July 17, 1956 W. N. HADLEY 2,754,565

BURLING MACHINE AND METHOD

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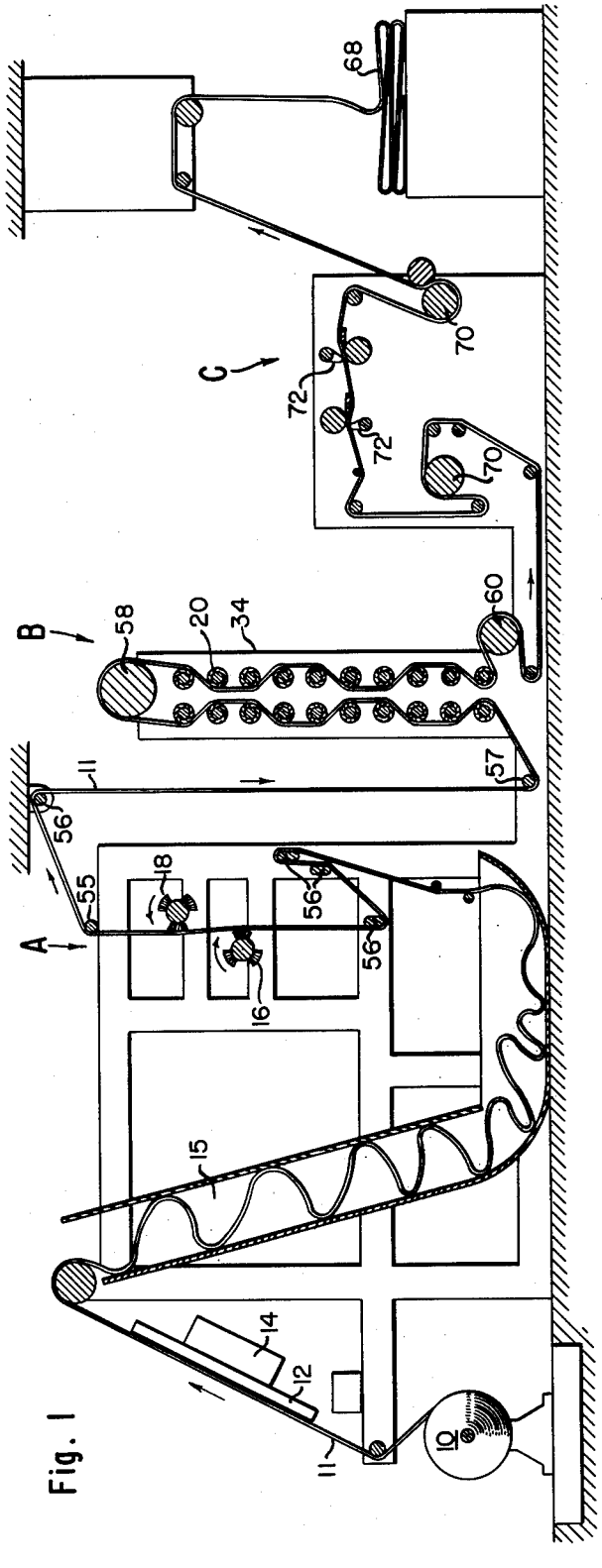


Fig. 1

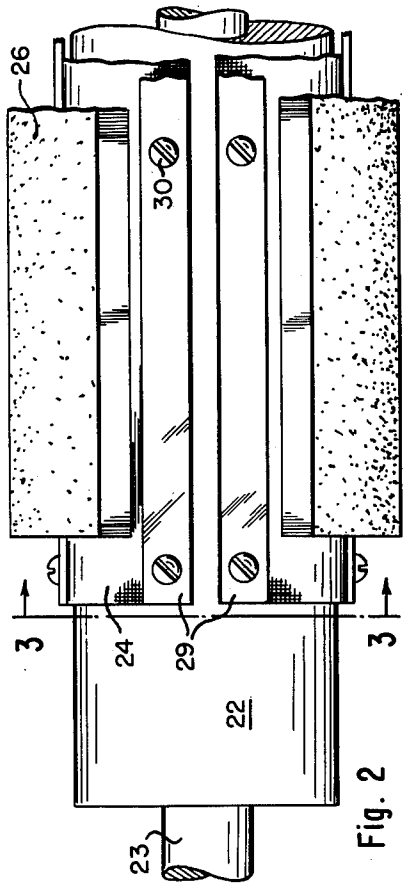


Fig. 2

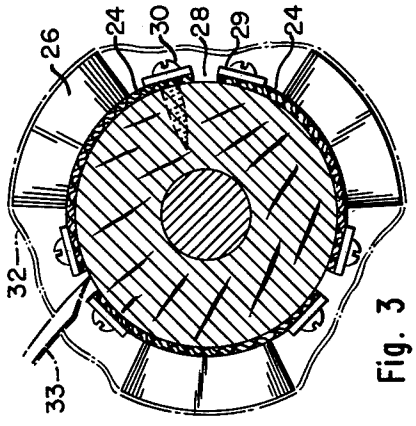


Fig. 3

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Fig. 4

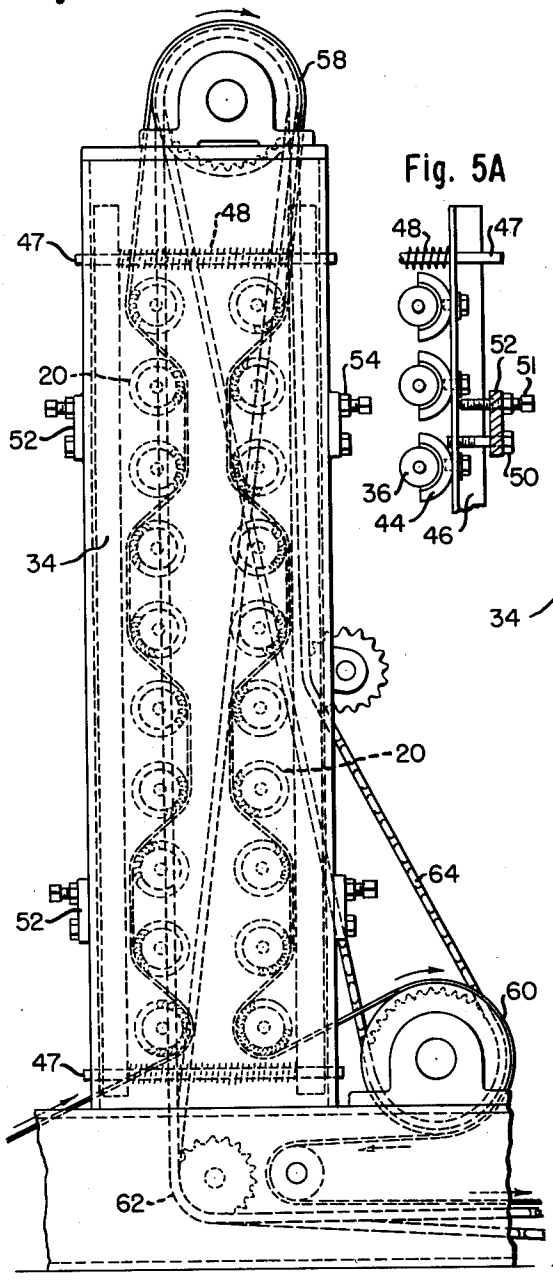
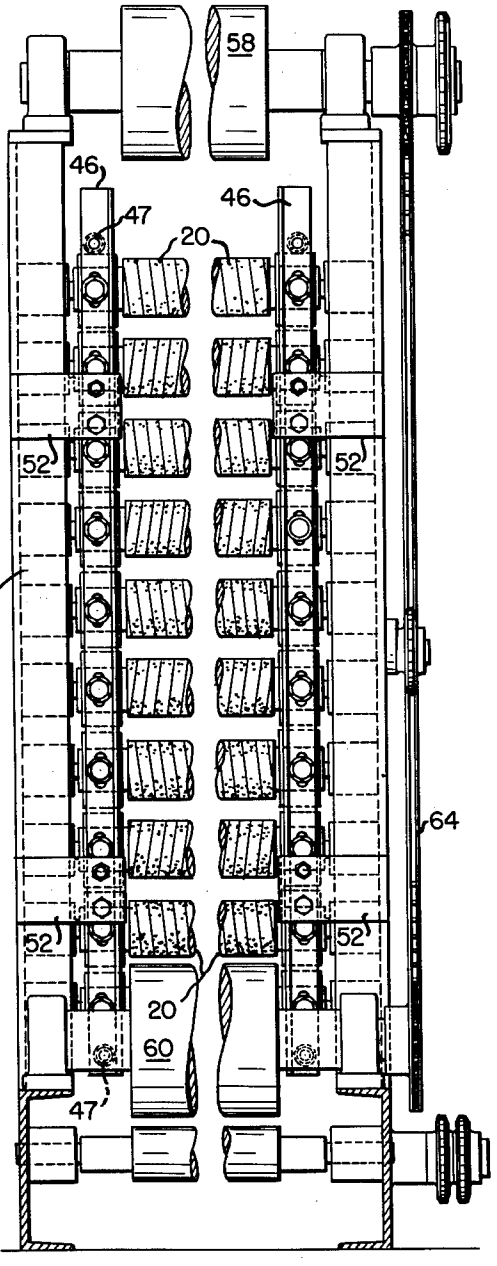


Fig. 5A

Fig. 5



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Fig. 6

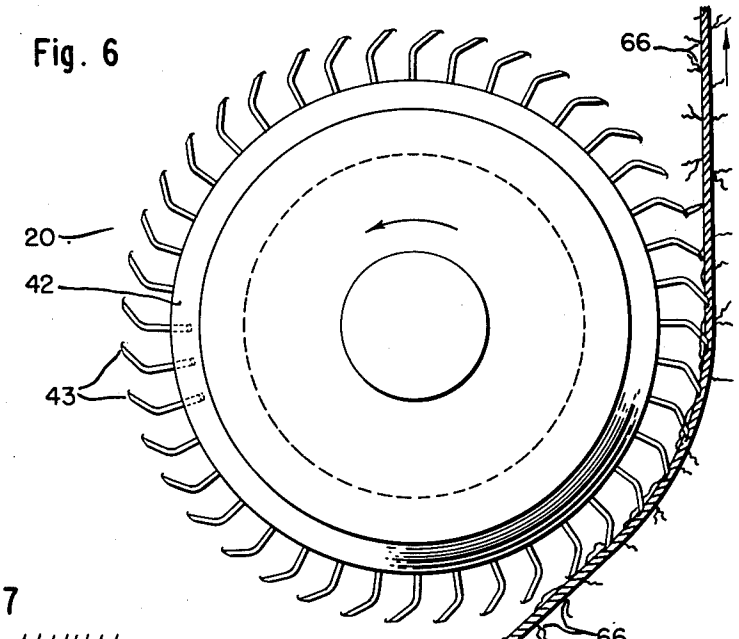


Fig. 7

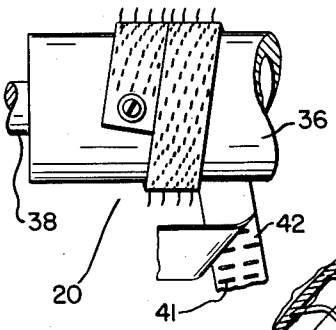
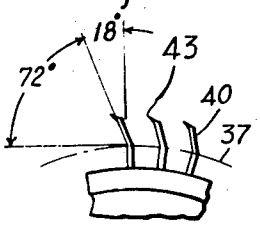
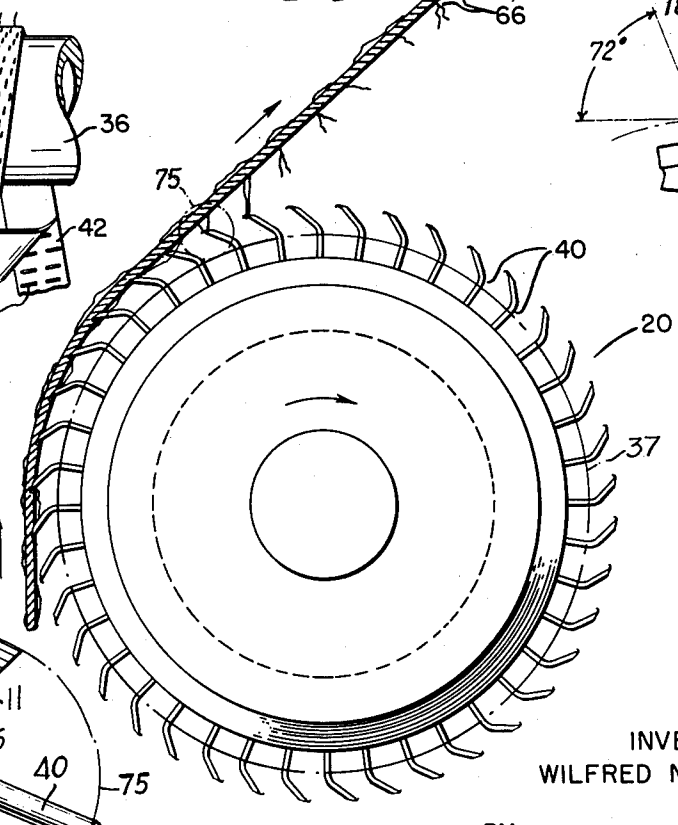


Fig. 8.





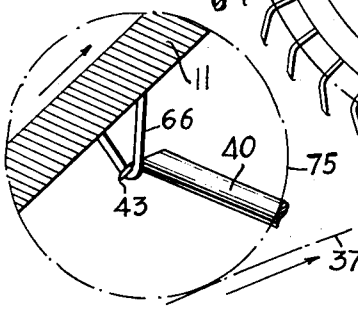


Fig. 9.

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BURLING MACHINE AND METHOD

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Application June 12, 1951, Serial No. 231,148

10 Claims. (Cl. 26—27)

This invention relates to the mechanical treatment of woven fabric to remove loose and long threads and lift the short thread ends, knots and other defects to the surface of the fabric for subsequent shearing treatment. Heretofore this operation has been a tedious and expensive procedure performed solely by manual labor. The primary object of my invention consists in the provision of novel method and mechanism for performing this operation mechanically and at greatly reduced cost in time and expense.

The improved mechanism comprising the invention includes means for feeding the fabric in open width and taut condition along a predetermined path, means including rotary brushes for first removing long threads from the fabric, and further means including hook-like needles for thereafter penetrating the fabric and bringing defective knots and the like and short threads to the surfaces of the fabric for subsequent shearing. The prior removal of the long threads by the brushes precludes their fouling and interfering with the working operation of the needles on the fabric. The rotary brushes and needle mechanism are of novel and improved construction particularly adapted to perform the functions of the invention, all as hereinafter more particularly described. The production of an improved machine of this nature and for the purposes described comprises a further object of the invention.

These and other features of the invention will be more readily understood and appreciated from the following detailed description of a preferred embodiment thereof selected for purposes of illustration and shown in the accompanying drawings in which:

Fig. 1 is a sectional schematic view longitudinally and vertically through a machine embodying my invention,

Fig. 2 is an enlarged fragmentary elevation of my improved rotary brush,

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2,

Fig. 4 is an enlarged elevation of the needle working mechanism shown in Fig. 1,

Fig. 5 is a front elevation of Fig. 4 partially broken away,

Fig. 5A is a fragmentary view of mechanism shown in Figs. 4 and 5,

Fig. 6 is an enlarged end elevation of two worker rolls carrying the hook-like needles and illustrating their operation on the fabric,

Fig. 7 is a fragmentary elevation on reduced scale of a worker roll and particularly illustrating its construction,

Fig. 8 is a fragmentary view illustrating the preferred needle construction employed, and

Fig. 9 is an enlarged view of the portion of Fig. 6 within the circle 75.

In Fig. 1, 10 indicates a roll of woven fabric 11 as it is received from the loom. This fabric contains loose and long threads, knots, short ends and various defects all of which must be removed and which have heretofore been removed by slow and tedious hand work. The fabric is led from the roll 10 over an inspection frame 12 illuminated beneath at 14, and from thence the fabric passes loosely into a collecting chamber 15.

The novel features of the invention are indicated at A and B in Fig. 1. The mechanism at A embodies primarily two brushing rolls 16 and 18 engaging the two faces of the fabric and adapted to remove long threads therefrom prior to the treatment of the fabric at B. The mechanism at B embodies a plurality of needle carrying rolls 20 for engaging both faces of the fabric and bringing defective knots and the like and short threads to the surface of the fabric for subsequent shearing treatment.

The brushing rolls 16 and 18 are illustrated in detail in Figs. 2 and 3. Each comprises a cylindrical body member 22 mounted on a shaft 23. Disposed in spaced relation thereon and thereabout are three arcuately curved and relatively long plates 24 each having a bank 26 of long and stiff wire bristles extending outwardly of its convex face. The banks of bristles are in spaced relation circumferentially of the brush providing gaps 28 therebetween. The plates are secured to the body 22 by long metal strips 29 engaging the plates and screws 30 extending through the strips and plates and into the member 22.

The brushes 16 and 18 are suitably driven in the directions indicated in Fig. 1 whereupon they engage the long threads on the fabric and wrap them about the brushes. Such threads as are attached at one end to the fabric are also broken from the fabric and removed. When the brushes become loaded with a mat 32 of these long threads the mat must be removed since the brushes would otherwise fail to perform their intended function. The spacing of the brushes as indicated permits the cutting of the mat, as by knife 33, whereupon the mat can be stripped from the brushes.

The needling mechanism at B preferably embodies two parallel series of working rolls 20 rotatably supported at their ends in a frame 34. Each roll comprises a cylindrical body member 36 supported on a shaft 38 and having a plurality of needles 40 disposed in spaced relation around and along the roll. I preferably mount the needles on the rolls in the novel manner illustrated in Fig. 7. The needles illustrated comprise the legs of staples 41 driven outwardly through a band 42 of fabric wrapped about and secured to the inner body portion of the roll. As illustrated, the staples are driven through a relatively narrow band 42 of reinforced fabric and are shaped, sharpened, ground and hardened to provide hook-like free ends 43 all pointing in the same direction longitudinally of the band. The wrapping of a wider band or a plurality of bands 42 about the roll provides a greater lateral slant or inclination to the needle points so that they have a more effective sidewise picking action.

The rolls are mounted for free rotation in the frame 34 and each end of each body member 36 is engaged by a friction shoe 44 preferably individually adjustably mounted on a rail 46. Each rail is supported on rods 47 for lateral movement toward and from the rolls and is normally forced away from the rolls by compression springs 48 on the rods. The rail together with all the brake shoes thereon is adjustable bodily toward and from the rolls by bolts 50 and 51. The bolts 50 extend loosely through a plate 52 rigid with the frame 34 and are threaded into the rail. The bolts 51 are threaded into the plate 52 and their inner ends abut against the rail, lock nuts 54 being provided on the bolts 51 for engaging against the plate. Thus by adjusting the bolts 50 and 51 all the brake shoes on the rail can be simultaneously adjusted as a unit relative to the rolls and thus provide uniform braking action thereon.

In the drawing I have illustrated two vertical series of

working rolls 20 with 10 rolls in each series. The fabric 11 passes from the chamber 15 over supporting bars 56, thence between the rotary brushes 16 and 18, thence over rods 55, 56 and 57, to and through the needling mechanism B. Power driven drums 58 and 60, located respectively at the top junction of the two series of rolls 20 and at the bottom of the second series of rolls, are provided for moving the fabric forwardly as indicated by the arrows.

As illustrated in Fig. 4, certain of the working rolls 20 directly adjacent to each other in each series have their needles pointing in the same circumferential direction and other rolls directly adjacent thereto have their needles pointing in the opposite circumferential direction and the fabric is threaded to the rolls and into contact with needles thereon pointing away from the drum which pulls the fabric, thereby projecting the needles into the fabric at both faces thereof when the fabric is drawn by the drum. The rolls with oppositely disposed needles can be alternately arranged as illustrated in Fig. 6 or the rolls intermediately of the end rolls in each series can be arranged in pairs with the needles of the alternate pairs pointing in opposite circumferential directions, as illustrated in Fig. 4. This arrangement facilitates the tortuous threading of the fabric through the rolls.

The drum 58 is driven by a chain 52 and the drums 58 and 60 are connected by an endless chain 64. The drum 58 draws the fabric from the chamber 15, past the brushes 16 and 18, and through the first series of working rolls 20, and the drum 60 draws the fabric through the second series of working rolls 20. The brushes remove the long threads which would otherwise interfere with and clog the working of the needles 40. As the fabric is drawn over the rolls 20 in a direction opposite to the needles engaged thereby, the needles penetrate into the fabric, and the degree of penetration is regulated by the amount of braking effort placed against the rolls. The movement of the fabric rotates the rolls when the tension is sufficient to overcome the braking friction. It will be apparent that the amount of friction applied to the rolls will be determined largely by the weight and character of the fabric being treated.

The cylindrical body portion 36 of a preferred working roll which I employ is two inches in diameter and the needles are provided with a 72° bend and sharpened to form the hook-like points 43 at the extreme free ends of the needles for penetrating the fabric drawn thereagainst. As illustrated more specifically in Fig. 8, the needles are uniformly bent circumferentially of the roll at an intermediate point 37 and the degree of bend is such that the portion of each needle outwardly of the intermediate bend point 37 is bent approximately 18° from the inner portion thereof, the outer portion thus being bent 72° from the base line 37 shown in Figs. 6 and 8. As illustrated more particularly in Fig. 6, the needles penetrate the fabric and the hook ends 43 engage the slugs, knots, other defects and the loose ends, and as the needles leave the fabric the sharp hook ends cling to the defects and thread ends and lift them to the surface of the fabric, as illustrated at 66 in Figs. 6 and 9.

From the burling mechanism at B, the fabric passes to and through the shearing mechanism at C and is delivered fanfolded at 68, power driven drums being provided at 70 for thus continuing the movement of the fabric. The mechanism C includes shearing knives at 72 which shear from both faces of the fabric the threads and defects 66 disposed outwardly of the two faces. Following this burling treatment the fabric is passed through further treatments including fulling, scouring, carbonizing, neutralizing and dyeing, and following these treatments it may be passed through napping mechanism to pull out a nap or mat to produce a velvety finish or such finish as is desired.

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

1. Burling mechanism comprising means for feeding a strip of woven fabric in open width and taut condition along a predetermined path, two driven rotary brushes for respectively engaging the two faces of the fabric thereacross at one portion of the path to remove and break therefrom loose and rough threads, and a series of worker rolls at an adjacent and subsequent portion of the path for engaging both faces of the fabric on their peripheries and having outwardly extending needles with hook-like ends for entering the fabric and lifting loose and defective portions thereof outwardly of said faces.

2. A burling roll comprising a cylindrical body, fabric wrapped about and secured to the cylindrical surface of the body, and a plurality of needles anchored in the fabric and extending outwardly therefrom, the needles being uniformly bent intermediately thereof in one direction circumferentially of the roll and having sharpened hook-like points at their extreme free ends extending circumferentially in said direction.

3. The burling roll defined in claim 2 in which the portion of each needle outwardly of the intermediate bend thereof is bent approximately 18° from the inner portion thereof.

4. Burling mechanism comprising a series of relatively spaced rolls arranged in alternate pairs and mounted for rotation on parallel axes, a plurality of needles disposed in spaced relation around and along the rolls, said needles being anchored to and extending outwardly from the peripheries of the rolls and having sharp and hook-like free ends, means for placing a predetermined frictional resistance to free rotation on the rolls, and a driven drum at one end of said series for receiving and moving a strip of fabric over and in arcuate contact with the rolls, the needles of one alternate group of the rolls pointing in one circumferential direction and adapted to engage one face of the fabric and the needles of the other alternate group of the rolls pointing in the other circumferential direction and adapted to engage the other face of the fabric and the fabric being threaded about the rolls and into contact with needles thereon pointing away from the drum whereby the needles project into the fabric when the fabric is drawn longitudinally by the drum.

5. The combination defined in claim 4 plus a second series of like rolls spaced from the first named rolls, and a second driven drum remote from the first named drum and adjacent to a junction of the two series for receiving the fabric from one of the series and passing it to the other series.

6. Burling mechanism comprising a series of relatively spaced rolls mounted for rotation on parallel axes, a plurality of needles disposed in spaced relation around and along the rolls, said needles being anchored to and extending outwardly from the peripheries of the rolls and having sharp and hook-like free ends pointing in the same direction circumferentially of each roll, means for placing a predetermined frictional resistance to free rotation on the rolls, a driven drum at one end of said series for receiving and moving a strip of fabric over and in contact with the rolls, the needles of certain of the rolls pointing in one circumferential direction and adapted to engage one face of the fabric and the needles of the other rolls pointing in the other circumferential direction and adapted to engage the other face of the fabric and the fabric being threaded about the rolls and into contact with needles thereon pointing away from the drum whereby the needles project into the fabric when the fabric is drawn longitudinally by the drum, a second series of like rolls disposed along and spaced from the first named series, and a second driven drum remote from the first named drum and adjacent to a junction of two series for receiving the fabric from one series and passing it to the other series.

7. A method of removing knots and fabric imperfec-

tions from one face of a strip of fabric, which consists in moving the fabric in open width longitudinally and with said face in longitudinal and circumferential contact with a cylindrical body including spaced needles projecting outwardly therefrom and having sharp and hook-like fabric receiving ends pointing in a direction opposed to the movement of the fabric, and placing predetermined resistance to free rotation on the body whereby to cause the needles to engage the fabric at said face and pull out said knots and imperfections as the needles leave the fabric.

8. The method defined in claim 7 plus the step of continuing the movement of the fabric longitudinally and in open width beyond the needle engagement therewith and shearing said knots and imperfections from said face, thereby preparing the fabric for further and usual finishing treatment.

9. A method of removing knots and fabric imperfections from both faces of a strip of fabric, which consists in moving the fabric in open width longitudinally and with said faces respectively in longitudinal and circumferential contact with two cylindrical bodies including spaced needles projecting outwardly therefrom and having sharp and hook-like fabric receiving ends pointing in a direction opposed to the movement of the fabric, and placing predetermined resistance to free rotation on the

bodies whereby to cause the needles to engage the fabric at said faces and pull out said knots and imperfections as the needles leave the fabric.

10. The method defined in claim 9 plus the step of continuing the movement of the fabric longitudinally and in open width beyond the needle engagement therewith and shearing said knots and imperfections from said faces, thereby preparing the fabric for further and usual finishing treatment.

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