

April 28, 1959

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2,883,735

TUFTED FABRIC

Original Filed Jan. 6, 1956

2 Sheets-Sheet 1

Fig. 1.

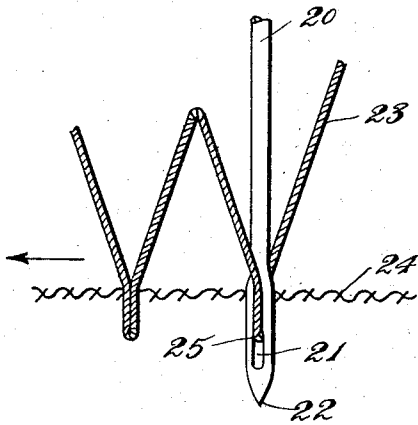


Fig. 2.

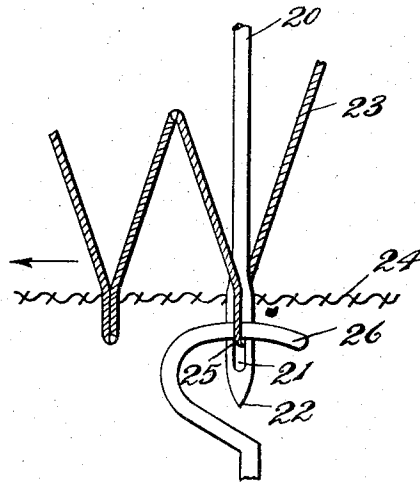


Fig. 3.

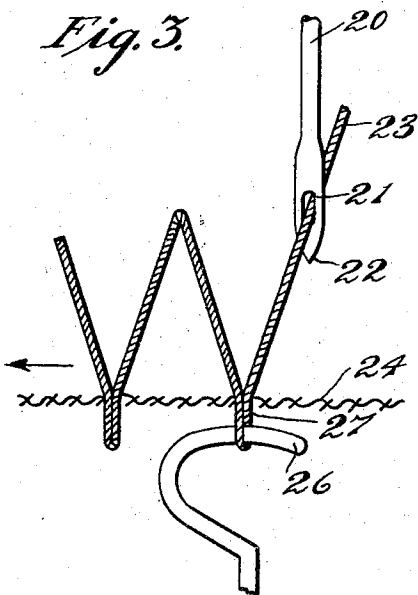
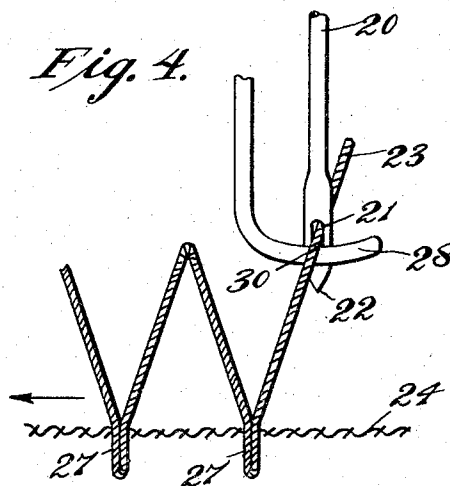


Fig. 4.



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2 Sheets-Sheet 2

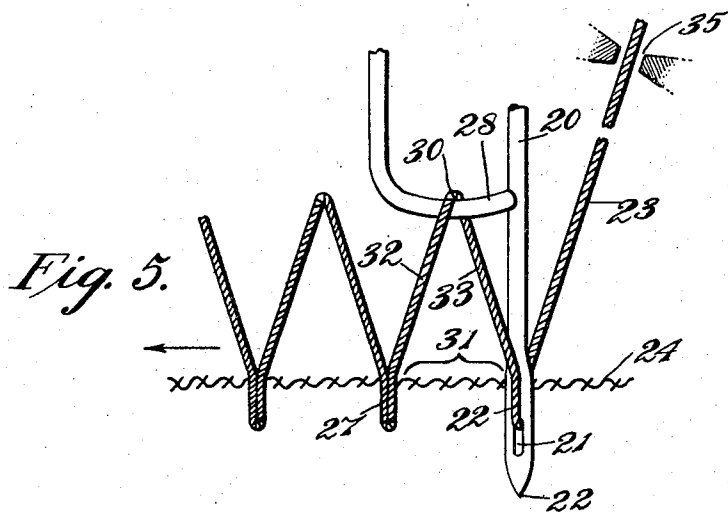


Fig. 6.

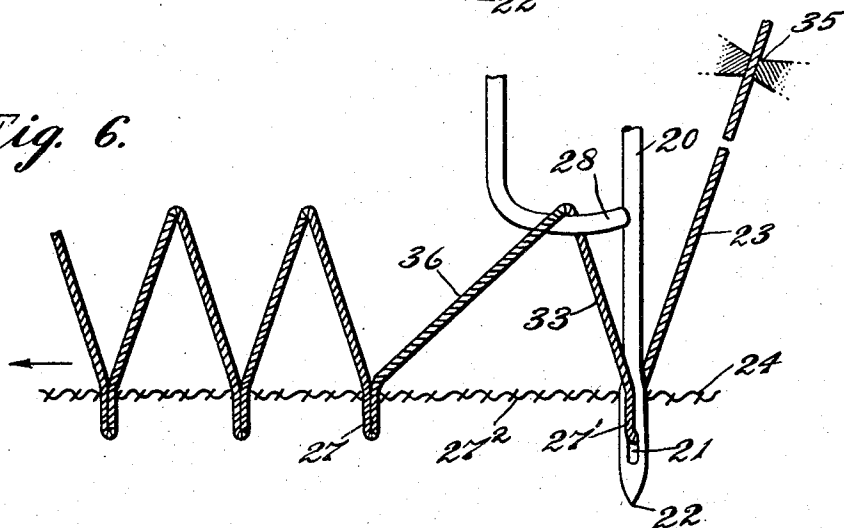
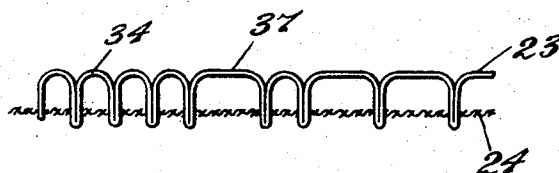


Fig. 7.

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1

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TUFTED FABRIC

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Application December 3, 1956, Serial No. 626,024

3 Claims. (Cl. 28—78)

The present invention relates to tufted pile fabrics.

This application is a subdivision of my copending application Serial No. 557,809, filed January 6, 1956, for Tufting.

A purpose of the invention is to obtain by needling a wide base of the pile projection so that the stability of the pile loop or tuft will be increased.

A further purpose is to permit selective formation of floats in needled pile fabrics.

A further purpose is to form the pile on the side of the backing from which the needle operates rather than the reverse side, anchoring the pile for the reverse bend near the backing by loopers.

A further purpose is to reverse the direction of the yarn ends immediately at the point of anchorage instead of projecting the yarn through the fabric for a substantial distance, and to secure the pile at the anchorages by loopers operating on the side of the fabric remote from that from which the needles operate.

A further purpose is to remove anchorages by plucking to form floats, suitably accomplishing the plucking either as a separate operation, or preferably as part of the operation of needling.

A further purpose is to provide selective pattern control of the yarn feed on the end to accomplish plucking of anchorages.

Further purposes appear in the specification and in the claims.

In the drawings I have chosen to illustrate only one of the numerous embodiments in which my invention may appear, selecting the form shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figures 1 to 6, inclusive, are progressive diagrammatic sections illustrating the steps of forming the fabric.

Figure 7 is a diagrammatic longitudinal section showing the completed fabric of the invention.

In the prior art, pile fabrics such as carpets, rugs and upholstery fabrics have traditionally been produced by weaving. Considerable progress has been made with tufting or needling of fabrics, according to which a gang of needles acting in unison is projected or punched through the fabric, carrying yarn ends which are engaged over loopers to form loops which produce the ultimate pile. The loops suitably remain uncut or are cut, as well known. In this prior art tufting practice, the needle in forming the pile travels relatively far through the backing, achieving a point at which the eye of the needle is at or beyond a position which corresponds to the height of the pile, and then the looper engages and the needle reverses, bringing the two sides of the pile projection through the same punched hole in the backing. Accordingly the pile projection, unlike that produced by weaving, has an extremely narrow base, the two sides of the pile projection being substantially together at the backing. Accordingly, the pile projection has little stability, and is relatively easily crushed.

In accordance with the present invention, unlike the

2

prior art practice, the pile projections are formed on the side of the backing from which the needle operates so that the spacing between rows occurs during the formation of a pile projection, and the pile projection is relatively wide in the base. This leads to high stability in the pile projections, greatly reducing the tendency of the pile projections to crush and increasing the ability of the pile projections to remain upstanding. This effect is true particularly when the pile projections are uncut, but also to some extent when the pile projections are cut.

A further advantage of this new character of tufting in accordance with the invention is that almost all of the pile yarn is projected into the pile and very little remains in the backing of the fabric. Furthermore the amount which remains in the back of the fabric is not dependent on the row spacing, but can be regulated by adjusting the needle stroke.

A further advantage of the invention is that pile projections thus formed can be plucked, removing entirely the anchorage, and thus forming relatively wide based pile projections or floats. This can be accomplished either after the fabric is tufted and before adhesive or the like is applied to reenforce the back and further hold the pile to the back, or preferably the plucking can be accomplished during tufting by controlling the yarn feed tension on the individual ends by a pattern control so that individual ends will be plucked during tufting.

Considering now the drawing in detail, I here illustrate one needle 20 of a gang of needles extending across the machine transversely to the plane of the paper, and reciprocated in the direction of needle length in unison by a needle bar and related mechanism not shown. Each needle of the gang has an eye 21 near its point 22 which receives and manipulates a pile yarn end 23. It will be understood that there is a different pile yarn end 23 for each needle of the gang, and that the character of the pile yarn end 23 as to material and color or moresque character will either be the same or different at different needle positions, depending on the pattern.

As well known, a backing 24 is progressed through the machine by mechanism not shown, suitably moving in the direction of the arrow. The backing will usually be a woven fabric such as burlap, or osnaberg, although it may permissibly be a felted fabric such as felt, paper or the like.

As shown in Figure 1, the gang of needles has passed through the backing until the most forward portion of the yarn end at 25 is immediately beyond the backing. Actually, in practice this distance beyond the backing will normally be less than the exaggerated showing of the drawing, which is intended to facilitate illustration. At this position, as shown in Figure 2, loopers 26 as well known in the art advance to a position above the eye and above the yarn end at 25, anchoring the yarn end against withdrawal when the needle retracts. The looper motion will suitably be a pivoting or oscillation, as well known in tufting machines. The looper is omitted in retracted position so as not to confuse the drawing.

Figure 3 shows the needle retracted while the looper 26 holds a pile anchorage 27 in the backing. At the same time the backing has fed forward, and the anchorage 27 has moved forward with respect to the needle axis.

In the position of Figure 4, with the needle raised or retracted, loopers 28 move in below the eyes of the needles to form anchorages 30 for the tops of the pile. While the loopers 28 are novel in the sense that loopers on the needle operating side are not employed in usual practice, their motion can be an oscillating or pivoting motion substantially the same as the loopers 26, which is well known. The loopers 28 in Figure 5 now secure the top of the pile projection at a position midway be-

3

tween anchorages 27. Thus it will be seen that the pile projection has a wide base 31 between the two anchorages, assuring that the sides 32 and 33 will have a maximum stability. This feature can be incorporated into the pile fabric to form normal pile projections 34, as shown in Figure 7, and where desired the fabric may consist entirely of such projections.

In some cases it is desirable to obtain pattern effects by plucking, that is by removing anchorages. This can be done in the fabric of Figure 5 by pulling out one of the anchorages 27 at a particular point to form a float, accomplishing the plucking either by hand or by any suitable mechanism such as a hook. It is preferable, however, to pluck out the anchorages during tufting, thus assuring that the excess material will be accurately controlled and the floats will not be excessively high.

This is desirably accomplished by placing pattern control yarn feed on the yarn ends as well known in the art. Thus in Figure 5 the feed restricting elements of the pattern control yarn feed 35 are open and no unusual tension is applied, so that no plucking occurs. As shown in Figure 6, the feed restricting elements of the yarn feed 35 are there closed on the particular yarn end shown, greatly increasing the tension, so that when the needle advances to form the anchorage 27' there is not sufficient yarn available and the previous anchorage which had been formed at 27² is plucked out, the yarn riding over the looper 28 to form a float having one side 33 similar to a normal pile projection and one side 36 which is relatively long. In the final fabric floats 37 having a wide base are obtained at locations determined by the pattern control. If desired, the yarn feed may be variable to require plucking in some cases of two anchorages rather than one, and in other cases of one anchorage, thus producing floats of different length according to the pattern control.

It will be evident of course that the fabric of Figure 7 has the advantage over prior art constructions that all the projections have wide bases and are stable, while novel texturing effects are provided by the floats.

The invention is applicable of course to a wide variety of types of pile yarn, the pile yarn in the present instance being sometimes wool, sometimes nylon, rayon or other natural or synthetic fibers or blends or moresque combinations. The back of the fabric will be suitably coated with rubber or other suitable adhesive.

4

In view of my invention and disclosure, variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the fabric shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A pile fabric having a backing, a plurality of pile ends extending through and anchored in the backing, each pile end at a position of anchorage entering the backing and reversing beyond the backing and protruding from the anchorage on the side opposite from the reversal to form pile, certain pile projections longitudinally and transversely of the fabric being relatively widely spaced between points of anchorage and others being relatively closely spaced.

2. A pile fabric having a backing, a plurality of pile ends extending through and anchored in the backing, each pile end at a position of anchorage entering the backing and reversing beyond the backing and protruding from the anchorage on the side opposite from the reversal to form pile, certain pile projections longitudinally and transversely of the fabric being relatively widely spaced between points of anchorage and others being relatively closely spaced, the positions of the relatively widely spaced pile projections varying in the fabric according to a pattern effect.

3. A pile fabric having a backing, a plurality of pile ends extending through and anchored in the backing, each pile end at a position of anchorage entering the backing and reversing just beyond the backing and protruding from the anchorage on the side opposite from the reversal at the position of anchorage to form pile, the protrusion at the side of the reversal being relatively limited compared to the protrusion at the side opposite from the reversal.

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