June 20, 1939. H. L. SHUTTLEWORTH 2,163,135

PILE FABRIC

Filed March 9, 1939

Fig. 1,

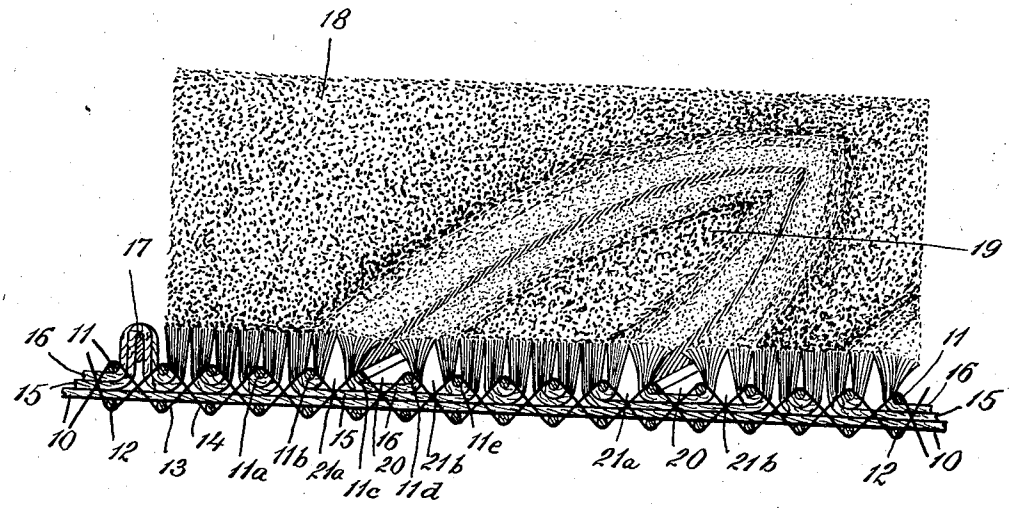
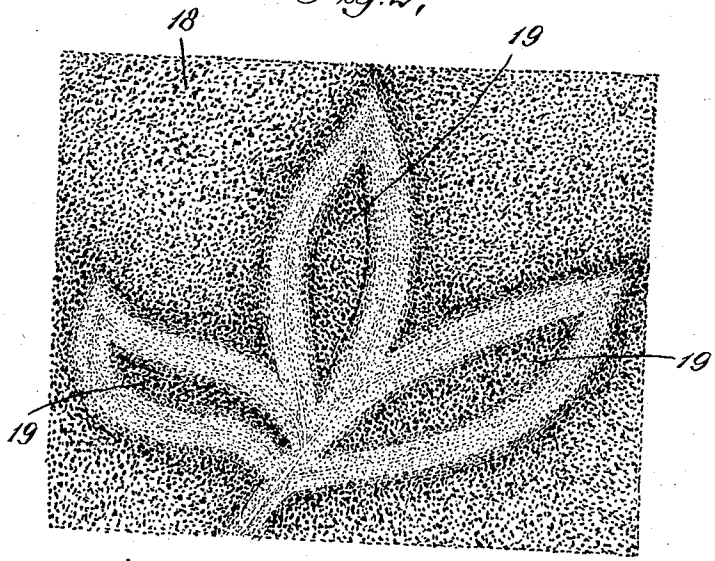


Fig. 2,



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PILE FABRIC

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1 Claim. (Cl. 139—406)

This invention relates to woven pile fabrics, such as are employed as rugs and carpets, and is concerned more particularly with a novel pile fabric in which the pile surface has the appearance of containing a pattern or design in relief. The invention further comprehends a method by which the new fabric may be conveniently and expeditiously produced on looms of a standard type by proper control of the operations thereof.

Heretofore, various expedients have been proposed for the manufacture of pile fabrics having embossed effects on the pile surface, one purpose of such embossing being to set off the figures in the design and make them more readily apparent by the contrast between such figure areas and the remainder of the pile surface, which may be referred to as the ground areas. According to one method, a pile fabric is made in the usual manner and portions of the pile surface are then clipped so as to reduce the height of the pile therein. This method is carried on by hand and it has not proven successful because of the high degree of skill involved and of the cost of the operations.

Another expedient for the production of embossed effects on pile surfaced fabrics involves the use of differentially twisted yarns in the pile surface, these yarns being introduced in accordance with a pattern. After such a fabric is completed, the pile surface is given a subsequent treatment to relieve the twist in certain of the yarns and this treatment causes certain of the tufts to either sink below or rise above the tufts made of yarns not affected by the treatment. A fabric produced in this manner has a surface containing pile tufts of different heights, but the method is not satisfactory because all the tufts of a particular yarn will not respond in like manner to the subsequent treatment for relieving twist and, as a result, the method is not positive and it is impossible to produce a perfect design in which all portions of certain areas are formed of tufts of one height and all the tufts in the remainder of the pile surface are of a different height.

A further procedure which has been attempted involves inserting the tufts in the ground and figure areas in accordance with a pattern and controlling the tuft insertion mechanism so as to omit tufts along the boundaries common to the areas of the two types. By this omission of the tufts, it is intended that the contrast between the figure and ground areas will be accentuated, but in order to produce the desired effect, a relatively wide space must be left along the boundaries and, as a result, the pile along the margins of the areas may be readily crushed and flattened so that, in use, the fabric soon takes on an objectionable appearance.

The present invention is directed to the provision of a novel fabric in which contrast between the figure and ground areas is obtained in an accurate manner and the fabric is free of the objectionable features of the fabrics produced by the methods heretofore employed.

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

Fig. 1 is a view in perspective of a pile fabric embodying the invention, and

Fig. 2 is a plan view of the new fabric.

As illustrated in the drawing, the new fabric includes stuffer warps 10 varying in number as may be desired, weft shots 11 and 12 in two series lying, respectively, above and below the stuffer warps, and binder warps 13 and 14 which cross the weft shots both above and below and hold the weft shots in place against the stuffer warps. In addition, the fabric includes a plurality of sets of pile warp yarns, the fabric illustrated containing two sets of such yarns designated 15 and 16, respectively. In the weaving of the fabric, the pile warp yarns are raised over wires 17 in the usual way to form pile loops extending upward between adjacent weft shots 11 of the upper series, and, upon withdrawal of the wires, the loops may be severed at the top to form a cut pile surface.

For the production of the new fabric, a Wilton loom of the usual type may be employed, the manipulation of the pile warp yarns being controlled by a jacquard mechanism. In the preferred form of the fabric, two frames of pile warp yarn of a single color are employed and yarns from both frames pass through each split in the reed. In the weaving operation, the jacquard raises both frames of yarn over the pile wires to form pile throughout the fabric, except at predetermined points along the boundaries of the figure and ground areas of the pattern. Along these boundaries or outlines, the yarns of both frames remain in the body of the fabric, thus leaving a space devoid of tufts with the yarns crossing the bottom of the space. On opposite sides of the space, the yarns of a single frame only are raised over the pile wires to form the pile and, as a result, the boundaries of the figures are defined by a space devoid of tufts, and on either side thereof are bands in which

the pile is of less density than elsewhere in the pile surface.

In the production of the fabric by the method of the invention, the pile warp yarns 15 and 16 are raised over the successive wires 17 between adjacent weft shots 11 in the upper series throughout the figure and pile areas except along the margins thereof. Thus, as illustrated in Fig. 2, the area 18 is the ground and the areas 19 are those of the figures and along the boundaries between these two kinds of areas, the yarns 15 and 16 of the two frames are not raised, as indicated at the point 20, and a space devoid of tufts is formed. On opposite sides of the space are bands 21*a*, 21*b* lying within a figure or ground area and formed of tufts made of pile yarns of a single frame only. The pile in each such band is of less density than the pile elsewhere within the figure and ground areas, and this variation in the pile density in the bands, together with the spaces devoid of pile along the boundaries, sets off the figure areas from the ground and produces the desired effect in the pile surface.

It will be observed from Fig. 1 that, in the fabric illustrated, the pile yarns of both frames are raised between weft shots 11*a*, 11*b*, while between the weft shots 11*b* and 11*c*, the yarns 15 remain within the fabric and the yarns 16 are raised over the wire. Between the shots 11*c* and 11*d*, the yarns of both frames have not been raised, thus providing the space devoid of tufts, and between the weft shots 11*d* and 11*e*, the yarns 15 remain within the fabric while the yarns 16 have been raised over the wires. The manipulation of the pile yarns in the manner described to produce the space lying between the bands of reduced density is effected under the control of the jacquard mechanism, and the action of the mechanism causes the bands and space to outline the figures. In the construction illustrated, the space and the bands each have a width at the bottom equal to the distance between a pair of neighboring weft shots, but if desired, the width of the bands and space may be increased. Preferably, the width of the space is not in excess of the distance between neighboring shots. Also, more than two frames of yarn may be employed for the production of the pile, although satisfactory effects are obtained by the use of two frames, as shown.

The reduction in pile density, together with the space between the bands, produces an outline around the design figures which is readily apparent in a pile surface of a single color effect, and the setting off of the figure areas from the ground areas is maintained regardless of wear on the pile surface. In prior fabrics in which a space has been left along the figure outlines by the failure to insert tufts, the crushing of the pile is likely to close the space and destroy the desired effect, if the space is relatively narrow, and if the space is sufficiently broad to be visible after a period of wear, the matting of the pile along the space gives the pile surface an undesirable appearance. In the present fabric, the reduction in pile density in the bands along the space prevents the space from being obscured by the crushing of adjacent pile tufts and, in fact, the relief effect in the new fabric is accentuated rather than reduced by wear.

I claim:

A pile fabric comprising the combination of stuffer warps, weft shots lying above and below the stuffer warps, binder warps crossing the weft shots above and below and binding the weft shots in place, and a pair of sets of pile warps lying within the body of the fabric with the warps of both sets raised between adjacent upper weft shots to provide a pile surface, said surface including figure and pile areas outlined by bands in which the pile surface is formed of raised pile warps of one set only, adjacent bands being separated by a space in which the pile warps of neither set have been raised.

HOWARD L. SHUTTLEWORTH.