

Oct. 29, 1957

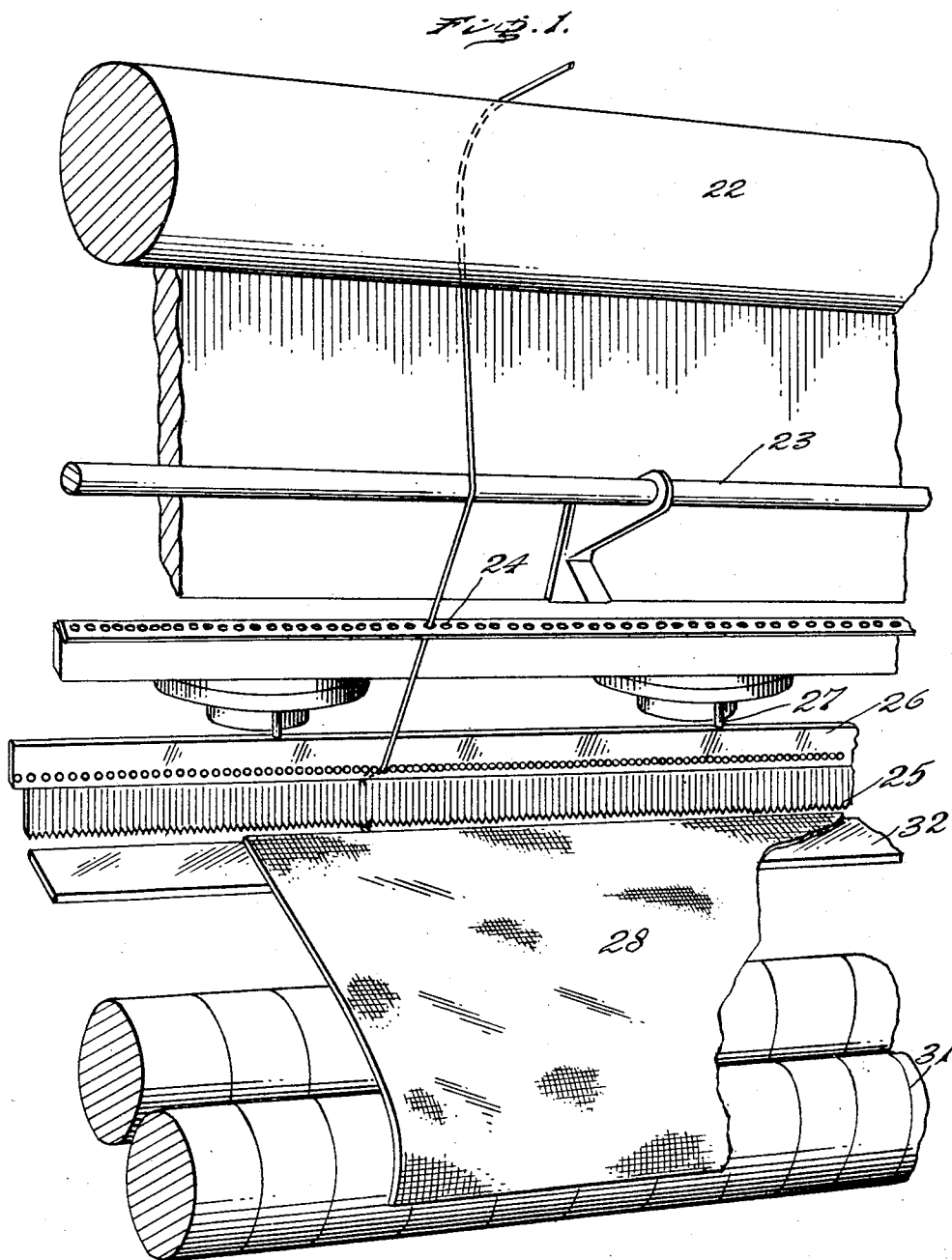
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2,811,244

NEEDLING PILE FABRIC

Filed Oct. 27, 1953

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

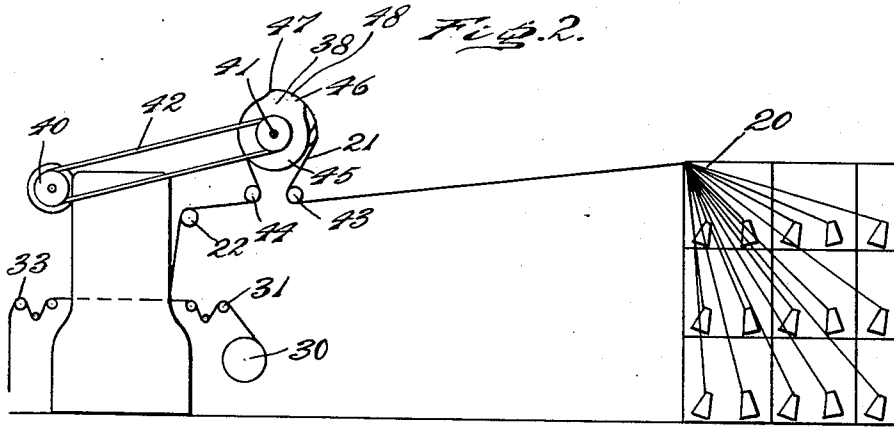


FIG. 3.

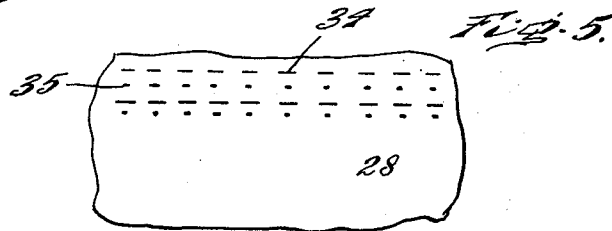
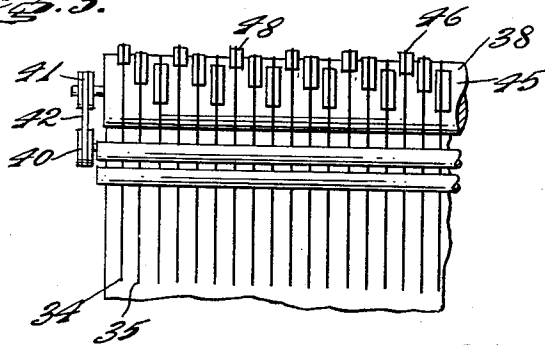
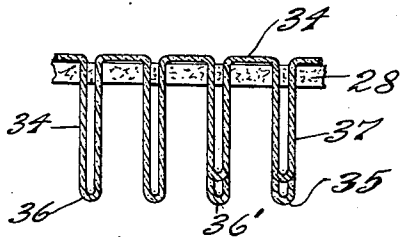


FIG. 4.



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1

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NEEDLING PILE FABRIC

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2 Claims. (Cl. 203—355)

The present invention relates to feeding of pile yarn, particularly in connection with needling of pile fabric.

A purpose of the invention is to simplify the differential feeding of pile yarn ends to a needling device or the like by means which will provide a pattern repeat.

A further purpose is to feed pile yarn ends around the periphery of a roll, and to dispose a portion of the roll periphery on a larger radius than other portions, the portions of larger radius being distributed at intervals lengthwise and circumferentially as desired.

A further purpose is to control the tension of runs of stitches by feeding yarn ends at different circumferential speeds on a feeding roll.

Further purposes appear in the specification and in the claims.

In the drawings I have chosen to illustrate one only 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.

Figure 1 is a fragmentary diagrammatic perspective of a needling machine to which the invention has been applied.

Figure 2 is a fragmentary diagrammatic side elevation of a needling machine embodying the invention.

Figure 3 is a fragmentary front elevation of the feed mechanism of the invention.

Figure 4 is a longitudinal section of a pile fabric in accordance with the invention.

Figure 5 is a fragmentary diagrammatic face view of a needled pile fabric produced by the invention.

Describing in illustration but not in limitation and referring to the drawings:

In the prior art, efforts have been made to increase production of pile fabrics such as carpets, rugs and floor mats by needling such fabrics, using a gang of needles each carrying an individual pile yarn end, and advancing and retracting as a group to form a transverse row of pile projections every time the needles enter the backing. This process is called needling, punching or stitching. While this method lends itself to high production rates, it has been limited by the fact that the pile has been almost entirely of a single color, it has not been possible to produce color patterns of substantial diversity, and even texturing has been very limited.

By the present invention, the production of color patterns is facilitated, and texturing is greatly simplified.

The invention lends itself to the production of high and low pile in a succession of runs, so that any desired pile yarn end can be made low or high. The invention also in one aspect permits the formation of color contrasting patterns by using alternate pile yarn ends of different colors, and raising all of the pile yarn ends of color A in a certain pattern area to maximum height, while forming low pile of pile yarn ends of color B so that they are masked.

In accordance with the invention the pile yarn ends are all carried around the periphery of the feed roll, but dif-

2

ferent portions of the periphery are on different radii, so that they advance different ends at different speeds during different parts of the pattern repeat.

In accordance with the invention, pile yarn ends are withdrawn from a suitable source, such as creel 20, to a feed mechanism 21 and from the feed mechanism the yarn ends are carried over a feed roll 22, and guides 23 and 24 to eyes near the points of needles 25 formed in a row or gang. The needles extend fully across the machine, and are supported on a needle bar 26 and reciprocated by a needle advancing and retracting mechanism 27 as well known. The needles move forward as a unit to form a series of stitches, all abreast, through a backing 28 suitably of burlap or osnaburg, which is progressed from a roll 30 over feed mechanism 31 and a support 32 to take-up mechanism 33.

In one embodiment of the invention, alternate pile yarn ends 34 and 35 will be of different colors, and in a particular area where the color of pile yarn ends 34 is to be seen, pile yarn ends 34 will form high loops 36. In a pattern area where the color of pile yarn ends 35 is to be seen, pile yarn ends 35 will form high loops 36' and pile yarn ends 34 will form low loops 37. In Figure 5 the high loops are indicated by dashes and the low loops are indicated by dots, thus implying that high loops mask the low loops.

The invention is also applicable where all of the yarn ends are of the same color, in which case the invention may be used to produce texturing effects by making all of the loops in a particular area low or high, as the case may be.

The invention is designed to feed the yarn selectively according to the pattern by a very simple mechanism. Feed roll 38 is driven in step with the needling machine by pulleys 40 and 41 and belt 42 to advance the yarn from guide roll 43 to guide roll 44. Feed roll 38 extends the full width of the machine and all of the pile yarn ends desirably pass over it.

Some portions of the feed roll are of relatively smaller periphery, as shown at 45, and when pile yarn ends are in contact with this reduced periphery, they advance at lower rates. At intervals around the roll, spaced both longitudinally and circumferentially as required by the pattern, bulges or cam portions 46 are provided of larger diameter and having preferably gradual forward and rearward merging surfaces 47 which join the normal diameter area 45. The bulge portions will desirably be separate attachments secured to the roll in any desired position.

Thus in operation it will be seen that a pile yarn end which is being fed entirely by the reduced circumference 45 of the feed roll will be advancing relatively slowly. One which is fed by the increased circumference 48 on the bulges will advance rather rapidly and one fed partly by one circumference and partly by another circumference will advance at an intermediate rate. The rapidly advancing pile yarn end will be relatively slack and the more slowly advancing pile yarn end will be relatively taut. When the needle moves forward it will form a high pile projection in every case, but if the yarn is taut it will tend to rob yarn from the last previous stitch forming a lower pile projection on that previous stitch. It will also have high spring-back, so that if the yarn is taut the new loop will tend to reduce slightly in size when the looper or hook as well known releases, thus tending to make the particular pile projection lower. If, on the other hand, the yarn is not taut it will form a high loop and the high loop will remain.

In accordance with the invention the texturing will occur in runs of sequences of stitches, since several stitches occur while the yarn is travelling over one of the bulges 46.

The invention presents a very desirable solution of the problem because the feed can be operated at very high

speed, thus permitting very rapid operation of the needling machine.

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 process and apparatus 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. In a yarn feed operating on a plurality of yarn ends fed side by side for a needling machine or the like, a roll having a common smaller diameter, and bulges of larger diameter extended out from the smaller diameter at different positions axially of the roll corresponding to the feeding paths of different yarn ends, the bulges being at different angular positions around the roll, in combina-

tion with means for feeding yarn ends against the circumference of the roll each in contact with the roll at the position of one of the bulges.

2. A yarn feed of claim 1, in which the means for feeding yarn ends brings the ends into feeding engagement with the roll at the smaller diameter and also at the bulges.

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