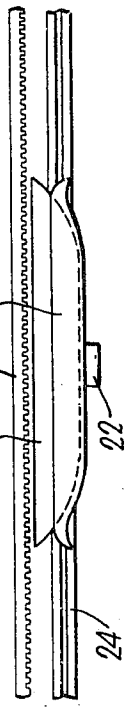

FIG. 13.

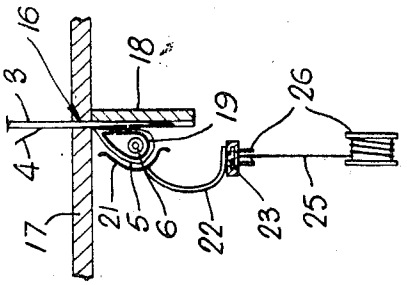

FIG. 15.

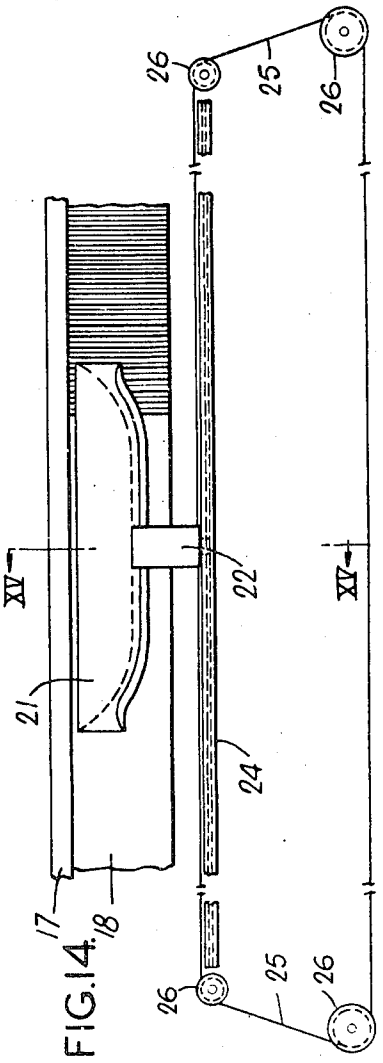

FIG. 14.

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MANUFACTURE OF PILE FABRICS

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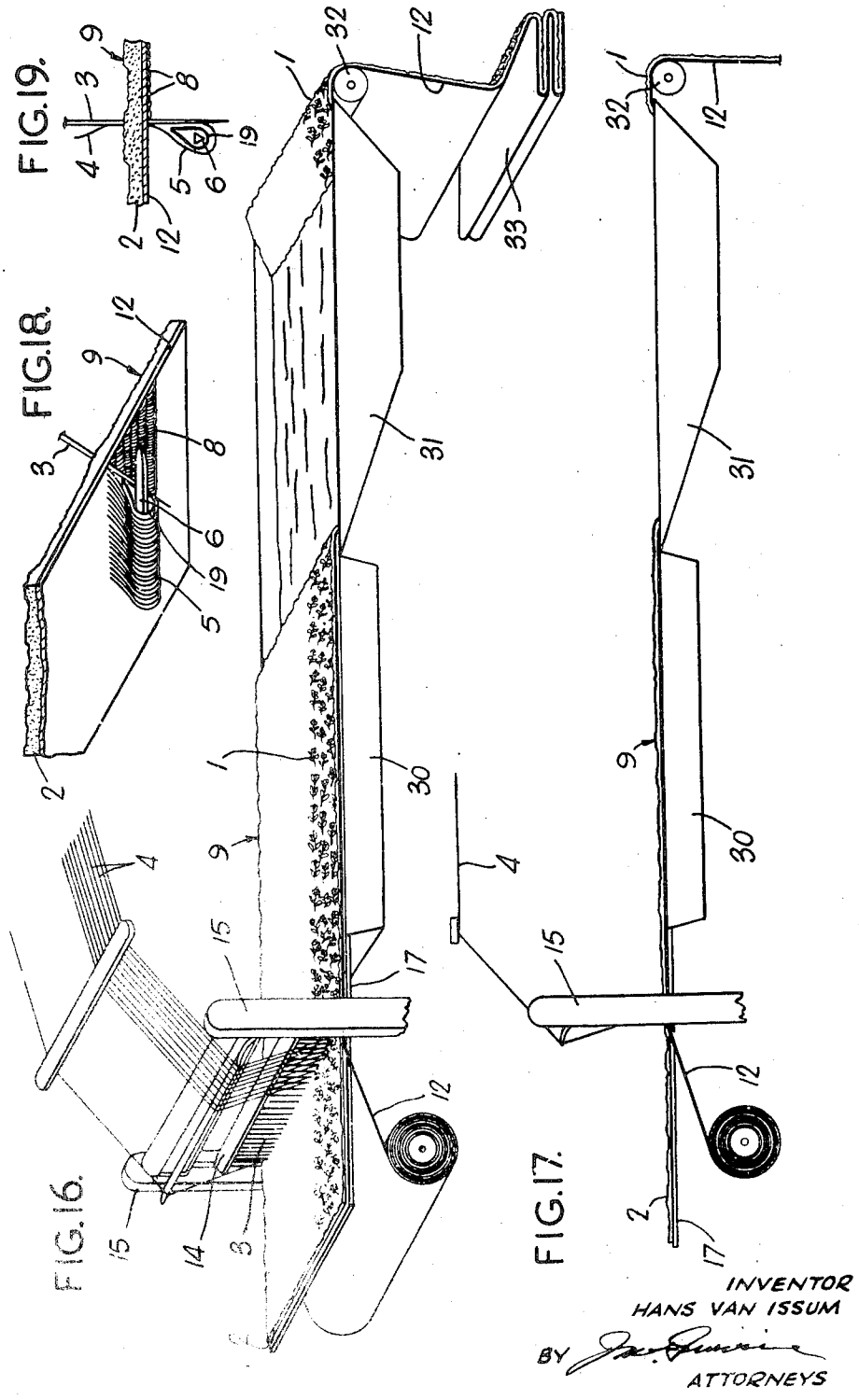

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Patented Sept. 6, 1949 2,480,984

UNITED STATES PATENT OFFICE

2,480,984

MANUFACTURE OF PILE FABRICS

Hans Van Issum, Heaton, Bradford, England, assignor, by direct and mesne assignments, to Fabric Development Company Limited, Bradford, Yorkshire, England

Application May 12, 1947, Serial No. 747,414
In Great Britain November 6, 1945

11 Claims. (Cl. 154—76)

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The invention relates to methods or processes of manufacturing pile fabrics in which the yarn in suitable formation to form the pile is temporarily supported or consolidated in a soluble, meltable or equally suitable substance which, after a backing has been applied or formed, is removed from the pile which can be brushed or otherwise finished.

Hitherto it has been proposed to arrange the yarn in multi-linear formation prior to the application of the consolidating or supporting substance.

According to the present invention the supporting substance is pre-formed into a layer, for instance, a tablet, slab or sheet of any desired dimensions and the pile is produced in the layer by inserting strands into said layer and preferably continuous strands such as yarn by means of a knitting, embroidering, sewing or similar operation, the needles employed being adapted to draw the yarn for the pile into or through the layer.

By drawing the yarn by the needles through the layer of supporting substance the thickness of the layer may be utilised to determine the height of the pile, e. g. with a layer having plain surfaces, a pile of uniform height can be produced. If a cut pile is required the pile or linear formation formed in the layer can be cut either before or after removal of the supporting substance.

If an uncut pile of non-uniform height is to be produced the layer is provided with depressions in a surface which will give the required varying thickness of layer to suit the varying height of pile required. Thus, if a pattern is required a surface of the layer may be utilised to enable pile of different height to be formed by moulding, embossing or cutting the surface with the required pattern in relief, i. e. in intaglio or cameo, before the knitting, embroidering or sewing operation is performed, the varying thickness of the layer due to the pattern determining the required variation in the heights of the pile produced by the needles. In the claims the term relief is to be understood as including patterns or unevennesses produced according to any of the above methods.

The layer may be superposed on a fabric or other flexible backing so that the yarn is locked or bound to it during the creation of the pile.

Whether a backing is used or not it is preferred to fix the pile by means of a plastic.

The supporting substance of which the layer is composed may be any of the examples given in the specification of our pending application for patent Serial No. 642,958, being removable from the pile either by melting or by washing or by means of a solvent, and for convenience will hereinafter be referred to in the description and appended claims as a removable supporting substance.

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In the accompanying drawings:

Figure 1 is a diagrammatic section through a layer of removable supporting substance illustrating the production of pile by means of needles of a sewing machine, the layer having plain surfaces.

Figure 2 is a similar section in which the layer has an upper patterned surface.

Figures 3 and 4 are similar sections to the above wherein the layer in each case is provided with a backing of flexible material.

Figures 5 and 6 are sections of pile fabric produced by cutting the layer after being provided with pile according to Figure 1 and removing the supporting substance.

Figures 7 and 8 are sections of pile fabric produced by the method hereinafter described with reference to Figure 2.

Figure 9 is a section showing a layer of removable supporting substance provided with a pattern on both surfaces and with a pile formed within it.

Figure 10 is a section of a pile fabric produced by cutting the layer shown in Figure 9 transversely of the pile and removing the supporting substance.

Figure 11 is an isometric view of a needle guide and shuttle guide.

Figure 12 is an isometric view partly in section showing the co-relation of a needle to the shuttle and its bobbin.

Figure 13 is a plan of a needle guide and shuttle guide.

Figure 14 is a front elevation of a needle guide, shuttle guide and means for reciprocating the latter.

Figure 15 is a section on XV—XV, Figure 14.

Figure 16 is an isometric view diagrammatically illustrating one form of apparatus for producing pile fabric according to the invention.

Figure 17 is a side view corresponding to Figure 16.

Figure 18 is an isometric view diagrammatically illustrating loops formed by needles for the reception of the shuttle bobbin, and

Figure 19 is a cross sectional side view corresponding therewith.

In one example the pile 1, Figure 1, is produced by passing a pre-formed slab 2 of suitable supporting substance through a machine having a row of pointed needles 3 which pass substantially at right angles through the slab 2. The yarn 4 with which the needles 3 are fed forms the pile 1. As the needles 3 protrude below the slab 2, loops 5 are formed and a shuttle carries a bobbin diagrammatically represented by 6 through the loops 5 so as to insert a binding thread 7. The tension applied to the yarn tightens the

loops 5 as well as those 8 on the upper and lower surfaces 9 and 10 of the slab which surfaces in the example shown are plain. Consequently loop pile 1 of uniform height is produced in the slab 2 which not only supports the pile during its production but determines the height of the pile which is equal to the thickness of the slab. It will be understood that loop ends 8 when tightened lie in close contact with the adjacent surfaces of the slab but they are not so shown in Figure 1 for the sake of clearness.

If an uncut pile of non-uniform height is to be produced the surface 9 of the pre-formed slab 2 of supporting substance is made uneven so that the uneven thickness of the slab determines the uneven height required in the pile.

This enables any desired pattern to be produced as the upper surface of the pre-formed slab can be moulded, embossed or cut with the desired design or pattern. In Figure 2, for example, the upper surface 9 of the slab 2 is assumed to be so provided.

In the examples illustrated by Figures 3 and 4 a backing 12, which may be a fabric or any other suitable material, is passed with the slab 2 through the sewing machine so that the pile 1 is bound to the fabric backing.

When a slab 2 has been provided with pile 1 as described with reference to Figure 1 it is cut transversely of the pile. This can be effected by means of a band knife which is diagrammatically indicated at 11.

Some of the supporting substance of which the slab is composed is then removed from the cut surfaces of the upper portion of the severed slab so as to expose yarn ends which are then fixed in plastic or other suitable material for forming a backing. The supporting substance is then removed so that the pile fixed in its plastic or other backing material 13 forms the pile fabric as indicated in Figure 5.

These operations may be carried out as described in our pending application for patent Ser. No. 642,958.

Instead of the plastic or other backing being applied to the cut surface of the lower portion of the severed slab, it is applied to the lower surface in which case the pile fabric after removal of the supporting substance is of the form shown in Figure 6, which shows the lower cut portion of the slab having the fixing material applied to the binding 7.

The example above described with reference to Figure 3 has fixing or backing material applied to the fabric or other backing 12, so as to fix the bound looped ends of the pile. The supporting substance is removed as in the previous examples.

The examples described with reference to Figures 2 and 4 are backed with fixing material such as plastic similarly to those described with reference to Figures 1 and 3, the backing or fixing material being applied to the lower or non-patterned surface of the slab, and the supporting substance being removed so that the pile fabric is as represented in Figures 7 and 8.

The pre-formed slab 2 may be provided with a pattern on both its upper and lower surfaces 9 and 10 as indicated in Figure 9. In that example the slab 2, when provided with a pile is cut transversely to the pile by a knife 11 and fixing material 13, is applied to both of the cut surfaces, the supporting substance of each portion of the slab so cut being removed so that each portion of the pile fabric so produced is as represented by Figure 10.

A suitable machine with pointed needles for producing the pile in the pre-formed slab of supporting substance is one similar to a knitting machine provided with a transverse row of needles and a co-operating shuttle and bobbin.

Some of the details of such a machine are somewhat diagrammatically illustrated by Figures 11 to 18. Only one needle 3 is indicated in Figure 12 for the sake of clearness. For the same reason the operating mechanism is omitted as such does not form part of the present invention.

The needles 3 are carried by a bar 14, Figure 16, the ends of which are reciprocated in side guides 15 by suitable mechanism not shown. The needles pass through a slot 16 in a table 17, Figures 12 and 15, on which the pre-formed slab or sheet 2 of supporting substance is fed as indicated in Figure 16. The needles 3 are guided by a grooved needle guide 18, Figures 12 to 14. A shuttle 19 provided with a bobbin 6 is reciprocated below the table 17 so that the bobbin enters the loops 5 formed by the needles 3 and inserts a binding thread which is bound with the lower loops of the pile formed in the supporting substance 2 by the needles 3, i. e. the threads 7 in the loops 8 at the lower surface of the substance 2 indicated in Figures 1 to 4. The shuttle 19 is guided by a shuttle guide 21 carried by an arm 22 fixed on a shoe 23 sliding in a grooved rail 24. The shoe 23 is attached to a cable 25 passing over pulleys 26 one of which is assumed to be oscillated at the required periodicity by suitable means not shown as the above mechanism is only indicated diagrammatically.

A general lay-out of apparatus for carrying out the method is illustrated by Figures 16 and 17. In this example the pre-formed supporting substance 2 is made in the form of a sheet or long piece and is assumed to be a substance which can be removed by melting under heat or can be removed by heating and washing with a solvent.

It is fed over a table 17 so that the needles 3 can produce the pile in the supporting substance. It is shown provided with an embossed or moulded pattern in relief on its upper surface 9 so that the pile of correspondingly varying height is produced as hereinbefore described with reference to Figure 4, a fabric or other flexible backing sheet 10 being fed along with the sheet 2.

As the sheet 2 travels away from the needles it passes successively over a hot plate 30 and a bath 31 containing a washing liquid or solvent. The pile fabric so produced is then delivered over a roller 32 and allowed to fold as a pile 33. It may be finished by brushing.

Needles such as used on knitting machines, embroidery machines or sewing machines may be used to produce the pile with any kind of binding device, but in order to enable the needles to penetrate the pre-formed layer of removable supporting substance they should be provided with sharp points.

It is not necessary that the needles be arranged in one row.

Coloured yarn can be used to enable patterns to be formed in the pile fabric produced according to the invention.

I claim:

1. A process for manufacturing a pile fabric, which comprises forming a layer of solid pierceable and removable supporting substance, forming a pile in said substance by inserting strands through said layer so that the strands protrude from a surface of the layer, applying a backing to the protruding portions of said strands, and

removing said layer from said strands to expose a pile fabric.

2. A process for manufacturing a pile fabric, which comprises forming a layer of solid desolidifiable substance that is capable of being pierced, forming a pile in said substance by sewing yarn through said layer so that the sewed yarn is exposed on at least one surface of said layer, applying a backing to said exposed portions of said yarn, and desolidifying said substance to remove said layer from said yarn to expose a pile fabric.

3. A process for manufacturing a pile fabric, which comprises forming a layer of solid pierceable and desolidifiable supporting substance, forming a pile by sewing yarn through said layer so that the longitudinal runs of the yarn rest on one face of the layer and loops of said yarn extend beyond the other face of said layer, concatenating said yarn loops on said other layer face to prevent their withdrawal, applying a backing to the exposed yarn on one side of said layer, and desolidifying said substance and removing said layer from said yarn to expose a pile fabric.

4. A process for manufacturing a pile fabric, which comprises forming a layer having a uniform thickness of solid desolidifiable substance that is capable of being pierced, forming an uncut pile in said substance by sewing yarn through said layer so that the longitudinal runs of the yarn rest on one face of the layer and loops of said yarn extend beyond the other face of said layer, concatenating said yarn loops on said other layer face, applying a backing to the exposed yarn on one side of said layer, and desolidifying said substance to remove said layer from said yarn to expose a pile fabric.

5. A process for manufacturing a pile fabric, which comprises forming a layer having an uneven thickness of solid pierceable and desolidifiable supporting substance, forming an uncut pile by sewing yarn through said layer so that the longitudinal runs of the yarn rest on one face of the layer and loops of said yarn extend beyond the other face of said layer, concatenating said yarn loops on said other layer face, applying a backing to the exposed yarn on one side of said layer, and desolidifying said substance to remove said layer from said yarn to expose a pile fabric.

6. A process for manufacturing a pile fabric, which comprises forming a layer of solid desolidifiable substance that is capable of being pierced, providing said layer with a pattern in relief on at least one surface, forming an uncut pile in said substance by sewing yarn through said layer, so that the longitudinal runs of the yarn rest on one face of the layer and loops of said yarn extend beyond the other face of said layer, concatenating said yarn loops on said other layer face, applying a backing to secure it to the exposed yarn on one side of said layer, and desolidifying said substance to remove said layer from said yarn to expose a pile fabric.

7. A process for manufacturing a pile fabric, which comprises forming a layer of solid pierceable and desolidifiable supporting substance, forming a pile by sewing a plurality of rows of yarn simultaneously through said layer so that the longitudinal runs of the yarn rest on one face of the layer and loops of said yarn extend beyond the other face of said layer, concatenating said yarn loops on said other layer face, applying a backing to the exposed yarn on one side of said layer, and removing said layer from said yarn to exposed a pile fabric.

8. A process for manufacturing a pile fabric, which comprises forming a layer of solid desolidifiable sustance that is capable of being pierced, forming a pile in said substance by sewing yarn in a plurality of rows simultaneously through said layer to produce loops of yarn protruding from a surface of said layer, passing a thread through said simultaneously produced loops to secure the yarn beyond the surface of the layer after the loops are tightened, applying a backing to the protruding portions of the loops, and desolidifying said substance to remove said layer from said yarn to expose a pile fabric.

9. A process for manufacturing a pile fabric, which comprises forming a layer of solid pierceable and desolidifiable supporting substance, forming a pile in said substance by sewing yarn through said layer so that the sewed yarn is exposed on the bottom surface of said layer, cutting the layer and the yarn transversely to the yarn to produce two pile containing layer portions, exposing the yarn ends in said layer portions by removing some of the substance therefrom, applying a backing to the exposed yarn ends of said layer portions, and desolidifying said substance to remove the layer portions from the yarn and expose a pile fabric.

10. A process for manufacturing a pile fabric, which comprises forming a layer of solid pierceable and desolidifiable supporting substance, forming a pile in said substance by sewing yarn through said layer so that the sewed yarn is exposed on the bottom surface of said layer, cutting the layer and the pile transversely to the pile to produce two pile containing layer portions, removing some of the substance from one surface of the upper layer portion to expose the ends of the yarn therein, applying a backing to the exposed yarn of each layer portion, and desolidifying said substance to remove the layer portions from the yarn to expose a pile fabric.

11. A process for manufacturing a pile fabric, which comprises forming a layer of solid pierceable and desolidifiable, supporting substance, placing a flexible backing material against one surface of said layer, forming a pile in said substance by sewing yarn through said layer and said backing so that the longitudinal runs of the yarn rest on the exposed face of said layer and loops of said yarn extend beyond the outer face of said backing, concatenating said yarn loops on the outer face of said backing, and desolidifying said substance to remove the layer from the yarn and expose a pile fabric.

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