Nov. 15, 1966 W. T. HARRISON ET AL 3,285,797

AXMINSTER CARPET

Filed May 4, 1964

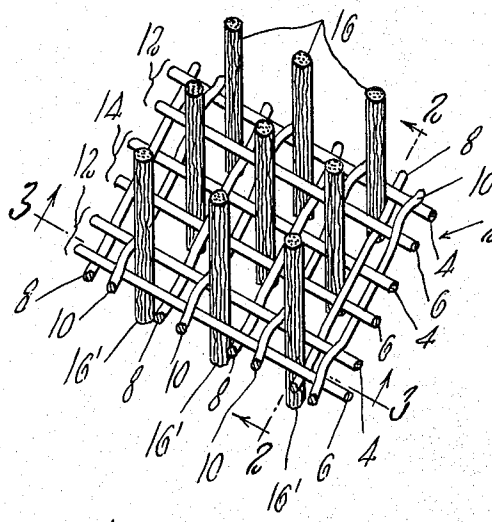

Fig. 1.

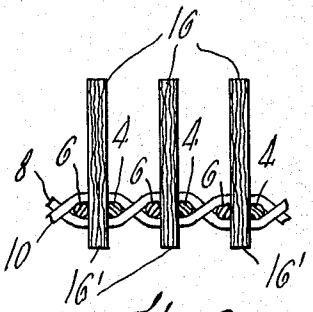

Fig. 2.

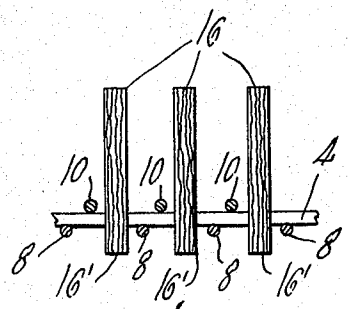

Fig. 3.

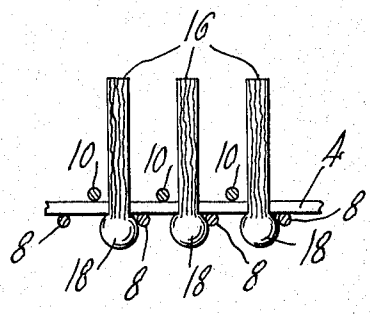

Fig. 5.

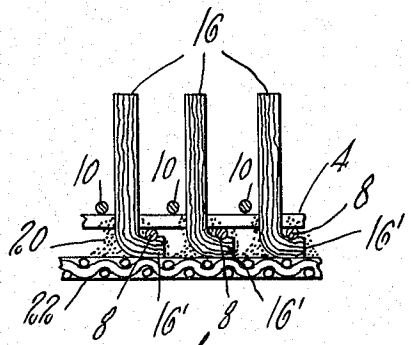

Fig. 4.

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3,285,797

AXMINSTER CARPET

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3 Claims. (Cl. 161—67)

The present invention relates to pile fabric floor covering such as carpets and rugs, herein for convenience called carpet, and more particularly to an Axminster type carpet of a novel construction providing an attractive pile face and which can be produced rapidly and at low cost.

The novel Axminster carpet construction of the invention provides not only an attractive pile face in which the pattern may be sharply delineated but has many other advantages over the conventional Axminster V-tuft construction.

An object of the invention is to provide a novel Axminster carpet construction providing good pile coverage of the backing structure and wherein the pile elements are firmly secured in the backing.

Another object of the invention is to provide an Axminster carpet construction wherein the pile tufts consist of a single leg only but in which the pile tufts are firmly bound into the backing structure.

A further object of the invention is to provide an Axminster type carpet construction wherein the pile tufts are of fusible fibers and have their lower ends firmly fixed in the backing fabric.

A still further object of the invention is to provide an Axminster type carpet having a backing construction which provides a built-in cushion.

Other and further objects, features and advantages of the invention will become apparent from the following description of presently preferred embodiments of the invention, in which description reference is made to the accompanying drawing, wherein

FIG. 1 is a schematic view in perspective illustrating the fabric construction wherein the spacing between the warp and weft strands of the backing is exaggerated for purposes of illustration;

FIG. 2 is a warpwise vertical sectional view on line 2—2 of FIG. 1 looking in the direction of the arrows;

FIG. 3 is a weftwise vertical sectional view taken on line 3—3 of FIG. 1 and looking in the direction of the arrows;

FIG. 4 is a view similar to FIG. 3 but showing a modification; and,

FIG. 5 is a view similar to FIG. 3 showing another modification.

The fabric of the invention consists of a backing structure and a pile face. The backing structure is formed from warps and wefts, the wefts being inserted in pairs, as is customary in Axminster manufacture, and the pairs of wefts being separated warpwise of the fabric by crossings of binder warp threads. The binder warp threads also are disposed in pairs, the pairs being spaced weftwise of the fabric. One of the two binder warp threads of each pair is woven over alternate pairs of wefts and under the intermediate pairs of wefts and the other binder warp thread of each pair is woven under said alternate pairs of wefts and over said intermediate pairs of wefts. The two binder warp threads constituting a single pair are disposed closely together weftwise of the fabric. The pile face is formed from pile tufts disposed in warpwise and weftwise rows. Each pile tuft consist of but a single leg passing through the backing fabric and extending upwardly from the backing to the desired height to form the pile face. The other end of the pile tuft extends a short distance below the backing fabric. Preferably an adhesive is applied to the back surface of the fabric, as by use of a doctor blade so as to leave empty pockets at various places between the ends of the pile tufts, and the fabric may be finished by applying a thin sheet of textile fabric to this adhesive-coated back. When the pile tufts are formed of fibers of a fusible material we have found that the bind of the pile tufts into the backing can be improved by applying heat to the lower ends of the tufts exposed at the back of the backing to cause fusion of the fibers constituting the tufts.

Referring now to the drawing, the backing fabric, indicated generally at **2**, FIG. 1, comprises wefts **4**, **6**, a weft **4** and a weft **6** forming a pair of simultaneously inserted wefts. Interwoven with the wefts **4**, **6** are spaced pairs of binder warp threads each pair comprising a binder warp thread **8** and a binder warp thread **10**. The binder warp threads **8** are woven under the alternate weft pairs **12** and over the intermediate weft pairs **14**. The other binder warp thread **10** of each pair is woven over the alternate weft pairs **12** and under the intermediate pairs **14**. In the drawing the strands of the backing are more widely spaced than they are in the actual fabric in order to simplify illustration of the fabric construction.

The pairs **12**, **14** of wefts are separated from each other by the crossings of the binder warp threads **8**, **10**. The binder warp threads **8**, **10** do not at any point lie between the two wefts **4**, **6** which constitute a pair. The binder warp threads therefore tend to urge the two wefts of a pair toward each other.

The pile face is formed by the pile tufts **16** which extend through the backing fabric **2**, having their lower ends **16'** projecting slightly below the backing, say about ¼" or less below the backing. These pile tufts **16** consist of a single leg only. The pile tufts **16** are inserted in the backing so that they are arranged in warpwise and weftwise rows. In the warpwise rows the pile tufts **16** lie between adjacent pairs **8**, **10** of binder warp threads. In the weftwise rows the pile tufts **16** are inserted to lie between the two wefts **4** and **6** of each weft pair **12** or **14**.

The fabric is woven on an Axminster loom and the pile tufts **16** may be inserted by the conventional tube frames well known in the art. In order to insert the pile tufts between the two wefts **4**, **6** of a pair, these wefts must be separated or spaced apart during the wipe-in motion of the tube frame, which separation may be accomplished in any desired manner, as is known in the art, for example by the procedure and apparatus disclosed in the Davis Patent No. 1,341,417 of May 25, 1920. When the pile tufts have been wiped in between the separated wefts constituting a pair, the pile yarns are then drawn upwardly to leave the appropriate length of pile yarn extending below the backing structure at **16'** whereupon the pile yarns are severed at a point sufficiently above the backing to form pile tufts **16** of the desired height. The next beat up of the lay brings the wefts **4**, **6** of the pair together, gripping the pile tuft **16** between them, whereupon the heddles are manipulated to reverse the shed of binder warp threads **8** and **10** to hold the beaten up weft pair in place in the fabric. Gripping of the pile tuft yarn **16** between the wefts of a pair contributes to firm binding of the pile face in the backing structure **2**. The binder warp threads are woven under substantially equal tension and the wefts lie substantially in a single plane.

The construction preferably is such that the pairs **8**, **10** of binder warp threads lie closely against the adjoining pile tuft leg **16**, thus providing that the backing structure **2** grips each pile tuft **16** weftwise as well as warpwise.

The fabric preferably has a liquid adhesive coating applied to its back to aid in further securing the pile tufts **16** to the backing **2** and to impart desirable characteristics to the completed fabric. Such back coating preferably is applied by a doctor blade or other means which will tend to lay the lower ends **16'** of the pile tufts over against

the strands of the backing structure **2** and in such a way as to coat the lower ends of the pile tufts **16'** and at least adjacent portions of the wefts and the binder warp threads with films of adhesive **20** but to leave open or empty pockets or spaces distributed over the back between the pile ends **16'** and the back of the backing structure **2**. The fabric may be finished by applying over adhesive coating **20** a thin textile fabric **22**. The pile ends **16'** will lay over to a greater or lesser extent depending upon their length, the fibers from which they are formed, and other conditions. Some or all of the pile ends **16'** may remain relatively straight, or may partly or entirely straighten up again after they have been coated. In any case, preferably the adhesive **20** is so applied that after the textile fabric **22** is in place there remain open pockets or spaces between the carpet backing **2** and the fabric **22** and between the pile tuft ends **16'**. Such open spaces tend to cause the carpet backing to provide a highly desirable cushioning effect.

Referring to FIG. 5, when the pile tufts **16** are formed of a thermoplastic or fusible material, for example of a polyamide such as nylon, we have discovered that the lower ends **16'** advantageously may be treated by application of heat to cause fusion of the fibers of the pile tufts. Upon fusion the nylon tends to "pill" or assume a global shape **18** and may adhere to adjoining weft and warp strands. Such fusion treatment further contributes to secure binding of the pile tufts **16** into the backing. Such fusion treatment may be applied by means of wires heated to a temperature of about 400° F., for example, or by any other suitable means.

The pile fabric of the invention exhibits a sharp pattern delineation due to the fact that each pile tuft **16** comprises a single leg only and tends to stand upright because of the way in which it is located in the backing structure so that the binding forces applied to it by the warps and wefts are symmetrical and do not tend to cause the pile tuft to depart from an upright position. In addition, the insertion of the pile tufts between the two wefts constituting a simultaneously-inserted pair, such wefts being constrained toward each other by the binder warp threads, tends to bind the pile tufts securely into the backing fabric, unlike prior fabric construction, of Reinhardt Patents 2,940,479 and 2,945,511, for example. At the same time the fabric is inexpensive as contrasted with a conventional Axminster fabric wherein the pile tufts are in the shape of a V, the lower end **16'** having been turned upwardly about one of the wefts and being sufficiently long to form an additional pile leg. A greater yield of carpet yardage is produced for each set of yarn spools in manufacturing the carpet of the invention. For example, yields of the order of 590 yards may be produced from a single set of yarn spools as contrasted with only 340 yards from a set of yarn spools when weaving the traditional V-tuft Axminster carpet. Since fewer spool changes are required the cost is reduced because of the increased operational time of a set of yarn spools. With the carpet construction of the invention there is less yarn waste in shearing. Further the weaving speed can be increased with fewer operational interruptions, and other advantages in manufacture and product are obtained, while yet providing a highly desirable carpet product.

We claim:

1. A pile fabric floor covering comprising a backing of wefts and binder warp threads, the wefts being distributed warpwise of the fabric in spaced pairs and lying substantially in a single plane, and the binder warp threads being under substantially equal tension and spaced weftwise of the fabric in pairs, one binder warp thread of each pair being woven under alternate pairs of wefts and above the intermediate pairs of wefts and the other binder warp thread of each pair being woven above said alternate pairs of wefts and under said intermediate pairs of wefts, and a pile face formed of pile tufts bound in said backing, each tuft consisting of a single leg extending through the backing between two adjacent pairs of binder warp threads and between the two wefts of a said pair of wefts.

2. The pile fabric floor covering of claim **1** wherein said pile tufts comprise fusible fibers and the fibers of the ends of the pile tufts on one side of the backing are fused together.

3. The pile fabric floor covering of claim **1** wherein an adhesive material is disposed on the ends of the pile tufts and adjoining backing strands at one side of the backing, and a layer of textile fabric is united to said pile tufts by said adhesive, leaving spaced empty spaces between said textile fabric and said backing.

No references cited.

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