June 13, 1967 J. H. FORKNER 3,325,323
TUFTING THROUGH A POROUS BACKING
WHICH IS SUBSEQUENTLY FUSED
Filed July 5, 1963 4 Sheets-Sheet 1

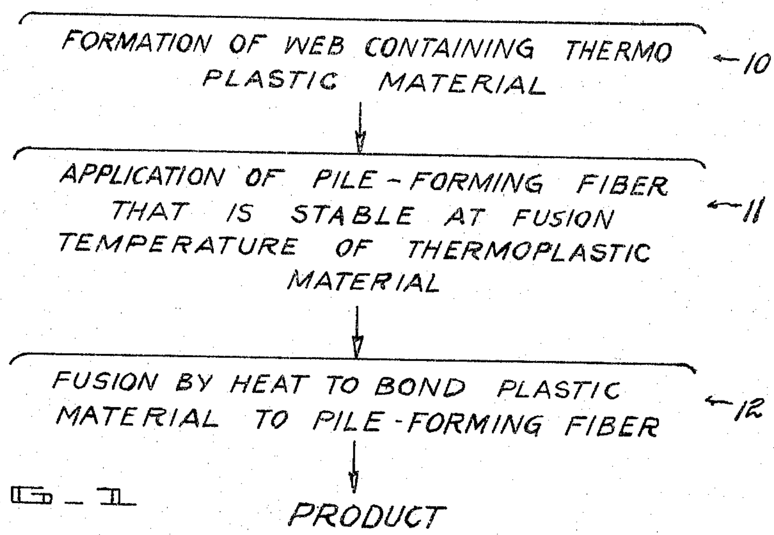

FIG_1

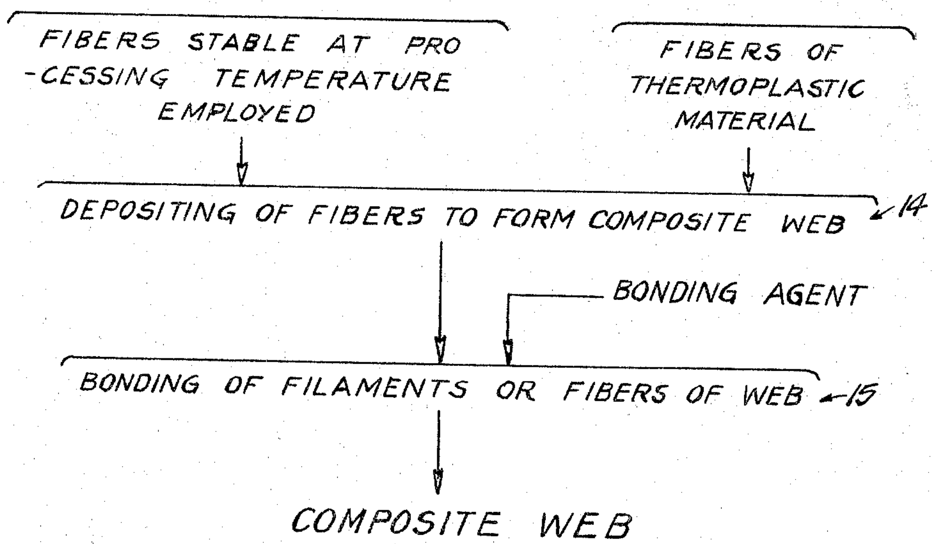

FIG_2

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BY Flehr and Swain.
ATTORNEYS.

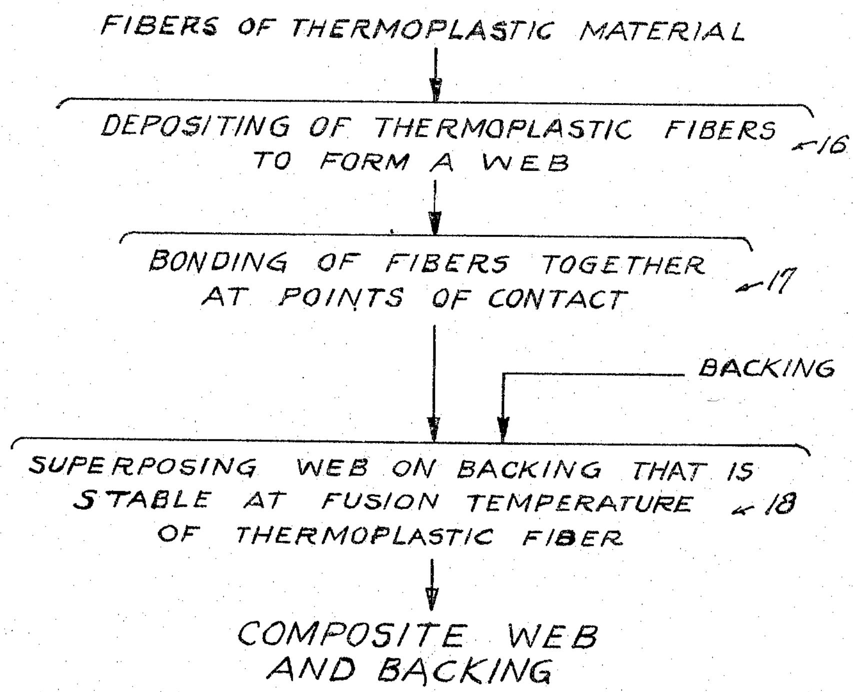

FIG. 3

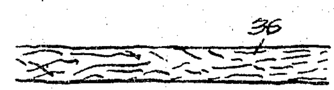

FIG. 5

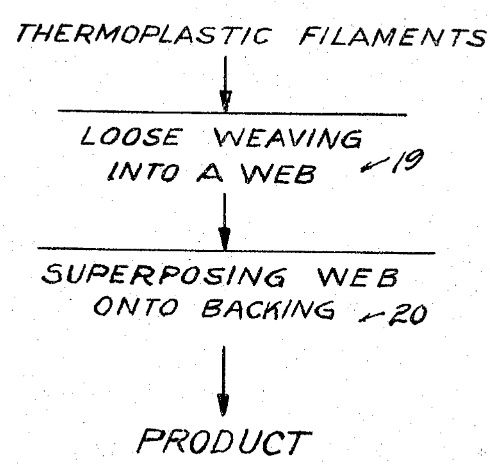

FIG. 4

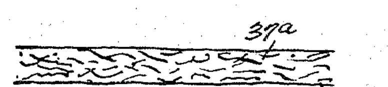

FIG. 6

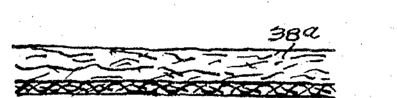

FIG. 7

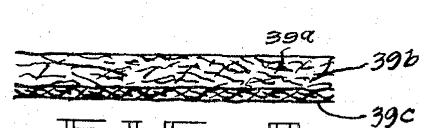

FIG. 8

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TUFTING THROUGH A POROUS BACKING WHICH IS SUBSEQUENTLY FUSED

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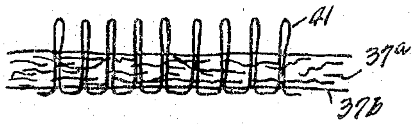

FIG. 9

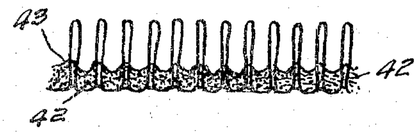

FIG. 10

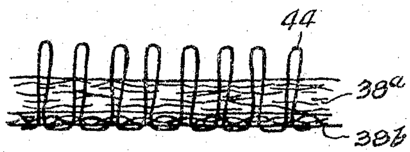

FIG. 11

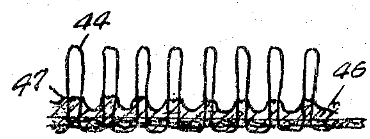

FIG. 12

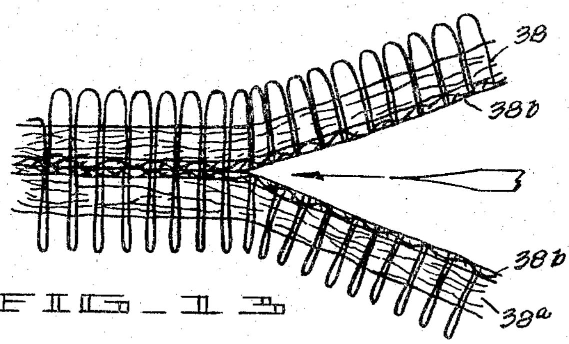

FIG. 13

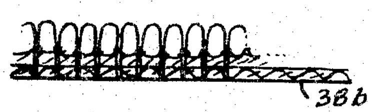

FIG. 14

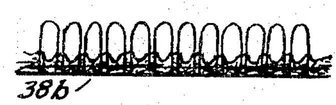

FIG. 15

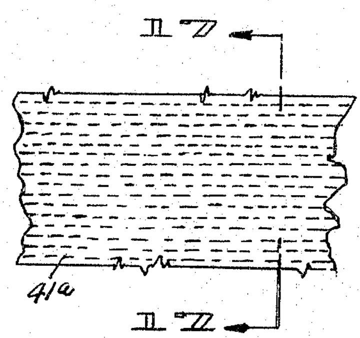

FIG. 16

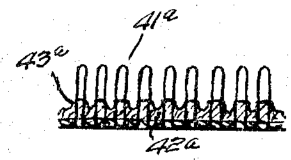

FIG. 17

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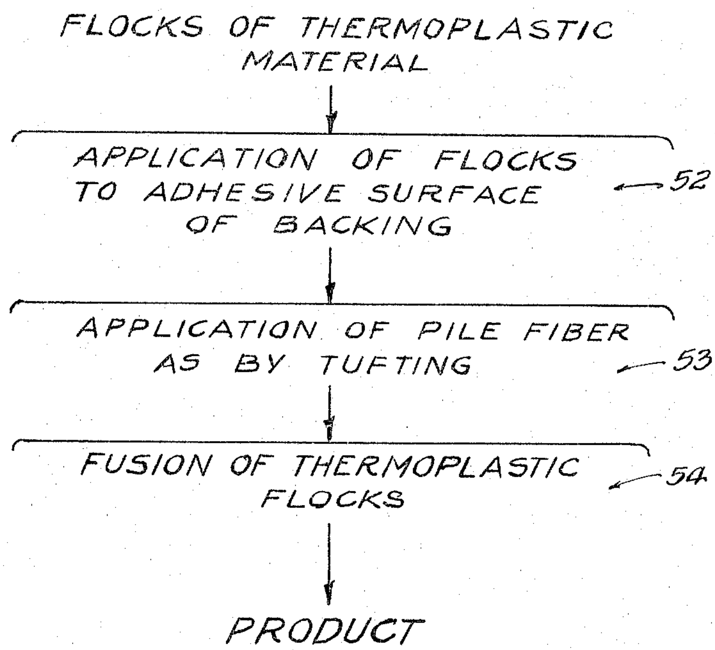

FIG. 18

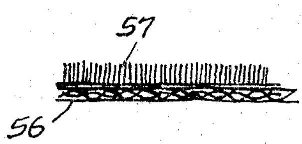

FIG. 19

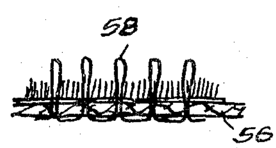

FIG. 20

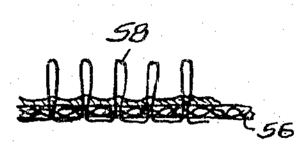

FIG. 21

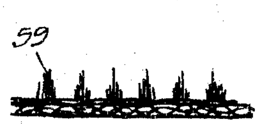

FIG. 22

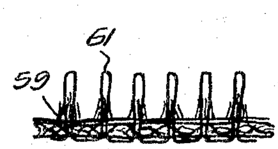

FIG. 23

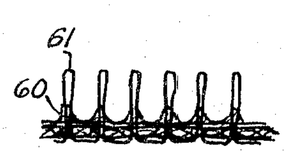

FIG. 24

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United States Patent Office

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Patented June 13, 1967

3,325,323

TUFTING THROUGH A POROUS BACKING WHICH IS SUBSEQUENTLY FUSED

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Filed July 5, 1963, Ser. No. 292,876
5 Claims. (Cl. 156—72)

This invention relates generally to textiles or fabrics of the type having a pile on one surface of the same, as exemplified by tufted carpets and various types of upholstery and tapestries. Also it pertains to methods for the manufacture of such products.

Textiles or fabrics of the above type are characterized by the use of pile-forming fiber which is attached in various ways to a backing. A typical tufted carpet consists of a backing of woven or unwoven fabric to which tufts of yarn are applied on a tufting machine. The tufts penetrate the backing material and are attached by coatings of latex or resins on the under or back side. Carpets of this type are known to have certain disadvantages. Particularly they are subject to shedding due to dislodgement of particles from pile yarn unsupported by resin coverage. Also soil may work its way into the backing from the upper side, where it is difficult to remove. In contrast with carpets incorporating my invention, the tufts comprising the pile are less adequately supported and covered by resin. Besides shedding such carpets are subject to matting. In other words, the pile does not quickly return to its normal position after being flattened by applied foot pressure.

It is an object of the present invention to provide improved products of the above type which make effective use of resilient plastic materials to bond the pile-forming fibers to the backing from its upper facial surface.

A further object of the invention is to provide improved products of the above type in which the plastic material is bonded to a substantial length of the pile-forming fiber, on that side of the backing where the pile is located.

Another object of the invention is to provide improved textile products of the above character in which the plastic material is thermoplastic and is caused to bond to the pile-forming fiber, after the fiber has been applied to the backing.

Another object of the invention is to provide carpets which incorporate a thermoplastic material in such a manner that it forms an effective flexible bond with respect to the pile-forming fiber, and at the same time forms a substantially impervious flexible covering over the upper surface of the backing.

My invention makes possible products incorporating some or all of the following features: a carpet having resilient thermoplastic resin forming or incorporated in its backing, with the resin being bonded to a substantial length of the pile yarn; a carpet as just described in which the backing consists of fiber which is stable at the fusion temperature of the resin, and which is embedded therein; a carpet in which thermoplastic resin is bonded to and covers the upper surface of the backing; a carpet in which the pile-forming yarn is held to the backing entirely by resilient thermoplastic resin on the upper side thereof, and the customary yarn loop on the bottom surface of the backing is omitted; a carpet in which tufts of yarn are bonded to and supported by extensions of resilient thermoplastic material whereby when foot pressure is applied to flatten the tufts against the backing the resin extensions bend with the tufts, the tufts thereafter being raised by recovery of the resin extensions, after such pressure is removed.

Another object of the invention is to provide a novel form of backing assembly for use in the manufacture of carpets or like textiles or fabrics, the backing assembly being characterized by the fact that it can be penetrated by the needles of a tufting machine without undue resistance or needle deflection, and by the use of a thermoplastic material that is subject to fusion after tufting to form effective bonds between the tufting and the backing.

Another object of the invention is to provide an assembly as described in the foregoing paragraph in which during manufacture the thermoplastic material serves to support the tufting yarn by virtue of penetration of the yarn therein, the extent of yarn penetration corresponding generally to the length of the bond established between each yarn shaft and the resin after fusion.

A further object of the invention is to provide a carpet of the cut pile type which is characterized by reduced shedding, because of more effective bonding of pile-forming fiber.

Another object of the invention is to provide a novel method for producing my new textile products, the method being characterized by use of thermoplastic material in a particular manner to produce a final assembly, which when heated causes fusion of the thermoplastic material to produce the desired final product.

Another object of the invention is to provide a method of the above character which is applicable to a wide variety of filaments and fibers, including the natural animal and vegetable fibers, such as wool, cotton, hemp and the like, and the various synthetic fibers such as nylon, rayon, acrylic, and the like.

A further object of the invention is to provide a method of the above character which can be applied for the manufacture of a wide variety of textiles or fabrics, including those that are tufted like carpeting.

Another object of the invention is to provide a method of the above character which can be applied to produce textiles or fabrics with a wide variety of backing for the pile-forming fiber, including the woven and unwoven fabrics and resin bonded fibers.

Another object of my invention is to provide a method which can be used for the manufacture of textiles with a predetermined pile design, and designs that are accented by differences in the pile construction.

Additional objects and features of the invention will appear from the following description in which the preferred embodiment has been set forth in detail in conjunction with the accompanying drawings.

Referring to the drawing:

FIGURE 1 is a flow sheet illustrating the general steps of my method.

FIGURE 2 is a flow sheet illustrating more specific steps for carrying out my method.

FIGURE 3 is a flow sheet illustrating steps for preparing assembly for tufting.

FIGURE 4 is a flow sheet illustrating another procedure for preparing an assembly ready for tufting.

FIGURE 5 is an edge view of a thermoplastic mat such as is formed by the method of FIGURE 4.

FIGURE 6 is an edge view of a mat comprising thermoplastic filaments or fiber together with filaments or fiber which is stable at the fusion temperature of the thermoplastic.

FIGURE 7 is an edge view of a backing assembly including the thermoplastic mat of FIGURE 5 having backing of woven or unwoven material.

FIGURE 8 is an edge view of an assembly including backing together with the mat of FIGURE 6.

FIGURE 9 is a schematic view in section illustrating tufting applied to the mat shown in FIGURE 6.

FIGURE 10 is a detail in section showing the carpet after fusion of the thermoplastic resin.

FIGURE 11 is a view like FIGURE 9 but showing tufting applied to the assembly of FIGURE 8.

FIGURE 12 is a view like FIGURE 11 after fusion of the thermoplastic resin.

FIGURE 13 is a detail in section illustrating tufting applied through two assemblies of the type shown in FIGURE 7, with subsequent cutting of yarn between the assemblies.

FIGURES 14 and 15 show carpets produced in accordance with FIGURE 13, after fusion of thermoplastic material.

FIGURE 16 is a plan view of a portion of a carpet in which the tufts are disposed in regular rows, and the thermoplastic material formed with ribs that support the tufts.

FIGURE 17 is a cross section view taken along the line **17—17** of FIGURE 16.

FIGURE 18 is a diagram illustrating a flocking procedure which can be used for the manufacture of my carpet.

FIGURE 19 is a detail in section illustrating a backing to which thermoplastic flocks have been applied.

FIGURE 20 is a detail in section illustrating the application of tufting to the assembly of FIGURE 19.

FIGURE 21 illustrates the final carpet product after fusion of the thermoplastic flocks.

FIGURE 22 is a detail in section illustrating another procedure in which the flocks are applied in rows corresponding to the spacing of the tufts.

FIGURE 23 is a detail in section showing the assembly of FIGURE 22 after tufting has been applied.

FIGURE 24 illustrates the assembly of FIGURE 23 after the thermoplastic flocks have been fused.

My method as illustrated in FIGURE 1 consists of forming at **10** a web which includes thermoplastic material capable of being fused at a temperature level which will not injure the other fiber or filaments from which the carpet is made. For example, the thermoplastic material may be a resin having a melting point within the range of 150° to 300° F. (200° to 250° C. deemed optimum). In step **11** pile-forming fiber is caused to penetrate the web. As will be presently explained, this penetration can be carried out by conventional tufting procedures and it serves to dispose pile-forming fiber in such a manner that by subsequent fusion of the thermoplastic material, an effective bond is formed between the thermoplastic material and a substantial length of the pile-forming fiber. Assuming use of conventional tufting, as in the manufacture of carpets, the web is penetrated by the needles of a tufting machine and the tufting yarn inserted or intruded into the web. As will be presently explained, the thermoplastic material is present in such physical form that it does not tend to deflect or cause breakage of the tufting needles, and it does not cause undue needle heating or excessive resistance to penetration. In addition it is not dimensionally distorted by penetration of the tufting needles or insertion of the yarn.

Step **12** involves fusion of the thermoplastic material to provide the desired bond. The thermoplastic material is so selected that it can be fused at a temperature above ambient, but insufficient to injure the other fiber of the final product. Before fusion it should have some resiliency and flexibility. Also it is so selected that the thermoplastic material in the final product after fusion has a substantial amount of resiliency and flexibility. In practice it has been found satisfactory to use thermoplastic materials such as various synthetic resins and synthetic resin formulations which fuse at a temperature level of the order of 150° to 300° F., and which after cooling have a substantial amount of resiliency. Higher melting point resins or resin formulations (e.g., up to say 400° F.) can be used, where the other fiber of the product is of such character that it is not injured at such higher temperature levels. A wide variety of resins and resin formulations having suitable characteristics are available on the market and are described in the published literature. By way of example, reference can be made to the vinyls and polyolefins (polyethylene and polypropylene) and resin-wax formulations such as Elvax (Du Pont) blended with Flexol (Union Carbide).

As will be subsequently explained in greater detail, the resilient resin in the final product performs a number of functions. Briefly, it provides an effective bond with the pile-forming fiber and it provides a resilient support for the yarn which makes for longer wearing life without being subject to undesirable matting. Also it provides a layer on the upper side of the backing which is impervious to penetration of soil.

FIGURE 2 illustrates one procedure which can be followed to make a suitable thermoplastic containing web. Two types of fibers are shown being supplied to the step **14**. One is a fiber which is stable at temperatures of the order of 150° to 300° F. For example, I can use synthetic fibers like nylon or acrylic, which are stable at temperatures up to about 300° F. Also I can employ stable animal or vegetable fibers which have considerable strength and resistance to elevated temperatures. I also supply to step **14** fibers of thermoplastic material which will fuse at a temperature level of the order of from 150° to 300° F. (200° to 250° F. preferred). This may be a suitable resin or compounded resin exemplified by polyethylene, styrene or vinyl types. The fibers can be formed by known methods of spinning or extrusion. Preferably the fibers are deposited upon a supporting surface in such a manner that the lower part of the resulting loose mat comprises largely stable fiber, and the upper portion comprises largely the thermoplastic fiber having a melting temperature of the order specified. In step **15** the deposited mat formed in step **14** is subjected to treatment whereby a sufficient bond is formed between the filaments to provide a flexible self-supporting structure, which, for example, can then be passed through a tufting machine. One procedure is to somewhat compress the mat and to apply solvent solutions containing any one of a number of bonding agents, such as vinyl resins, etc. Such bonding solutions can be applied by spraying, immersion, and the like.

In a typical instance a composite web or mat formed as described above may have a thickness ranging from 1/8 to 5/8 inch. As will be presently explained, during fusion the voids contained in the mat are eliminated with reduction in volume which it occupies. Therefore the average thickness is greatly reduced. The stable fibers which are not fused become embedded in the thermoplastic material, thus providing a non-woven reinforcement which takes the place of conventional backing.

It should also be pointed out that the composite web formed in step **15** has voids distributed throughout its structure. Thus in a typical instance from 30% to 80% of the volume of the web produced by step **15** consists of distributed voids. I have found that a web formed in this manner can be readily penetrated by the needles of a tufting machine, without needle deflection or breakage. The resistance to penetration is not excessive, and excessive heating is not experienced because of frictional resistance. In addition, during tufting the web is not dimensionally distorted or extended in the direction of its plane.

FIGURE 3 illustrates a procedure which forms a web with an added backing. Thus in this instance fibers of thermoplastic material, like that used in FIGURE 2, are randomly deposited at **16** to form a loose mat. This web or mat is then subjected to some bonding of the fiber, in step **17**, and in step **18** it is superposed upon a backing material. The backing may be one of the type commonly used in carpet making, and can, for example, be relatively coarse woven fabric, like jute, cotton or nylon, or an unwoven felt-like material. The assembled web thus formed can be supplied to a tufting machine without any attachment between the applied backing and the thermoplastic fiber material. However, if desired, some superficial attachment or adhesion can be provided. Here again the thermoplastic web is characterized by voids distributed therein.

Backing made of nylon or like synthetic fiber is not customarily used in carpet making because it does not provide sufficient tuft retention to prevent pull-out. However, with my invention such synthetic backings can be used because the tufts are bonded to the backing by the thermoplastic resin.

In place of the procedure of FIGURE 3, I can use the procedure of FIGURE 4 to form a loose web of thermoplastic material. Thus in this instance thermoplastic filaments are loosely woven at 19 to form a loose web. Such a web is superposed upon a backing in step 20.

Another procedure which can be used to form a suitable web containing thermoplastic material is to form thermoplastic resin in the form of a foamed layer or sheet. This can be done by known techniques involving the use of gas forming or blowing agents. Here again the voids provide a mat or web which can be readily penetrated by the needles of a tufting machine without needle deflection or undue resistance or friction.

FIGURES 5–8 illustrate some of the webs that can be formed by the procedures described above. In FIGURE 5 the mat or web **36** is made entirely of thermoplastic fibers or filaments, and formed as described with reference to FIGURE 3. As previously stated, in typical instances such a mat may range in thickness from ⅛ to ⅝ of an inch, and from 30% to 80% of the volume may consist of distributed voids.

FIGURE 6 represents a composite web formed in the manner described with reference to FIGURE 2. Here the upper portion **37a** comprises thermoplastic filaments, distributed as in FIGURE 6, and the lower portion **37b** comprises mainly stable filaments which are not affected by fusion of the thermoplastic filaments.

In FIGURE 7 the web consists of a layer **38a**, which can be like FIGURE 5, superposed upon the backing **38b**. As previously explained, this backing may be a coarse woven fabric or it may be a suitable unwoven textile.

In FIGURE 8 the web consists of a structure such as shown in FIGURE 6, superposed upon the backing **39c**. In other words the layer **39a** is like the layer **37a** of FIGURE 6, and the layer **39b** is like the layer **37b**.

FIGURE 9 illustrates a web of the type shown in FIGURE 6, after being passed through a conventional tufting machine. It will be seen that the dimensions of the web have not changed. The loops **41** of tufting yarn extend from the surface of layer **38a**, the length being dependent upon the character of the pile desired. For the conventional tufting machines this tufting operation is carried out while the web is inverted from the position shown in FIGURE 9. By way of example, reference can be made to carpet tufting machines manufactured by Singer-Cobble Co., Broad Street Machine Company, Inc., and Ten Tex Corporation, all of Chattanooga, Tenn.

FIGURE 10 illustrates what occurs when the structure of FIGURE 9 is subjected to an elevated temperature to fuse the thermoplastic. When fused the thermoplastic material subsides into the substantially impervious layer **42**, which is interspersed with reinforcing fiber comprising the layer **37b** of FIGURE 6. During initial phases of fusion, the thermoplastic adheres and bonds to the adjacent piling tufts and these areas of bond remain while other portions of the thermoplastic subside. Thus the subsided layer **42** is irregular, and upwardly extending and tapered extensions **43** of thermoplastic material are formed about each tuft. In the finished product of FIGURE 10, the solidified thermoplastic material has a substantial amount of resiliency, thus lending convenient flexibility to the carpet.

The resilient and flexible extensions **43** about each tuft not only aid in forming a secure bond between the yarn of the tufts and the solidified thermoplastic, thereby securing locking the tufts to the backing, but in addition permit the tufts together with extensions to be bent over or flattened when foot pressure is applied. When such pressure is removed these extensions recover their original vertical position, thus raising and repositioning the tufts. Therefore a carpet made in this manner is relatively immune to matting.

FIGURE 11 illustrates application of tufting to a web of the type shown in FIGURE 7. Here the tufting yarn **44** is applied in the form of open loops. After fusion of the thermoplastic material and its solidification, the structure appears as in FIGURE 12. Here again the solidified thermoplastic layer **46** is substantially impervious, and is bonded to the lower portions of the tufting yarn **44**, and to the extensions **47** of substantial thickness surrounding each of the tufts of yarn.

In both FIGURES 10 and 12 it will be noted that the solidified thermoplastic material does not merely form a bond between the tufts of yarn and the underlying backing, but on the contrary actually forms a bond extending over a substantial length of each tuft near its lower end. This makes for secure locking of the tufts to the backing, thus preventing shedding, and in addition prevents matting in the manner previously described.

FIGURE 13 illustrates tufting applied simultaneously to two webs formed as shown in FIGURE 7, the two webs being placed back to back. After being tufted or woven in this manner, the yarn is severed between the backings **38b**, thus permitting the two structures to be separated in the manner illustrated in the right-hand portion of FIGURE 13. Each of the two structures is then completed by curing at an elevated temperature, thus producing final products such as shown in FIGURES 14 and 15. In accordance with this procedure, a substantial mount of yarn is saved because it is unnecessary to provide loops on the back side, as in FIGURES 10 and 11.

In connection with FIGURES 10 and 12, reference has been made to the irregular character of the thermoplastic after fusion. In FIGURE 16 I have shown a final product made substantially like FIGURE 10, but with the tufts **41a** disposed relatively close together and in regularly formed rows. As will be apparent from FIGURE 17, the fused thermoplastic **42a** has rib-like extensions **43a** which extend along the rows of tufts. As previously described with respect to FIGURE 10, these extensions are formed during fusion. During initial stages of fusion the thermoplastic adheres and bonds to the adjacent piling tufts and these areas of bond remain while other areas of the thermoplastic subside. The formation of evenly spaced rib-like extensions lends to the general appearance and dimensional stability of the carpet, and serves effectively to form bonds extending over a substantial length of each tuft near its lower end.

In the processes described with respect to FIGURES 11 to 15 inclusive, the mat of thermoplastic resin is associated with a fibrous backing before tufting. Instead of this procedure, it is possible to apply tufting to a mat of thermoplastic resin made as described in connection with FIGURE 5. Thereafter a fibrous backing can be applied to the mat, as by use of a suitable adhesive, and the assembly heated to fuse the resin while positioned with the mat and tufting overlying the backing. Fusion causes the resin to bond to the tufts of yarn and to the upper surface of the backing, thus forming an effective bond between the tufts and the backing.

In the methods described above, the thermoplastic is made into the form of a mat, sheet, or layer, with distributed voids, before pile fiber is applied as by tufting. In the procedure shown in FIGURE 18, the fusible thermoplastic material is provided by a flocking technique. Thus suitable fusible and flexible flocks of thermoplastic fiber are provided, as for example flocks which may range from ⅛ to ⅝ inch in length. These flocks can be made of resin or resin formulations having melting points and characteristics after fusion as previously described. In step **52** the flocks are applied to the adhesive surface of a suitable backing. The adhesive surfacing on the backing should be such that it is capable of retaining the ends of the flocks on contact, without, however, interfering with orientation of the flocks, in accordance with known flocking techniques. Also this adhesive should be compatible with the thermoplastic material from which the flocks are made, whereby in the final fusion step, the adhesive does not interfere with proper bond between the thermoplastic and the file-forming fiber, and the backing. After the flocks have been evenly distributed over the surface of the backing, pile fiber is applied in step **53**, as by use of a conventional tufting machine. The presence of the pile minimizes interference with the tufting operation, because the tufting needles readily penetrate through the thermoplastic fiber without deflection or undue resistance. In the final fusing step **54**, the thermoplastic fiber is fused and coalesced to form bonds with the tufting fiber, and with the backing.

The disposition of the thermoplastic fiber is dependent upon the particular technique used for its orientation. By application of continuous controlled agitation to the backing, it is possible to "up-end" the flocking fibers, whereby they extend generally at right angles to the adhesive surface of the backing. Also electrostatic techniques can be employed more effectively and rapidly to distribute and orient the flock in the desired manner. It will be evident that by proper control of the flocking step, the quantity of thermoplastic thus applied to a given unit area of the backing can be adjusted as desired. Also it is possible to adjust the concentration in predetermined areas, as for example to provide a greater or a more limited concentration in parallel rows corresponding to the rows of tufting fiber. Particularly deposition of the flocks to particular areas can be controlled by limiting the adhesive to the areas where the flocks are desired.

FIGURES 19, 20 and 21 represent stages in the manufacture of a carpet in accordance with the procedure of FIGURE 18. In FIGURE 19 the backing **56** has thermoplastic flock **57** adhering to its upper surface, and in this instance up-ended, in other words extending generally at right angles to the plane of the backing. In FIGURE 20 the tufting **58** has been applied. As previously stated this tufting operation is generally carried out while the backing is being vibrated. FIGURE 21 shows the final product after the thermoplastic flock has been fused. This product is quite similar to the one produced by a thermoplastic mat or layer in the manner previously described. Instead of using flocks that of thermoplastic material, it is possible to produce a mixture of flocks, some being fusable and others being stable at the temperatures used for final fusion of the thermoplastic material. Assuming that these flocks are then distributed over the surface of the backing in the manner shown in FIGURE 19, and such backing tufted in the manner shown in FIGURE 2, the final product is as shown in FIGURE 21, except that the stable flocks remain to provide an undercoverage supplement to that of the tufts.

As shown in FIGURE 22 the flocking technique can be such that flocks of varying lengths are employed, with the longer flocks **59** being disposed in rows corresponding to the spacing between the tufts. Thus concentration of resin in the final product is deposited in predetermined areas and quantities by variance of flocking techniques exemplified by selective surface pregumming, length, or diameter, or type of flock fiber or blend. In addition, presence of stable fibers retaining their identity can be positioned to be in juxtaposition to the pile yarn providing support and creating novel non-woven features to the product. After tufting the structure can appear as in FIGURE 23. After fusing the product may be as shown in FIGURE 24. The structure is generally the same as in FIGURE 21, except that the extensions **60** of the fused thermoplastic about the fiber tufts **61** are somewhat greater, and corresponds generally to the length of the thermoplastic flocks **59**.

Examples of my invention are as follows:

Example 1

The procedure employed was substantially that described with reference to FIGURES 1 and 3. The thermoplastic material employed was a compound comprising two parts of a vinly resin manufactured by Du Pont and sold under the trade name of Elvax, and one part of a plasticizer manufactured by Union Carbide and Chemical Company, and sold under the trade name of Flexol EPO. This material had a melting point of about 170° F. Filaments were deposited in random fashion and bonded together at points of contact, to form a loose web about $\frac{3}{16}$ inch thick. This mat was superposed upon a backing of woven jute, such as is commonly used as a carpet backing. This assembly was then introduced into an 8-needle tufting machine, and nylon yarn tufting applied. A substantial length of tuft ($\frac{3}{16}$ inch) was left protruding on the side formed by the thermoplastic material. After tufting, this assembly was placed upon a suitable supporting surface, with the tufts extending upwardly, and introduced into an oven where it was exposed to an air temperature of 300° F., for fifteen minutes. The product obtained was substantially the same as shown in FIGURE 14, although the tufts correspond to those shown in FIGURE 12. The fiber of the tufts was effectively bonded to the thermoplastic, and the thermoplastic was thermally bonded to the jute backing, making it impermeable. The finished product had a substantial degree of flexibility. It was noted that each tuft was supported over a substantial distance of its length by flexible raised resin extensions extending along the pile rows. After the tufts were compressed as by walking upon the surface of the carpet, they rapidly returned to normal vertical position. The thermoplastic resin formed an impervious coating over the woven jute backing which resisted penetration of soil.

It will be evident that my method and product may be modified in various ways without departing from my invention. For example, various known modifying agents can be added to the thermoplastic material, to produce desired characteristics in the final product, or to provide a desired melting point. Particular reference can be made to antistatic materials and chemicals, color modifying dyes, pigmenting materials, waxes and plasticizers, and the like.

The flocking procedure described can be used to produce predetermined patterns, by limiting the application of the adhesive to a predetermined pattern area. The flocking technique can also be applied to a film or sheet made of substantially the same thermoplastic material, and this film subsequently applied to a conventional backing before tufting. In such event, the film fuses during final heat curing, together with the thermoplastic flocks.

The thermoplastic material may incorporate activators to impart varying degrees of thermosetting properties. By the use of activators with selected resins it is possible to produce a final product wherein the cured thermoplastic material is relatively immune to refusion at the temperature used during final curing.

I claim:

1. In a method for the manufacture of carpet-like textiles wherein a web of thermoplastic material is subjected to a tufting operation with intrusion of tufts of yarn into the web, after which the web is fused, the improvement comprising using a web having voids distributed throughout the same whereby during fusion the web forms bonds with the yarn and then subsides between the tufts to form an impervious layer that has a thickness less than that of the unfused web, the subsiding of the fused web forming integral extensions of the thermoplastic material about the tufts.

2. A method as in claim **1** in which the voids constitute from 30–80% of the volume of the unfused web.

3. A method as in claim **1** in which the web is a mat formed of fibers of thermoplastic material.

4. A method as in claim 1 in which the web is a mat formed of foamed thermoplastic material.

5. A method as in claim 1 in which the web is applied to a backing before tufting whereby the tufts of yarn are applied with intrusion through both the web and the backing.

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