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E. J. COGOVAN

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PILE FABRICS AND METHOD FOR MAKING THEM

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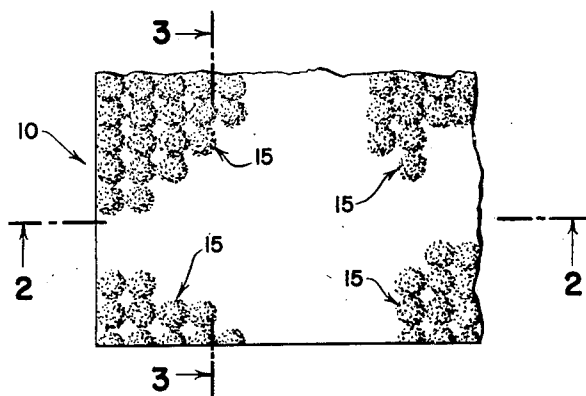


FIG. 1

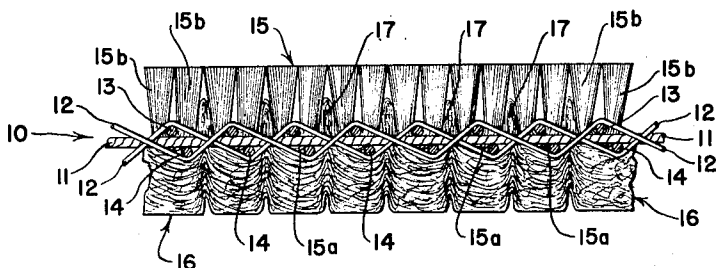


FIG. 2

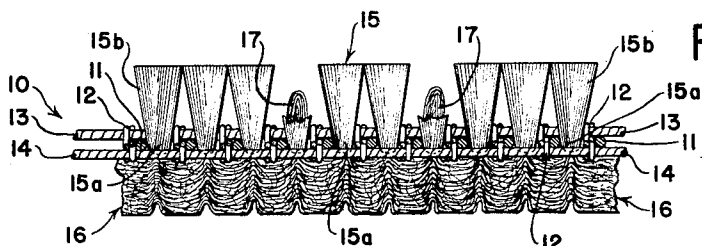


FIG. 3

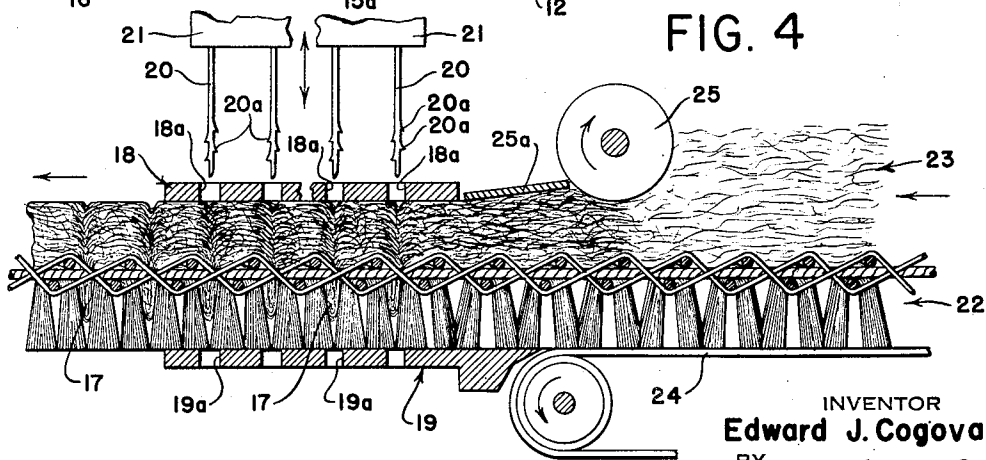


FIG. 4

INVENTOR
Edward J. Cogovan

BY
Permie Edwards Morton Parsons Taylor
ATTORNEYS

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PILE FABRICS AND METHOD FOR MAKING THEM

Edward J. Cogovan, Amsterdam, N. Y., assignor to Mohawk Carpet Mills, Inc., Amsterdam, N. Y., a corporation of New York

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4 Claims. (Cl. 28—72.2)

This invention relates to pile fabrics of the type commonly employed as floor coverings and including a backing made up of binder and stuffer warp yarns interwoven with filling yarns, and pile yarns having portions anchored in the backing and other portions projecting upwardly out of the backing. More particularly, the invention is concerned with a novel floor covering, which includes a pile fabric and a cushioning layer of felted fibrous material forming an integral part of the covering and so united to the backing of the pile fabric as to stiffen the backing and also to improve the quality of the pile. The invention also includes a method, by which the new fabric can be efficiently produced.

In the use of pile fabric floor coverings, it is common practice to employ a cushion layer beneath them, since such a cushion not only makes the floor covering softer and more yielding under foot, but also adds to the life of the pile fabric. One form of such rug or carpet cushions now in wide use is made of needled felt, which is formed by laying a bat of mixed fibers of animal hair, jute, etc. upon a sheet of loosely woven fabric, such as burlap, and forcing the fibrous material through the fabric by the action of a bank of reciprocating barbed needles. The fabric gives the needled felt the necessary strength to permit it to be handled without excessive care and, in the finished product, the fabric is wholly concealed within the fibrous mass.

In most applications, where a cushion underlay is employed beneath carpeting, the cushion sheet is laid upon the floor and the carpet or rug is laid loosely upon the cushion. However, for some purposes, as for the carpet in the rear compartment of a motor car or as a lining or carpeting for the trunk, it is common to secure a fibrous cushion to the back of the pile fabric by means of an adhesive. The pile fabric employed for such purposes is ordinarily of plain velvet weave and, since its cost must be kept low and it is not subjected to as severe wear as most carpeting for household and similar purposes, the fabric has a light backing with few stuffer warps and a smaller number of pile tufts per inch lengthwise. In such a carpet, each length of pile yarn is anchored beneath a filling yarn and the legs of each tuft extend upwardly on opposite sides of the yarn. As the number of tufts per inch lengthwise is low, adjacent tufts are frequently so spaced that the legs of each tuft may spring apart to an extent sufficient to expose the filling yarn binding a transverse row of tufts in place. This exposure in the pile of elements of the backing is referred to as "grinning" and is obviously objectionable. However, it cannot be avoided in low cost pile fabrics having a small number of tufts per inch.

The present invention is directed to the provision of a novel floor covering, which comprises a pile fabric and a fibrous cushioning layer united to the under surface of the fabric in such manner that the fabric and layer afford each other mutual support. Thus, the fabric is of conventional plain weave, but may contain so few stuffer warps and so few rows of pile elements per inch that the fabric would grin badly and be regarded as of low grade if used alone. The fibrous layer is a needled bat of animal hair, jute, and like fibers employed in rug cushions but it includes no fabric layer through which the fibers are needled; instead, in the production of the new floor covering by the new method, the fibrous bat is needled to the backing of the pile fabric in such manner that bundles of fibers are forced out of the bat and into and, in some instances, through the backing

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and well up among the elements of the pile. The fiber bundles are made up of fibers pulled from the interior of the bat by the needles and they serve to bind the fiber bat securely to the fabric. Also, in the needling operation, the pressure applied to the bat by the needles insures that the bat will closely engage the under surface of the backing of the fabric and conform to its irregularities, filling all hollows. Those portions of the fiber bundles, which extend through the fabric backing and among the elements of the pile, tend to force the pile elements into upright position, so that the pile of the fabric is made more uniformly dense and exposure of elements of the backing in the pile is lessened.

For a better understanding of the invention, reference may be made to the accompanying drawing, in which:

Fig. 1 is a plan view of one form of the new fabric; Figs. 2 and 3 are sectional views on the lines 2—2 and 3—3, respectively, of Fig. 1; and

Fig. 4 is a diagrammatic longitudinal sectional view of an apparatus that may be used in making the fabric by the new method.

The new compound fabric in the form illustrated includes a pile fabric 10 of conventional velvet construction having a backing made up of stuffer yarns 11, binder warp yarns 12 in two sets, and weft or filling yarns 13, 14 lying, respectively, above and below the stuffer warp yarns and bound in place by the binder warp yarns. The pile of the material is made up of tufts 15 of pile yarns, each tuft having a portion 15a bound beneath a weft yarn 13 and legs 15b projecting upwardly on opposite sides of the weft yarn. In the weaving of the fabric, the pile yarns are raised to form loops over pile wires provided with knives, and the loops of pile yarn are cut as the wires are withdrawn. This permits the lengths of yarn forming the tuft legs to untwist and open up somewhat and the cut ends are sheared in finishing operations, so that these ends lie substantially in a plane and ordinarily form the visible part of the surface of the pile.

A layer 16 of felted fibrous material is secured to the under surface of the backing of the pile fabric 10 by bundles 17 of fibers, which have been forced out of the layer and into the backing by the action of needles. The backing of the pile fabric employed is ordinarily of relatively loose weave and the fabric illustrated includes only a single stuffer warp for each row of tufts and lying in each space between adjacent pairs of binder warp yarns 12. With so loose a backing, it is not difficult to force the fiber bundles into the backing and they are preferably needled through the backing and well up among the pile tufts. The portion of each bundle among the tufts tends to force apart tufts engaged by the bundle and, as a result, these tufts are caused to stand more erect and thus better conceal the elements of the backing. Each fiber bundle is made up of fibers, many of which are of loop form with both ends lying embedded in the fibrous layer. The bundles thus provide good binding means for securing the layer to the backing of the pile fabric.

One form of apparatus for practicing the method of the invention is illustrated in Fig. 4. The apparatus includes spaced upper and lower plates 18, 19 provided with respective registering apertures 18a, 19a. A plurality of needles 20 having barbs 20a are mounted in a frame 21 above the plates and pass through the aligned apertures in the plates, when the frame is vertically reciprocated.

In the production of the new floor covering on the apparatus, the pile fabric 22 is employed in inverted position with its backing uppermost and upon such a fabric is laid a bat of loose fibers 23. The fabric and fibrous bat are advanced by suitable means, such as a belt 24, beneath a roller 25, which compresses the bat. The fabric with the fibrous bat in place then passes beneath a stationary guide plate 25a and enters the space between plates 18 and 19. The spacing of the plates is such that the bat is held firmly against the top of the backing without the pile tufts of the fabric being distorted to any considerable degree.

As the pile fabric with the fibrous bat thereon travels between the plates, the bank of needles is rapidly re-

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ciprocated and, on each down stroke of a needle, it passes entirely through the bat, so that its barbs 20a engage bundles of fibers and force them through the bat and into the backing of the fabric. When the needles are raised, the barbs free themselves from the fibers, so that the fibrous bundles remain in place in the backing. The length of the down stroke of the frame carrying the needles may be varied, so that the length of the portions of the fibrous bundles entering the pile of the fabric may be varied, as desired. In the needling of the bat to the backing, the pressure applied to the bat by the needles causes the bat to lie tightly against the under surface of the backing of the fabric and to conform to the irregularities in that surface.

In the finished product, the bundles of fibers protruding from the fibrous layer and passing through the backing increase the density of the backing and the backing strengthens the fibrous layer and acts as the fabric ordinarily employed with needled felt. The presence of the fiber bundles among the pile tufts improves the pile in causing the tuft legs engaged by the bundles to become more erect, so that the pile is more uniform and provides better coverage of the backing. The combination of the fabric and the fibrous layer secured to the under surface of the backing thereof at a multiplicity of points produces a floor covering having desirable body and weight, a soft yielding tread surface, and good wearing qualities. In addition, the new product can be made at lower cost than the combination of a pile carpet and a rug cushion of conventional form.

I claim:

1. A pile fabric, which comprises a backing made up of interwoven warp and weft yarns, pile yarns having portions anchored in the backing beneath weft yarns and other portions projecting above the backing to form pile tufts, and a layer of felted fibrous material secured against the under surface of the backing by bundles of fibers extending from the fibrous layer through the backing and among the pile tufts, the bundles of fibers extending through the backing a distance sufficient to provide lateral support for the pile tufts.

2. A pile fabric, which comprises a backing made up of interwoven warp and weft yarns, pile yarns having

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portions anchored in the backing beneath weft yarns and other portions projecting above the backing to provide the pile, and a layer of felted fibrous material secured in tight contact with the under surface of the backing by bundles of fibers extending from the fibrous layer through the backing and among the pile tufts, the fibers in the bundles having portions embedded in the interior of the layer and the bundles of fibers extending through the backing a distance sufficient to provide lateral support for the pile tufts.

3. A pile fabric, which comprises a backing made up of interwoven warp and weft yarns, pile yarns having portions anchored in the backing beneath weft yarns and other portions projecting above the backing to provide a pile formed of pile tufts, and a layer of felted fibrous material secured tightly against the under surface of the backing by bundles of fibers extending from the interior of the felted layer and through the backing into the pile, certain of the fiber bundles lying between and engaging the legs of adjacent pile tufts to provide lateral support for them.

4. A method of making a floor covering which comprises providing a pile fabric made up of a backing of interwoven warp and weft yarns and pile yarns having portions anchored in the backing and other portions projecting out of the backing to form the pile, advancing the pile fabric, advancing a fibrous bat in contact with the backing of the advancing pile fabric, and moving needles repeatedly through the fibrous bat to force bundles of the fibers therefrom through the backing of the pile fabric and sufficiently therebeyond to lie among and in contact with the elements of the pile and provide lateral support therefor.

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