

M. P. HAYWARD.
CLOTH STRETCHING MACHINE.
APPLICATION FILED NOV. 12, 1909.

1,039,281.

Patented Sept. 24, 1912.

2 SHEETS—SHEET 1.

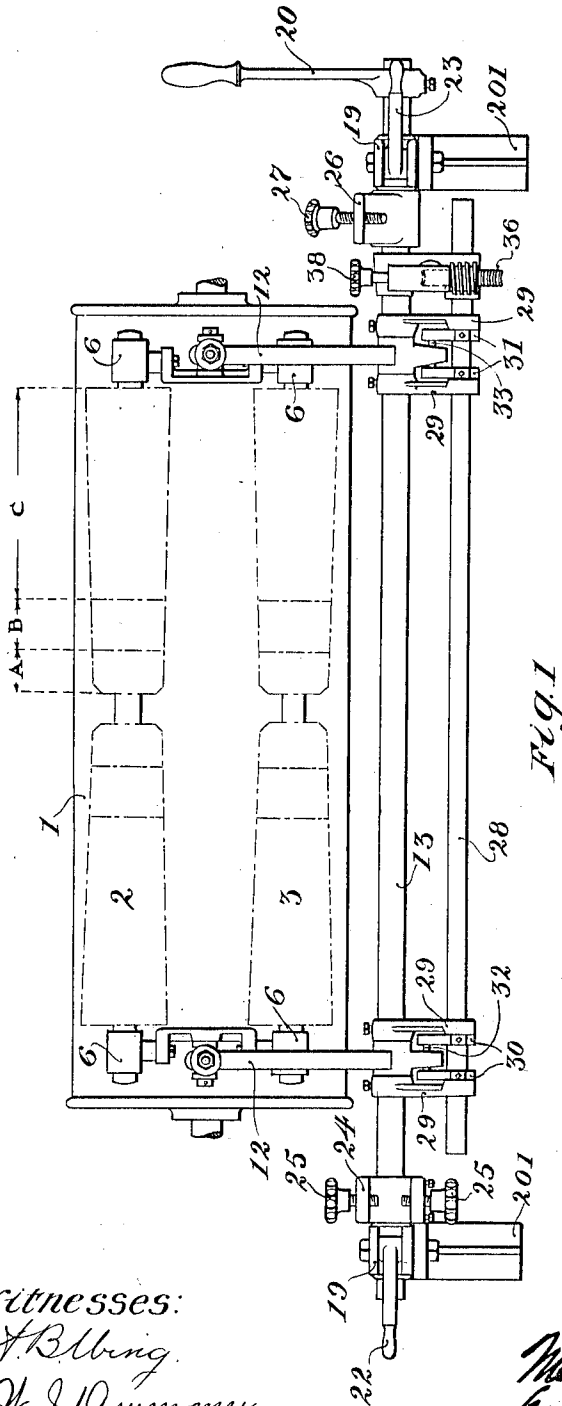


Fig. 1

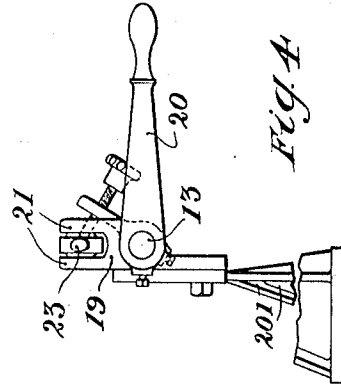


Fig. 4

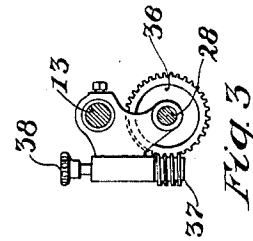


Fig. 3

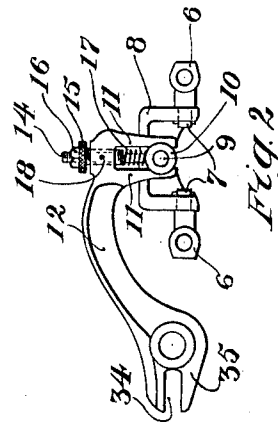


Fig. 2

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Fig. 5

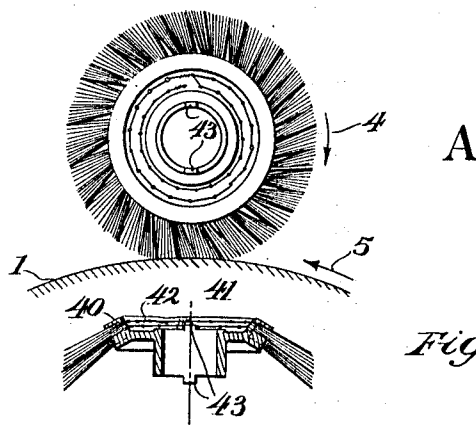


Fig. 6

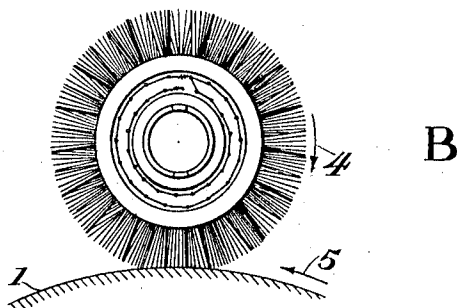
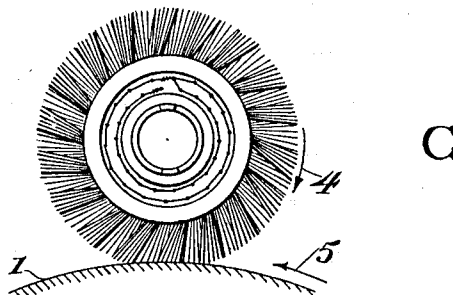


Fig. 7



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UNITED STATES PATENT OFFICE.

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CLOTH-STRETCHING MACHINE.

1,039,281.

Specification of Letters Patent.

Patented Sept. 24, 1912.

Application filed November 12, 1909. Serial No. 527,645.

To all whom it may concern:

Be it known that I, MELVILLE P. HAYWARD, a citizen of the United States, residing at Quincy, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Cloth-Stretching Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in cloth stretching machines.

This invention relates particularly to bristle stretching machines of the type illustrated in the patent to Birch No. 924,595. In this machine the cloth is stretched by the action of the bristles of the bristle roll or rolls which engage the cloth and strain or stretch it laterally. It has been found in the use of bristle stretching machines that the cloth had a tendency to creep forward at the center, that is, that the portions of the cloth which are stretched or moved laterally to the greatest extent advance more slowly through the machine than portions of cloth which are stretched or moved comparatively little with relation to the support. This causes a bowing or arching of the weft. This creeping action is very noticeable, for example, on lawns and percales the center of the width has been observed to advance several inches beyond the corresponding portions of the sides of the width of cloth, so that the weft extended from side to side on a bow or arch whereof the center was more advanced than the ends. In stretching some kinds of cloth this is immaterial, but in stretching other kinds of cloth it is required that the weft should extend across the cloth at right angles. In the machine of said patent the bristles were arranged in the surfaces of cones and so that they extended in the direction of the elements of such surfaces. This machine was incapable of use in stretching certain kinds of cloth where the bowing or arching of the weft was objectionable in the finished cloth. This was due to the peculiar action of the bristles on the cloth.

According to the present invention the bristles are arranged in different parts of the bristle rolls at different angles so that their action upon the cloth is modified. Thus in the illustrated embodiment of the

invention the bristles near the centers of the rolls are not only arranged conically but diagonally as well so that the line of direction of the bristles is along steep conical helices and the inclination is such that when the bristles come first into contact with the cloth the deflection of the bristles by engagement with the cloth tends to retard the advance movement of the cloth. Next to the centers of the rolls there are arranged bristles having the same arrangement as in the bristle roll of said patent, that is, they are arranged to extend along the elements of cones. At the ends of the rolls the bristles are arranged along the conical helices but incline in the opposite direction to those at the center so that when the ends of the bristles first engage the cloth their tendency is to accelerate the advance movement of the cloth as the bristles are deflected by their engagement therewith. Perhaps it is not accurate to say that the bristles accelerate the progression of the cloth, rather perhaps it should be said that the bristles, owing to this inclination, retard the progression of cloth less than the other bristles, that is, those in which the bristles extend along the elements of the cones and those in which they extend in the opposite direction along the conical helices. In any event the practical result of this illustrated embodiment is that it causes the rectilinear weft progression of the cloth through the machine.

One object of the invention is, therefore, to produce a bristle stretching machine which will not only stretch the cloth laterally in an efficient manner, but which will also act to advance the cloth through the machine at a uniform rate of speed at the edges as well as at the centers.

Other objects of the invention are to improve the construction of the devices upon which the bristle stretching rolls are supported and by which they are adjusted, thrown into and out of operation, and retained in given positions, also to produce a construction of roll which is capable of withstanding the action of heat and chemicals to as great a degree as is possible, also to produce a construction in which the rolls are durable and capable of sustaining the strains to which they are subjected in use, without too rapid deterioration.

To the above ends, the present invention consists in the improvement in bristle

stretching apparatus hereinafter described and particularly defined in the claims.

In the drawings illustrating the preferred form of the above invention, Figure 1 is a plan view of a bristle stretching machine in position on a drying machine; Fig. 2 is an end view of one of the supporting arms for the bristle rolls, and associated parts; Fig. 3 is a detail view illustrating the mode of adjusting the pressure with which the rolls bear upon the cloth; Fig. 4 illustrates a detail of the devices for removing the stretching rolls from the drum or can of the drying machine, and holding them out of engagement therewith and in engagement therewith; Fig. 5 is a representation of a bristle roll brush in which the bristles are inclined rearwardly; Fig. 6 represents a bristle roll in which the bristles are mounted radially; Fig. 7 illustrates a bristle roll brush in which the bristles are inclined forwardly; and Fig. 8 illustrates an axial section of a bristle stretching brush.

The illustrated embodiment of the invention is described as follows:—The invention is shown in connection with the can or drum 1 of a drying machine. This is the only portion of the drying machine shown, and it is only shown in order to show the relative position of the bristle stretching rolls and the can or drum. Bristle stretching rolls 2 and 3 are shown in outline in Fig. 1. Each roll is a double roll, that is, the opposite ends are symmetrically formed but the bristles extend in opposite directions and toward the ends of the can or drum. A description, therefore, of one-half of one of these bristle rolls will suffice for a description of the complete roll. As shown in the drawings, these rolls are preferably tapered slightly from the end toward the center. The taper is shown somewhat exaggerated in the drawing. The same bristle holders will be used from end to end, and a difference in the length of the bristles from the center to the end of one-eighth inch is found to be desirable in order that the deflection of the end bristles may be slightly greater than the deflection of the center bristles. In order to secure the advancement of the fabric through the machine with a straight weft traveling always parallel to itself without distortion, the bristles in the center portion of the rolls marked A extend rearwardly from the periphery of the bristle disks; thus, by reference to Fig. 5, it will be observed that as the disk therein shown rotates in the direction of the arrow 4 in contact with the cloth lying on the can 1, the surface of which is moving in the direction of the arrow 5, the bristles which engage the cloth being inclined rearwardly tend to move the cloth in a direction opposite to the direction of motion of the surface of the can 1, that is, in a direction op-

posite to the direction of the arrow 5. This results in retarding the rate of forward progression of the cloth and results, therefore, in holding back the center of the width from progression under the bristle roll as fast as it would naturally tend to move. The disks comprising this section of the roll may appropriately be referred to as retarding disks. The bristles of the disks in the portion marked B of the bristle roll extend radially outward from the surface of the bristle holder, as illustrated in Fig. 6. These bristles, therefore, neither tend to accelerate nor retard the progress of the cloth through the machine, and these disks may appropriately be referred to as normal disks. The accelerating disks in the portion C of the bristle roll have their bristles inclined forward, as indicated in Fig. 7, in a direction to engage the cloth and to carry it more rapidly in the direction of its progression than it would if engaged with radial bristles like those in the section B. If the bristles simply engaged the cloth and carried it through in the direction of progression thereof, that is, in the direction of the warp, there would be no necessity for inclining the bristles, but the function of the bristles is to be deflected by the engagement of their ends with the cloth, thereby causing the portion of the cloth with which it is engaged to be moved laterally outward or away from the center of the cloth. When, therefore, the end of a rearwardly inclined bristle engages the cloth, the movement of the end of the bristle due to the deflection of the bristle is in the direction to retard the advancement of the cloth at the same time that the portion of the cloth engaged thereby is moved laterally away from the center. With the radially extended bristles, such as those in section B, the end of the bristle, when deflected by engagement with the cloth, tends solely to move the cloth in a lateral direction (except in so far as the bristle end engages the cloth in advance of the center of the nip), but with the bristles of the section C, which are inclined forwardly, the end of the bristle, when it engages the cloth and begins to move in a lateral direction owing to the deflection of the bristle as it passes under the nip, is not only lateral but forward as well as lateral, so that as a result of the proper arrangement of these three sorts of bristles on one end of a bristle roll, rectilinear weft progression is secured. The exact movement of the cloth on the surface of the can or drum is difficult of ascertainment and variable throughout the width so the foregoing description is intended to be more relative than absolute. Suffice it to say, perhaps, that by arranging the bristles in the holders nearest the center of the roll so that they are inclined rearwardly, those in the next section so that they extend radially, and those

at the end so that they extend forwardly, approximate parallel rectilinear weft progression of the cloth is secured.

With different cloths, different arrangements of the disks will be employed, thus, with a lighter more flimsy fabric the section C will be increased in length and the section B will be sacrificed to the section A, while with a stiffer, firmer cloth the length of the section C may be diminished, and the section A of rearwardly inclined bristles may be entirely dispensed with. The present invention contemplates, therefore, any construction of bristle stretching rolls in which the bristles of different portions of the width of the cloth are inclined at different angles for the purpose of securing acceleration or retardation of different portions of the cloth subject to treatment. It is within the purview of the invention that rolls of this character should be employed for centering the fabric or for causing it to move laterally during its progression. It is within the scope of the invention that a roll of suitable bristle structure should be brought into contact with the cloth to correct incipient departures from the correct running of the cloth after which the roll should again be thrown out of operation.

The bristle stretching rolls 2 and 3 are supported in swivel bearings 6 having stems 7 at right angles to the axis of the shaft of the roll pivotally supported in a yoke 8 having a stud 9 passing through a block or box 10, which is supported between jaws 11 of the arm 12 loosely pivoted on the arm shaft 13. The box 10 has a stud 14 which extends through an adjusting sleeve 15 and receives at its outer end a nut 16 by which it is raised and lowered between the jaws 11. A spring 17 embraces the stud 14 between the box 10 and the end of the adjusting sleeve 15, and while it normally acts to hold the box at the extremity of the movement permitted by the position of the nut 16, it affords a capacity for upward yielding of the box under the pressure of use. The adjusting sleeve 15 is secured in place by a set screw 18.

The arm shaft 13 is mounted in bearings 19 supported upon pedestals 201 and secured to the frame of the drying machine. A lever 20 is secured to the end of the arm shaft 13 and affords means for lifting the bristle rolls off of the can when it is desired so to do. The bearings 19 are provided with jaws 21 in which are swiveled locking levers 22 and 23. These locking levers 22 and 23 are adapted to cooperate with adjusting stops on the arm shaft 13 for positioning that shaft, and indirectly the arms. At the left hand end of the arm shaft 13, as shown in Fig. 1, is secured the double stop carrier 24 through the arms of which are screwed the adjusting screws 25. By swinging the

locking lever 22 between the arms of the carrier 24, screwing the adjusting screws against such locking lever, the arm shaft 13 may be rigidly secured in desired position. At the right hand end of the arm shaft 13 is secured a single stop carrier 26 through which the adjusting screw 27 is screwed. When the locking lever 23 is swung around under the screw 27 and the latter is screwed down on it, this affords an additional means of securing the arm shaft in rigid position. The double stop carrier at the left hand end of the arm shaft 13 is sufficient for ordinary widths of stretching rolls, but in some cases where the width of the cloth being stretched is considerable, it has been found that the torsional yielding of the arm shaft 13 is such, when the adjusting screws 25 are adjusted so as to cause the stretching rolls to engage the cloth with heavy pressure, as to cause considerable torsional distortion thereof. In order to overcome this, it has been found convenient to use a second arm shaft adjusting means, such as is illustrated at the right hand end of the arm shaft.

The stretching roll carrying arms 12 may be secured directly to the arm shaft 13 and they may be adjusted so as to be caused to bear with greater or less pressure upon the cloth running under the stretching rolls by the means described, but for certain purposes it is preferred to use the arm adjusting means hereinafter described. An arm adjusting shaft 28 is located parallel to the arm shaft 13, being supported by means of the arms 29 secured to the arm shaft and having openings in which the arm adjusting shaft 28 is freely revoluble. The arm adjusting shaft carries two pairs of pin carrying arms 30 and 31 secured rigidly to the arm adjusting shaft 28 and carrying at their ends pins 32 and 33 respectively which engage the opening 34 in the rearwardly extended fork 35 of the arms 12. Fixedly secured to the adjusting shaft 28 is the worm wheel 36 which is engaged by the worm 37 operated by the hand wheel 38. By rotating the hand wheel 38 the worm 37 is caused to rotate the worm wheel 36 and thereby to rotate the arm adjusting shaft 28 so that the pins 32 and 33 are moved with relation to the two shafts 13 and 28 so as to rock the arms 12 on the shaft 13 thereby to secure a nice adjustment of the pressure of the bristle stretching rolls on the can. It will be seen that the bristle rolls may be lifted off of the cloth by means of the arm 20 after the locking levers 22 and 23 have been disengaged by throwing them into the position illustrated in Fig. 1, that then the rolls may be taken out for cleaning or replacement of bristle disks or otherwise as desired, and, when they are put back again and it is desired again to restore them to operating position, the locking levers will

be thrown forward, the fastening screws 25 and 27 screwed down, and that thereafter, by adjustment of the wheel 38, the nice adjustment of the bristle stretching rolls may be secured.

In the patent to Birch for a cloth stretching machine, No. 1,005,801, dated October 17, 1911, the cloth stretching roll is shown as made up of a series of disks 16 of wood in which the bristles are secured. In view of the severe pressure which is exerted by the end of the bristles upon the cloth, the tendency of the bristles to be thrust through the disk is very great, and it is desirable to provide a support for the bristles of such form that the endwise thrust on the bristles will be prevented from pushing the bristles through the holes in this support. To this end the bristle holder is formed as shown in Fig. 8, with a flange 40 arranged at an angle to the axis 41 of the shaft upon which the bristle holders are mounted, and this flange is bored with holes to receive the bristles. The bottoms of the bristle holes are closed except for a small opening through which the fastening wire 42 passes. This wire occupies nearly the entire area of the hole so that there is the least possible opportunity for the bristles to be thrust through the hole—in fact, the hole for the fastening wire is made so small that such wire is run through endwise and then back through the hole again, not as in the ordinary method of wiring bristles by passing a bight of the wire through the hole. The fastening wire is passed around the requisite number of bristles and the end of the wire pulled upon and the bristles drawn home to the bottom of the hole. This mode of supporting the bristles in closed-bottom holes in a bristle holder is of great practical importance in the construction of a successful bristle stretching machine as it affords an efficient support for the bristles and prevents their being pushed or forced through the bottoms of the bristle holes. A further means of adequately securing the bristles in the bristle holders is a strong cement which is forced under great pressure into the bristles after they are drawn into place in the holder through the fastening wire holes. This cement should have the capacity to resist the action of heat, moisture and the ordinary chemicals of the dilution used in bleacheries and dye houses.

The hub of the bristle holder is cylindrical in form and bored to fit the shaft upon which the bristles are mounted. It is elongated longitudinally to afford the rigidity of support requisite to withstand the pressures exerted by the bristles. Each end of the hub is provided with two locking projections 43 so that when the bristle holders are assembled on the bristle roll shaft, they hold each other from relative rotary move-

ment. The hubs of the bristle holders are of greater length than the longitudinal thickness of the bristle flanges and this contributes to the facility of washing the brushes because of the space left between the flanges.

The invention is not necessarily limited to use in a machine for stretching cloth as it may be used for stretching other materials or for bodily moving whole widths of cloth or other materials, as, for example, where it might be desired to cause a width of cloth to move in one direction underneath a bristle roll. So also by arranging the bristles in the opposite direction projecting toward the center, the machine may be used to gather a width of cloth into a rope ready, for example, for being passed into a kier or bleaching bin. So also the invention is not necessarily limited to the use of bristles as it comprehends within its scope the use of any equivalent thing as a substitute therefor.

While in the claims the expression "stretching machine" has been employed, this is intended not as a limitation of the invention intended to be defined by the claims but simply as descriptive of a machine embodying the invention of the herein defined. In the claims the expression "bristle roll" has been employed and except where from the contents it appears that term has been used to define the specific form of roll shown in the drawings, it is not intended that it should be so limited as the invention contemplates the use of independent supports for the bristle units such, for example, as a plurality of small rollers so arranged that their bristles engage the cloth in the manner herein defined, or so supporting the bristle holders that the bristles are applied to the cloth so that the progression of the cloth at the edges is accelerated over the rate of progression at the center. In the claims where the expression "radially inclined" occurs, it is intended to define the inclination of the bristles, or, to be more exact, the component of the inclination of the bristles, in planes which are normal to the axis of the roll, in contradistinction to the "lateral" or "axial" inclination of the bristles in planes including the axis of the roll.

Having thus described the invention, what is claimed is:—

1. A bristle roll for a bristle stretching machine, having cloth stretching bristles arranged thereon radially inclined at different angles in different parts thereof.

2. A bristle roll for a bristle stretching machine having bristles arranged thereon radially inclined at various angles to secure an approximately rectilinear parallel weft progression.

3. A bristle stretching machine, having, in combination, a bristle roll, an arm at each

end for carrying the bristle roll, an arm shaft upon which the arms are mounted, an arm adjusting shaft, and connections between the shafts for adjusting the pressure
5 transmitted by the arms to the brush roll.

4. A bristle stretching machine having, in combination, a bristle roll, arms at each end of the roll for supporting it, an arm shaft upon which said arms are mounted, holding
10 means on the arm shaft, a stop member movable to a position of engagement with the holding means to a position of disengagement therefrom for permitting the bodily movement of the entire bristle carrying
15 apparatus from operative to inoperative position.

5. A bristle roll for a bristle stretching machine comprising a plurality of bristle holders, having bristle holding flanges and
20 hubs supporting them, the bristle holding hubs being longer than the bristle holding flanges so that when assembled the flanges are separated from each other thereby
25 affording facility for the washing and drying of the rolls.

6. A cloth stretching machine, having, in combination, bristles and bristle holders for

supporting the bristles radially inclined at different angles at different parts on the holders so as to accelerate or retard or afford
30 normal progressive movement of the cloth.

7. An expander for bristle stretching machines consisting of a bristle roll having the bristles at the end of the roll inclined forwardly to accelerate the rate of progression
35 of the cloth through the machine.

8. An expander for bristle stretching machines consisting of a bristle roll having the bristles near its center inclined rearwardly to retard the rate of progression of the cloth
40 through the machine.

9. An expander for bristle stretching machines consisting of a bristle roll having the bristles at the end of the roll more forwardly inclined than the bristles near the
45 center of the roll.

10. A bristle roll for a bristle stretching machine having outwardly directed bristles tangential to imaginary conical helices wound around the axis of the roll.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."