June 4, 1957 R. R. MATTHEWS 2,794,449

WOVEN PILE FABRIC

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Fig. 1.

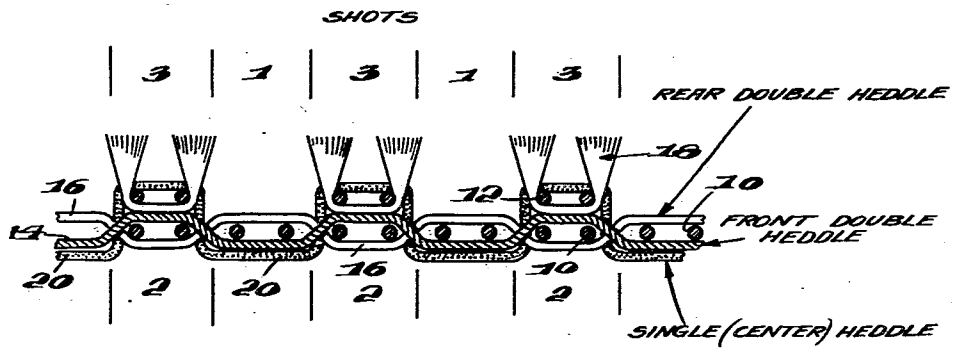


Fig. 2.

	POSITION OF HEDDLES PER CYCLE		
	REAR HEDDLE	MIDDLE HEDDLE	FRONT HEDDLE
1ST SHOT	UP	DOWN	DOWN
2ND SHOT	DOWN	UP	UP
3RD SHOT	DOWN	UP	DOWN

Fig. 5.

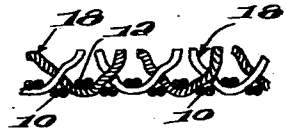
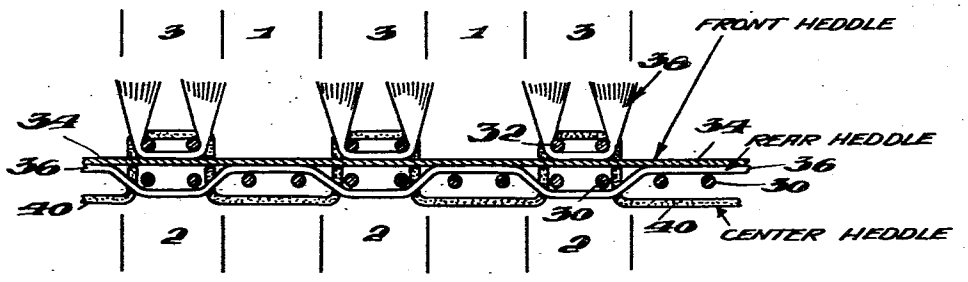


Fig. 3.



	POSITION OF HEDDLES PER CYCLE		
	REAR HEDDLE	MIDDLE HEDDLE	FRONT HEDDLE
1ST SHOT	UP	DOWN	UP
2ND SHOT	DOWN	UP	UP
3RD SHOT	DOWN	UP	DOWN

Fig. 4.

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WOVEN PILE FABRIC

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5 Claims. (Cl. 139—401)

The present invention relates to woven pile fabrics of the kind used as carpets and rugs, and more particularly to woven tuft carpeting such as is produced with power looms.

It is the general object of this invention to provide a woven tuft carpeting having a novel backing construction.

More specifically, the object of the invention is to provide a woven tuft pile fabric that has more flexibility, has a more tightly woven and substantially flat backing layer affording a saving in backing coating material, and that has a firmness of texture exceeding that of previously known weaves.

In the accomplishment of these objectives with their attendant advantages, a woven tuft pile fabric is formed which comprises a plurality of double weft shots in a common lower level, a plurality of double weft shots above alternate lower level double weft shots, a double warp chain binding together the lower level double weft shots, pile tuft elements looped under each upper level double weft shot, and a single binder warp lying alongside each double warp chain and extending over the upper level double weft shots and under the alternate lower level weft shots to bind together all the weft shots.

In a modified embodiment, similar objectives are attained, but to a lesser extent, by using a single warp chain in place of the double warp chain, and a stuffer warp intermediate the loops of the pile elements and the single warp chain.

The details of construction and procedure involved in producing the novel weave pile fabric embodying the principles of this invention will be more fully understood from the following descriptions of a preferred embodiment and of a modification thereof, when taken in connection with the accompanying drawing, in which:

Fig. 1 is a longitudinal diagrammatic view showing a section through a tufted pile fabric made in accordance with this invention, with a correlation of the shots made in weaving the same;

Fig. 2 is a table of heddle positions for the weaving cycle utilized in producing the fabric of Fig. 1;

Fig. 3 is a longitudinal diagrammatic view showing a section through a somewhat modified woven pile fabric embodying the principles of this invention;

Fig. 4 is a table of heddle positions for the weaving cycle utilized in Fig. 3; and

Fig. 5 is a longitudinal section view showing the intermingling of the pile tufts of a pile fabric embodying this nvention.

In the woven tuft fabric shown in Fig. 1, a plurality of double weft shots **10** extend horizontally in closely spaced relation in a common lower level, and a plurality of double weft shots **12** extend horizontally in a common upper level in vertical alignment above every other, or alternate, double weft shot **10** in said lower level. A double warp chain having a front chain **14** and a rear chain **16** binds the double weft shots **10** of the lower level in the assembled relation shown. A pile tuft

element **18** having a pair of upstanding legs is looped under each upper level double weft shot **12**. A single warp **20** extending behind and against the rear chain **16** of the double warp chains of the fabric passes over each upper level double weft shot **12**, thus binding the weft shots **12** and the pile tuft elements **18** to the lower level double weft shots **10**, held by the double warp chain **14—16**.

The wefts of the above-described fabric may be of jute or the like, the double warp chain may be of cotton or linen, as is also the single binder warp, and the pile yarn of the tuft elements is preferably made of a pair of singles wool or wool blend yarns. The pairs of singles are so plied together and of such relative twist and twist direction as to cause the tuft legs to separate, bend, and incline themselves in random directions. Thus maximum coverage is provided without sacrifice of desired stiffness. Such a pile construction having tuft legs with a high twist component plied with a low twist component has been previously known and used commercially in other weaves.

Other pile yarns such as regular hard twist yarns, ordinary balanced twist yarns, novelty knitted yarns, novelty nub yarns, novelty slub yarns, and all combinations of these also may be used in the reed, checkerboard effect, and in various other regular pattern effects.

The method of weaving the woven tuft fabric of Fig. 1 is indicated in the table of Fig. 2 tabulating the heddle positions per cycle. The first shot, second shot, and third shot of the cycle as set forth in the table correspond to the shots of the same number marked above and below the fabric weave of Fig. 1.

Although, for clarity of illustration, the single binder warp **20** is shown as extending below the lower plane defined by front and rear warp chains **14** and **16**, in the finished fabrics it lies in substantially the same plane. It will also be understood that the actual fabric is of tightly woven construction.

While in a conventional weave the pile tufts take a U or a V shape and stand in solid rows, in the novel weave of this invention the pile tufts of adjacent rows overlap and intermingle as clearly indicated in Fig. 5, wherein the tuft elements **18** and the double weft shots **10** and **12** correspond to the parts similarly designated in Fig. 1.

It will now be apparent that the novel arrangement of the double weft shots in close relation in a common lower level or plane results in less space to be filled by the backing coating material, that the double chain warp elements for these lower level double wefts insure tight binding, and that the single binder warp **20** passing over the spaced double weft shots in the upper level securely binds down the loops of the tuft elements and enters the backing between the double chains, to improve the strength and firmness of the nearly flat backing surface.

These advantageous results have been attained with but very little increase in binder warp material, and without appreciably complicating the weaving operations.

Since the modified embodiment of the invention illustrated by Figs. 3 and 4 closely follows the preferred embodiment which has been described in detail, the modification will be described more briefly with emphasis only on the points of difference. These differences are concerned with relative rearrangements of the three warp elements.

As shown in Fig. 3, closely spaced, double weft shots **30** lie in a common lower level plane, and widely spaced double weft shots **32** define a common upper plane and lie in vertical alignment with every other double weft shot **30**. A stuffer warp **34**, which may be of cotton or the like, extends intermediate the upper level of a single chain warp **36** and the loops of pile tuft elements **38**, which pass under the upper level weft shots **32**. A single

binder warp **40** extends between the chain warps **36**, immediately behind the stuffer warp **34**, and passes under every other pair of lower level wefts **30** and over every pair of upper level wefts **32** to bind the wefts **32** and the pile tuft elements **38** to the lower level wefts **30**, and the alternate lower level wefts **30** to the chain warp **36**.

While this modified construction is not quite as tightly woven, it possesses a substantially level backing surface with reduced space for receiving excess coating material, and a firm texture of good flexibility and strength.

The weaving procedure for the modified construction is clearly indicated by the correlation of the table of Fig. 4 with the correspondingly numbered shot shown above and below Fig. 3, it being noted that the principal difference is in the position of the front heddle in the first shot.

While a preferred embodiment and one modification of the woven pile fabric of this invention have been described in detail, it will be understood that variations and changes can be made in weaves without departing from the principles of the invention and the scope of the appended claims.

Having thus described my invention what I claim as novel and desire to secure by Letters Patent of the United States is:

1. A woven pile fabric comprising a plurality of closely spaced double weft shots in a common lower level, a plurality of double weft shots disposed in a common upper level above alternate lower level double weft shots, a double warp chain binding together the lower level double weft shots, pile tuft elements looped under each upper level double weft shot, and a single binder warp adjacent each double warp chain extending over the upper level double weft shots and under the alternate lower level weft shots.

2. A tightly packed pile fabric comprising a plurality of closely spaced double weft shots in a common lower level, a plurality of double weft shots disposed in a common upper level in vertical alignment above alternate lower level double weft shots, a double warp chain binding together the lower level double weft shots, pile tuft elements looped under each upper level double weft shot, and a single binder warp lying alongside each double warp chain and extending over the upper level double weft shots and under the alternate lower level weft shots.

3. A woven pile fabric comprising a plurality of closely spaced double weft shots in a common lower level, a plurality of double weft shots disposed in a common upper level above alternate lower level double weft shots, pile

tuft elements looped under each upper level double weft shot, a warp element extending under the lower level double weft shots that are beneath the pile tuft elements and over the lower level double weft shots intermediate the pile tuft elements, another warp element extending below the looped portions of the pile tuft elements and above the lower level double weft shots beneath said pile tuft elements, and a single binder warp disposed closely behind both of said warp elements and passing over the upper level double weft shots and under the alternate lower level double weft shots.

4. An Axminster carpet weave comprising a plurality of double weft shots in a common lower level, a plurality of double weft shots disposed in a common upper level above alternate lower level double weft shots, pile tufts looped under each upper level double weft shot, a warp element extending under the lower level double weft shots that are beneath the pile tufts and over the lower level double weft shots intermediate the pile tufts, another warp element extending below the looped portions of the pile tufts and above the lower level double weft shots beneath said pile tufts, and a binder warp disposed adjacent both of the said two warp elements and passing over the upper level double weft shots and under the lower level double weft shots therebetween.

5. A woven pile fabric comprising a plurality of double weft shots in a common lower level, a plurality of double weft shots disposed in a common upper level above alternate lower level double weft shots, pile tuft elements looped under each upper level double weft shot, a warp element extending under the lower level double weft shots that are beneath the pile tuft elements and over the lower level double weft shots intermediate the pile tuft elements, another warp element extending below the looped portions of the pile tuft elements and above the lower level double weft shots beneath said pile tuft elements, and a binder warp passing over the upper level double weft shots and under the alternate lower level double weft shots.

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