April 14, 1936. G. J. UNDERWOOD 2,037,548

PILE FABRIC

Filed Jan. 12, 1932

Fig. 1.

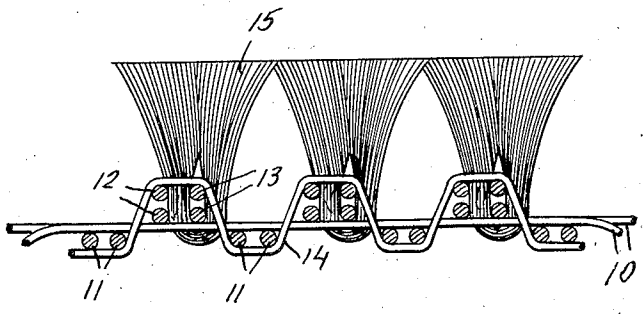


Fig. 2.

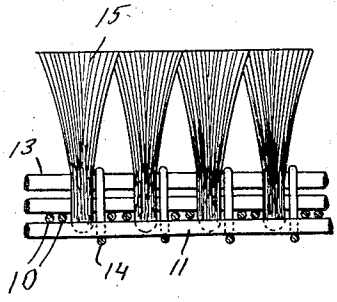


Fig. 3.

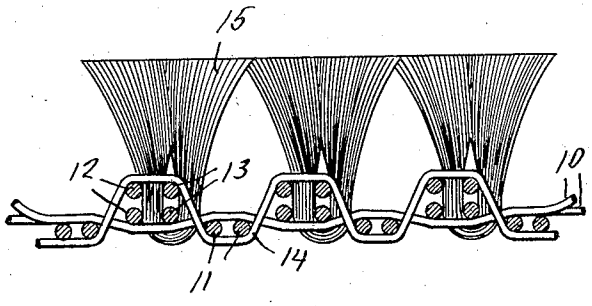
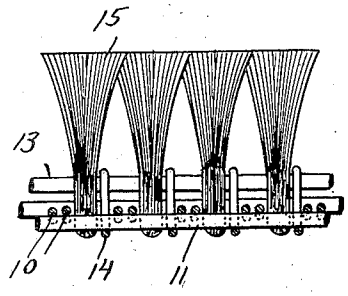


Fig. 4.



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PILE FABRIC

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Application January 12, 1932, Serial No. 586,140

3 Claims. (Cl. 139—401)

This invention relates to the art of weaving pile fabrics and is concerned more particularly with those pile fabrics in which an outline of the face pattern is visible on the back. The novel fabric of my invention is so woven that the extent to which the face pattern is visible on the back can be varied in amount and the pattern yarn exposed on the back is protected against contact with the floor surface and protected against being cut by the size which is ordinarily used in such fabrics to give the necessary binding and stiffness thereto.

Pile fabrics in which the pattern is visible on the back have been commonly made heretofore with a substantially flat back and with the pattern yarn exposed on the back and in contact with the floor surface. The pattern yarn is thus subjected to considerable wear and in fabrics in which the yarn varies in thickness, the wear becomes very noticeable. Also, most fabrics of this kind are coated on the back with a size which gives the fabric the necessary stiffness, and assists in binding the pile yarn in place, and in prior fabrics which rest on yarn showing through the back, the hardened size tends to cut the pile yarn fibres and thus reduce the life of the fabric, the cutting action being most pronounced in fabrics in which heavy or thick pile yarns are employed.

The present invention is accordingly directed to the provision of a pile fabric in which an outline of the face pattern is visible on the back and in which the yarn which shows at the back can be varied in amount even though yarns of different weights and thicknesses are used. The new fabric may have a comparatively smooth back but at the same time the pattern yarn which shows through on the back is protected by adjacent shots of weft from undue wear by contact with the floor and against cutting by the size. Also, the length of the yarn forming the tufts can be varied without interfering with the visibility of the pattern at the back and the tufts are securely anchored in the fabric so that they cannot easily work loose. The new fabric thus includes all the desirable features of fabrics of this type and has a longer life and better wearing qualities than fabrics of this type as heretofore commonly constructed.

The new fabric may be woven with the ordinary Axminster loom and preferably includes three shots of weft per row of tufts, binder warps, and one or more stuffer warps, two shots of weft of each cycle lying above the stuffer warps while one shot lies below. The binder warps extend above the upper weft shots and below the lower weft shots in the usual way and the pile yarns are looped about one of the upper weft shots and are held in place by the other upper weft shot on one side and by the lower weft shot on the other side. In weaving the new fabric, the tension on the stuffer warps and binder warps may be varied as desired and in one weave in accordance with the principles of the invention, the stuffer warps lie substantially in a plane so that the bottom of the pile loops lie slightly above the plane of the lower portions of the binder warps and are thus protected against wear. In a modified fabric, in accordance with the invention, the tension on the stuffer warps is reduced and that on the binder warps somewhat increased with the result that the stuffer warps no longer lie in a plane and the shots of weft above and below the stuffer warps more nearly approach the same plane. In such a weave, the bottoms of the pile loops may lie substantially in the same plane as the lower portions of the binder warps, thus taking some of the wear on the bottom of the fabric but not all, as is common in prior fabrics. In all types of fabrics constructed in accordance with the invention, the pattern is visible in the back and by varying the tension on the stuffer and binder warps, the pile loops may be raised or lowered as desired relative to the back of the fabric, thus varying the amount of face yarn pattern visible at the back and varying the length of the yarn forming the tufts.

A further advantage of the fabric so woven lies in the fact that in each of the two weft shots above the stuffer warp, the binder chain holds the two strands of each weft shot one above the other in vertical alignment and thus the pile yarns are tightly clamped by both strands in each shot. This results, in addition to other features enumerated, in a securely fastened pile which cannot be readily dislodged.

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

Fig. 1 is a view in longitudinal section of one type of fabric constructed in accordance with the invention;

Fig. 2 is a sectional view at right angles to Fig. 1;

Fig. 3 is a longitudinal section through a slightly modified fabric, and

Fig. 4 is a view at right angles to Fig. 3.

The application of the principles of the invention is illustrated in the drawing in the form of a fabric woven on an ordinary Axminster loom and including stuffer warps 10 and weft shots 11,

12, and 13, the three shots constituting a cycle with each shot made up of two strands. The shots of weft are so inserted in the fabric that one shot 11 lies below the stuffer warps and the two shots 12 and 13 above. A binder warp 14 passes below the lower weft shot 11 and above the upper shots 12 and 13 to hold them in place and the pile yarns 15 are looped about one of the upper shots 13 and held in place in part by the second upper weft shot 12 and in part by the lower weft shot 11. The shots of weft are inserted in the fabric by the usual needle traveling in and out of the shed formed by the binder and stuffer warps and the stuffer warps and binder warps are carried on beams with the usual let-off mechanisms and adjustably weighted arms which vary the tension on the threads.

In weaving the fabric illustrated, one or two sets of stuffer warps may be employed. If the fabric includes one set of stuffer warps, the loom will be provided with two heddle frames, one for the stuffer and one for the binder, while the use of two sets of stuffer warps requires a second stuffer heddle frame with both stuffer heddle frames moving up and down as a unit.

In the construction illustrated in Fig. 1, the stuffer warps lie substantially in a plane and the bottoms of the pile loops lie slightly above the lowermost portions of the binder warps. As a consequence, the pile yarns are visible at the back of the fabric so as to produce the outline of the pattern, but the binder warps take the wear. In weaving the fabric shown in Fig. 1, the tension on the stuffer warps is greater than that on the binder warps and the extra tension on the stuffer warps causes the upper weft shots to be raised so that the bottoms of the pile loops are protected against wear in the manner described.

The weave illustrated in Fig. 3 is produced by reducing the tension on the stuffer warps and increasing the tension on the binder warps. In this weave, it will be observed that the stuffer warps do not lie in a plane and the upper and lower weft shots have been caused to approach an intermediate plane. In this fabric, the bottoms of the pile loops lie substantially in the same plane as the lowermost portions of the binder warps and the wear on the back of the fabric is taken both by the pile yarns and the binder warps. By thus varying the tension on the stuffer and binder warps, the tuft yarns may be raised or lowered to a substantial extent in relation to the back of the fabric and in all instances, the tuft yarns are protected against wear by the lower weft shots and the binder warps. The amount of pile yarn visible in the back of the fabric and the length of the yarn forming the tufts can thus be regulated at will by the weaver. In all instances, the pile yarns are firmly secured in place by engagement at one side with an upper weft shot and on the other side by a lower weft shot. Also, in all fabrics produced in accordance with my invention, the pile yarns are protected, in the manner described, both against undue wear and against being cut by the hardened size.

In both forms of the fabric illustrated, it will be noted that the two strands of each weft shot above the stuffer warps lie one above the other, whereas the two strands of the weft shots 11 below the stuffer warps lie side by side horizontally. This arrangement of the strands of the shots results from the use of a single set of binder warps and the looping of the pile yarns about a shot lying above the stuffer warps. After the shot 12 is inserted and the pile yarns introduced, shot 13 is inserted and the pile yarns are looped about that shot. A shed is now formed with the binder warps below the stuffer warps for the reception of the shot 11. The looping of the pile yarns about shot 13 together with the tension on the binder warps result in both strands of each of the shots 12 and 13 moving to a position one above the other and thus the pile loops are held from within by the two strands of shot 13 in vertical alignment and on the outside to the left by the strands of shot 12 in vertical alignment. This produces an excellent binding of the pile yarns since they are gripped at two spaced points at one side. From the other side, the pile yarns are held by one strand of the shot 11. The two strands of this shot remain in their normal position side by side horizontally.

I claim:

1. A method of weaving a pile fabric having the pile loops exposed to a variable degree on the bottom of the fabric which comprises inserting weft shots in cycles of three with two shots per cycle above the stuffer warps and the other shot below the stuffer warps, looping pile yarns around one of the weft shots in each cycle above the stuffer warps, interweaving a single set of binder warps, over the weft shots above the stuffer warps and under the weft shots below the stuffer warps, and adjusting the relative tension of the binder and stuffer warps to predetermine the extent to which the pile loops are exposed on the bottom of the fabric.

2. A method of weaving a pile fabric of the Axminster type containing a single set of stuffer warps, weft shots inserted in cycles, pile tuft yarns, and a single set of binder warps, which comprises inserting the weft shots in cycles of three, with two shots per cycle lying above the stuffer warps and one shot per cycle lying below the stuffer warps, looping the pile tuft yarns about one shot of each cycle lying above the stuffer warps, manipulating the binder warps during the weaving to cause them to pass over all the weft shots above the stuffer warps and under all the weft shots below the stuffer warps, and controlling the positions relative to the back of the fabric of the weft shots about which the tuft yarns are looped by regulating the tensions on the binder and stuffer warps.

3. As an article of manufacture a carpet or rug comprising a stuffer warp, two weft shots above the stuffer warp, a single weft shot below the stuffer warp laterally offset from the two upper weft shots constituting a weaving cycle, a single binder warp passing over both upper weft shots and then downwardly and under the lower weft shot of the same cycle, pile forming tuft yarns loosely embracing an upper weft shot between the legs of the tufts and having the bend or loop of the tufts extending downwardly into the plane of the binder warp where said binder warp passes about the lower weft shot.

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