May 5, 1959 W. N. HADLEY 2,884,678

FABRIC NAPPING MECHANISM

Filed Nov. 15, 1955

Fig. 1.

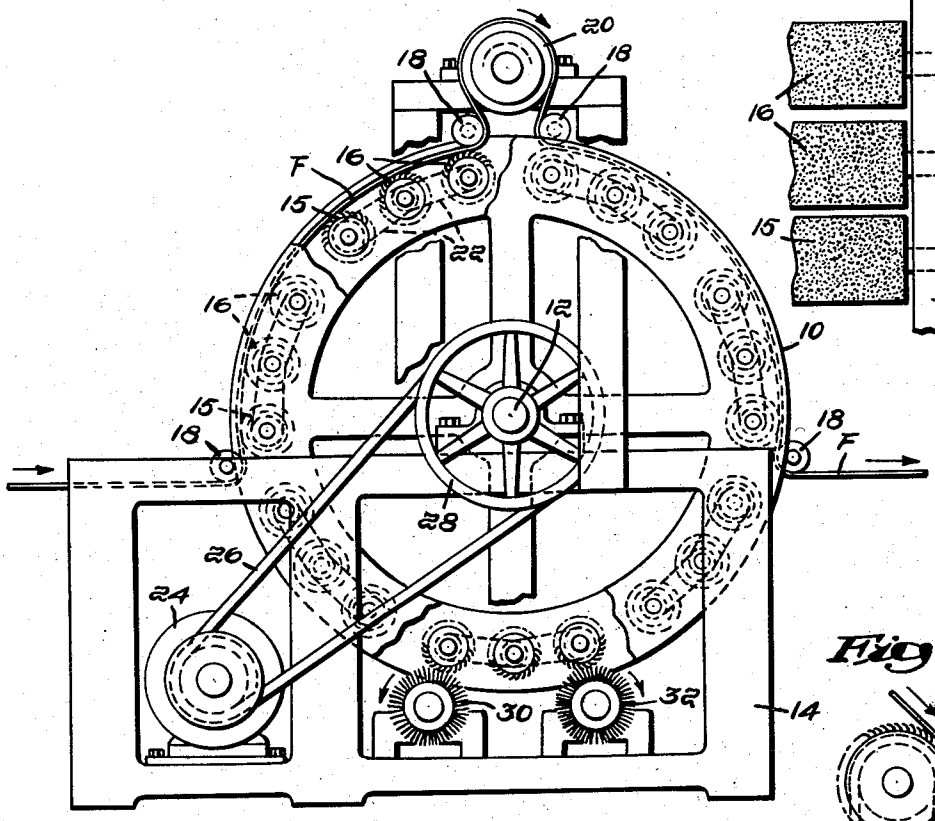


Fig. 2.

Fig. 4.

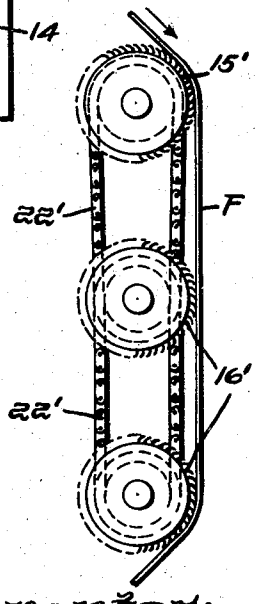


Fig. 3.

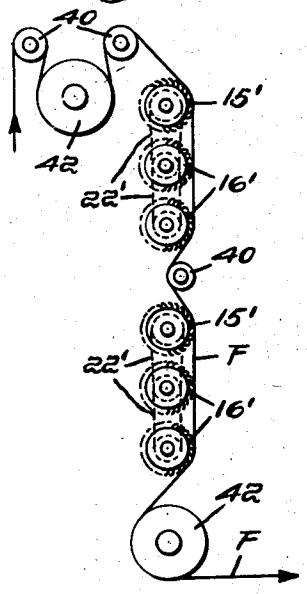
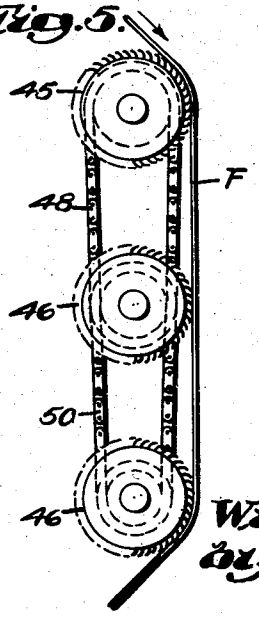


Fig. 5.



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FABRIC NAPPING MECHANISM

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1 Claim. (Cl. 26—29)

This invention relates to the art of fabric napping, i.e. the raising of a fine and fuzzy nap at one or both faces of woven fabric which nap is finally leveled off and finished by brushing and shearing. Napping is commonly produced on fabrics by pile and counterpile worker rolls operating in opposed relation on the fabric, the pile workers serving to hold and retard movement of the fabric while the counterpile workers function in opposition thereto to perform the nap raising function. I have discovered that faster and improved napping can be effected by employing a plurality of relatively adjacent and successive counterpile workers at successive napping stations along the fabric, a preliminary portion of the nap being raised at the first station and the next succeeding station or stations serving to effect further napping treatment or treatments thereon to produce the required nap. In some cases it may be desirable to nap with relatively increased energy at succesesive stations to produce the desired nap. The production of novel apparatus for thus progressively napping fabrics comprises a primary object of the invention.

The invention furthermore includes the novel mounting of groups of relatively spaced napping rolls on and about the periphery of a cylinder rotatable on a horizontal axis, together with means for supporting and feeding a strip of fabric about an arcuate portion of the cylinder and in napping contact with the rolls. Each group of rolls embodies a pile worker and one or more counterpile workers, all disposed in position to engage and effect napping of the fabric as the fabric is fed about the cylinder. The fabric is disposed about an arcuate portion only of the cylinder and means at another arcuate portion thereof is provided for stripping flock from the napping rolls as the cylinder is slowly rotated during the napping operation. The production of novel mechanism of this nature and for the purpose described comprises a further object of the invention.

These and other features of the invention will be best understood and appreciated from the following description of preferred embodiments thereof selected for purposes of illustration and shown in the accompanying drawing in which:

Fig. 1 is an end elevation, partially broken away, of a napping machine embodying the invention,

Fig. 2 is a fragmentary side elevation of a portion of Fig. 1,

Fig. 3 is a fragmentary end elevation of a modified construction embodying the invention,

Fig. 4 is an enlarged elevation of a portion of Fig. 3, and

Fig. 5 is a view like Fig. 3 and illustrating a further modification.

My Patents 2,698,476 and 2,716,797 disclose a napping machine employing a plurality of napping rolls arranged in pairs, each pair comprising a pile worker roll and a counterpile worker roll. Each pile worker is driven by contact of the moving fabric therewith and its counterpile worker is connected to and driven relatively at a slightly faster speed from the pile worker, the napping operation being performed by the counterpile worker. Napping has heretofore been effected by passing the fabric over as many such pairs as is necessary to produce the required nap. I have now discovered that the required napping operation can be effected with superior results and at increased speed by providing a plurality of counterpile workers in directly adjacent relation and feeding the fabric consecutively thereto, the first such worker functioning to pull out a preliminary portion of the nap from the fabric and the succeeding workers progressively continuing the napping operation on the fabric. As disclosed herein, this improved treatment is effected by arranging the napping rolls in groups of three or more rolls each, the first roll of each group engaged by the traveling fabric being a pile worker and the succeeding rolls being counterpile workers which perform the napping operation.

Referring first to Figs. 1 and 2 of the drawing, **10** indicates a cylinder mounted on a shaft **12** in a frame **14** for rotation on a horizontal axis. A plurality of napping rolls **15** and **16** are mounted in spaced relation on and about the periphery of the cylinder for rotation on axes parallel with the shaft **12**. The rolls are illustrated in the drawing as arranged in groups of three rolls each with each group embodying one pile worker **15** and two counterpile workers **16**, it being understood that more counterpile workers can be employed in each group if desired.

A plurality of outwardly extending needles are disposed on and along each napping roll and provided with hook-like ends pointing in the same direction circumferentially of the roll. The fabric F to be napped is guided by rollers **18** to contact the napping rolls about an arcuate portion of the cylinder and about a power driven drum **20** operative to feed the fabric in the direction indicated by the arrows. The needles on pile workers **15** extend in a direction opposed to the movement of the fabric and the needles on the counterpile workers **16** extend in the direction of movement of the fabric. The napping operation is further facilitated by engaging the fabric with the groups of rolls along two adjacent arcuate portions of the cylinder and feeding the fabric longitudinally thereof and over the rolls by the drum **20** disposed between the two adjacent arcuate portions, as illustrated in Fig. 1.

The engagement of the moving fabric with the pile workers **15** effects rotation of these workers, and the counterpile workers **16** are rotated therefrom in the same direction and at a slightly increased peripheral speed by connecting chains **22**. Thus the first worker **16** engaged by the fabric pulls out a preliminary portion of nap from the fabric and the succeeding workers **16** follow successively and progressively to the end of completing the desired napping operation. I have found that this improved arrangement and procedure functions not only to effect the required napping treatment more rapidly and through a shorter napping path, but furthermore that it results in producing a superior, fuller and longer nap.

During the napping operation the cylinder **10** is rotated slowly by a motor **24** through a belt **26** to a pulley **28** on the shaft **12**. A further feature of the invention includes stripping brushes **30** and **32** disposed to engage the napping rolls at the arcuate portion of the cylinder not included within the traveling fabric. The brushes are rotated in the directions illustrated and serve to clear flock from the rolls as they pass the brushes at each rotation of the cylinder. Thus the rolls are maintained in clean condition for efficiently effecting their napping function.

In Fig. 3 I have illustrated a vertical type of napping

machine in which the groups of worker rolls are arranged in lateral alignment vertically. These rolls **15'** and **16'** otherwise substantially correspond to the rolls **15** and **16** and are connected by chains **22'** to rotate in like manner. The fabric F passes about idler rollers **40** and power driven drums **42** which feed the fabric over the rolls in the direction indicated.

The counterpile workers **16** and **16'** will ordinarily be driven at equal peripheral speeds as indicated in the drawing, but in some cases it may be desirable to effect progressively increasing energy operation on the fabric and this can be done by rotating these rolls at progressively increasing peripheral speeds. The rolls **45** and **46** shown in Fig. 5 are thus connected by chains **48** and **50** so that each succeeding roll is rotated at a peripheral speed slightly faster than that of the next preceding roll.

The napping rolls **16**, **16'** and **46** operate on the fabric in the direction of movement of the fabric strip, the first such roll of each group serving the function of pulling out a preliminary portion of the fibers from the fabric and the succeeding roll or rolls functioning in the same direction to pull out more and longer fibers and comb out the raised fiber and give it a uniformly smooth and finished appearance. A longer and shaggier nap with finished appearance is thus produced with the fibers all extending parallel in the same direction. Furthermore, the complete operation is produced more rapidly and in a shorter napping path and the resulting nap is fuller, longer and of substantially improved appearance with all fibers extending uniformly in the same direction.

Such fabrics as heavy wool coatings, blankets, etc. require a relatively longer and heavier nap than is produced with the limited napping effected with machines in present use, and the purpose of the invention resides in the production of a machine sufficiently flexible to produce any type of the nap desired. It is particularly noted that the napping rolls (**16**, **16'** or **46**) are not necessarily driven by the first roll (**15**, **15'** or **45**) of each group as illustrated in the drawing and when a substantial number of napping rolls are employed in each group such rolls will ordinarily be driven from the main power source as in my Patent 2,749,593. Thus any number of successive napping rolls can be employed in each group to produce the type of nap required.

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

Fabric napping mechanism comprising a cylinder mounted for rotation about a horizontal axis, a plurality of relatively spaced rolls mounted on and in spaced relation about the periphery of the cylinder for rotation on axes parallel with said axis and arranged in groups of at least three rolls each, a plurality of needles disposed in spaced relation around and along the rolls, said needles on each roll being anchored to and extending outwardly from the periphery of the roll and having hook-like free ends pointing in the same direction circumferentially, means for supporting a fabric in open width and extending transversely across the rolls in contact with the needles at the peripheries of the rolls about an arcuate portion of the cylinder, means for supporting the fabric in like manner across the rolls about an adjacent arcuate portion of the cylinder, a power driven drum rotatable on an axis parallel with the cylinder and disposed outwardly of the periphery of the cylinder between said two arcuate portions for supporting said fabric and feeding it longitudinally thereof over the rolls about said arcuate portions of the cylinder, said free ends of the needles on the roll of each group first engaged by the fabric extending in a direction opposed to the movement of the fabric and the ends of the needles on the other rolls in each group extending in the direction of movement of the fabric, means connecting the rolls of each group to rotate said other rolls in the same direction and at a peripheral speed slightly faster than that of said first engaged roll, and means for slowly rotating the cylinder.

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