United States Patent [19]

Policella

[11] **3,779,441**

[45] **Dec. 18, 1973**

[54] **FABRIC TENSIONING APPARATUS**

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[22] Filed: **Mar. 16, 1972**

[21] Appl. No.: **235,270**

[52] **U.S. Cl.** **226/111,** 226/195, 19/.58

[51] **Int. Cl.** **B65h 17/42**

[58] **Field of Search** 226/111, 195; 19/.46

[56] **References Cited**

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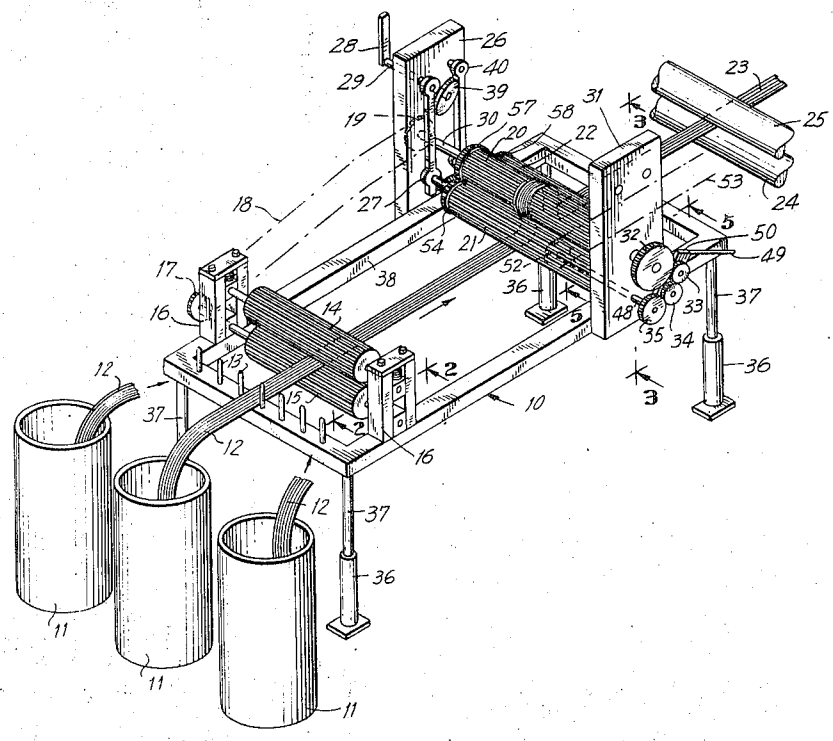
Primary Examiner—Allen N. Knowles

Attorney—Allison C. Collard

[57] **ABSTRACT**

A fabric tensioning apparatus particularly suitable for synthetic fabrics, such as nylon and the like, having a first assembly of splined profile rollers for receiving lengths of crimped synthetic fabric and stretching this fabric under tension between a tripod assembly of rollers in a continuously moving manner so that the fabric can be fed directly to a cutting machine and cut to uniform lengths for use in carpets and the like.

6 Claims, 6 Drawing Figures



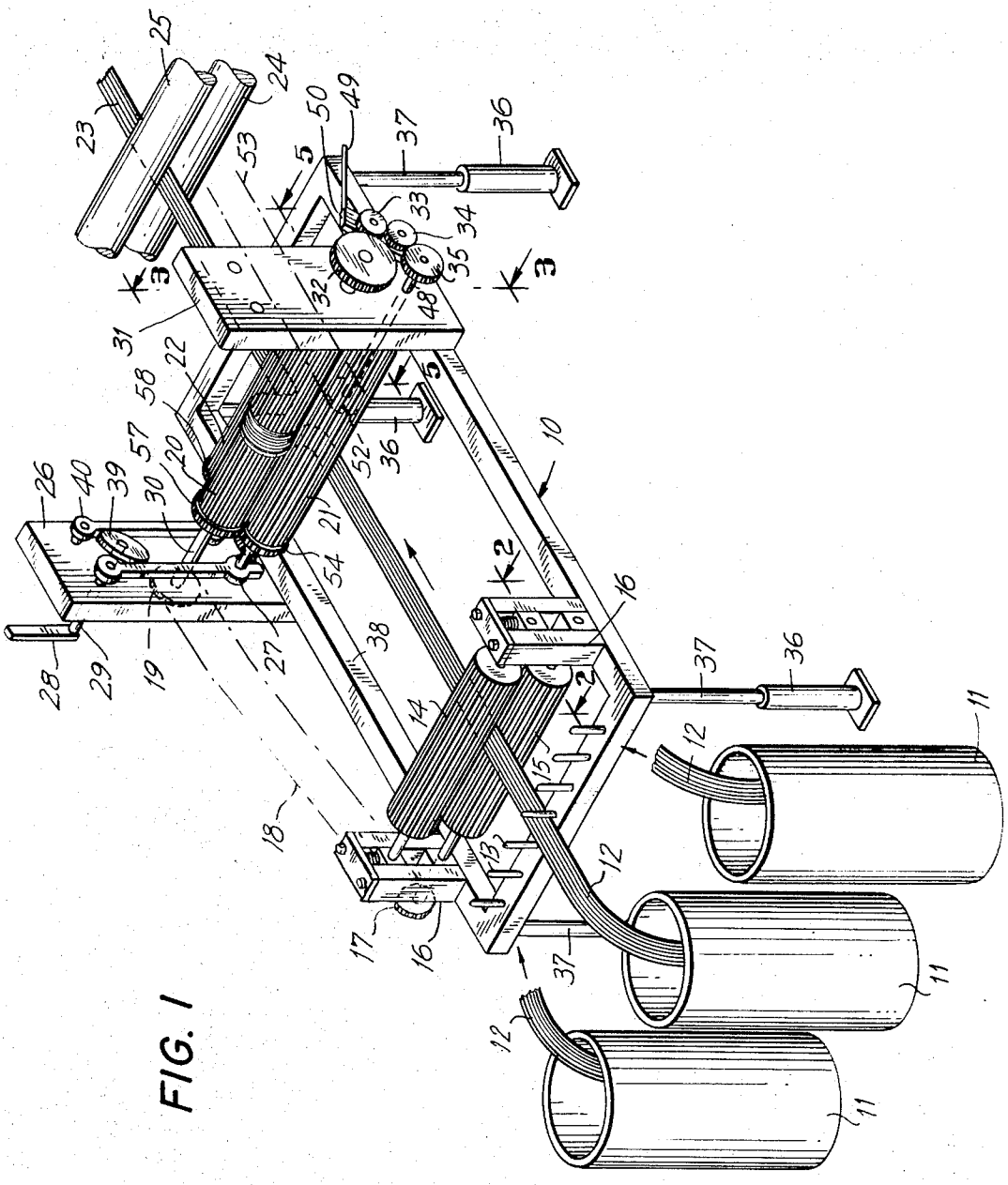
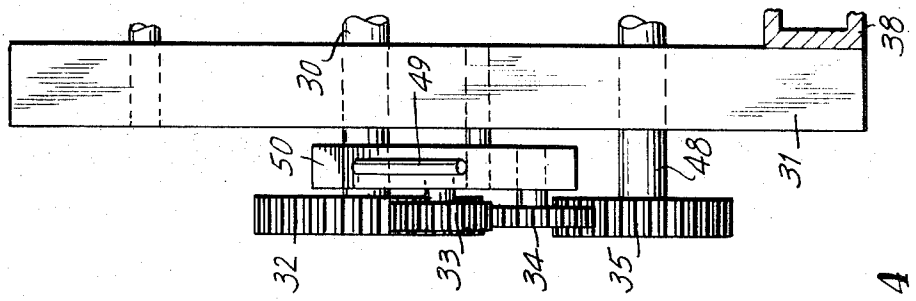


FIG. 1

FIG. 4



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FIG. 3

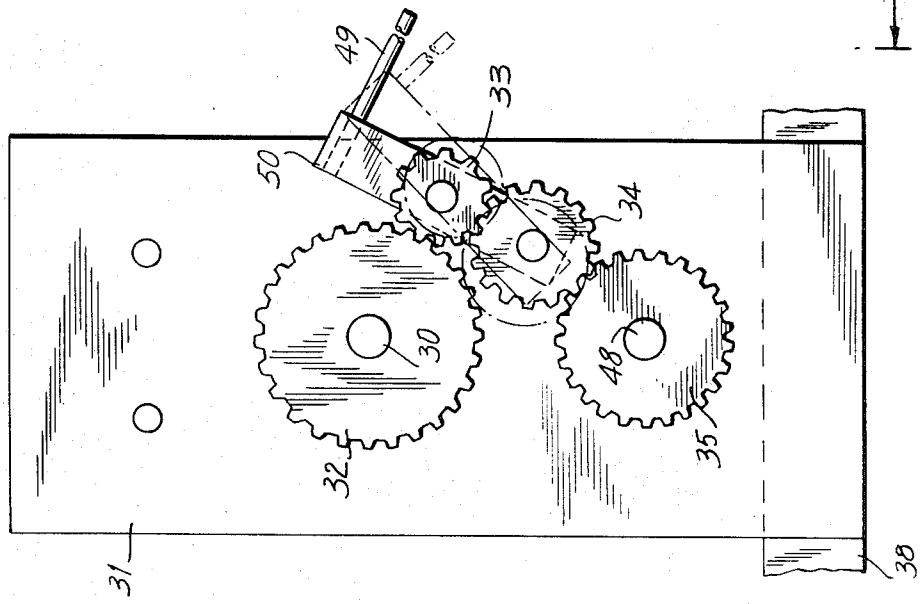
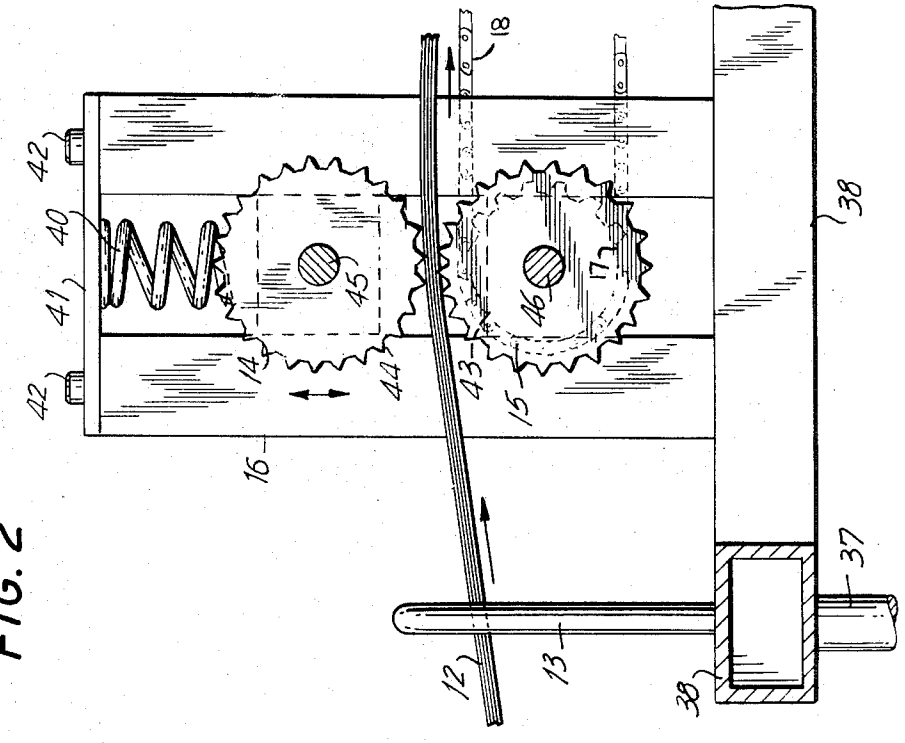


FIG. 2



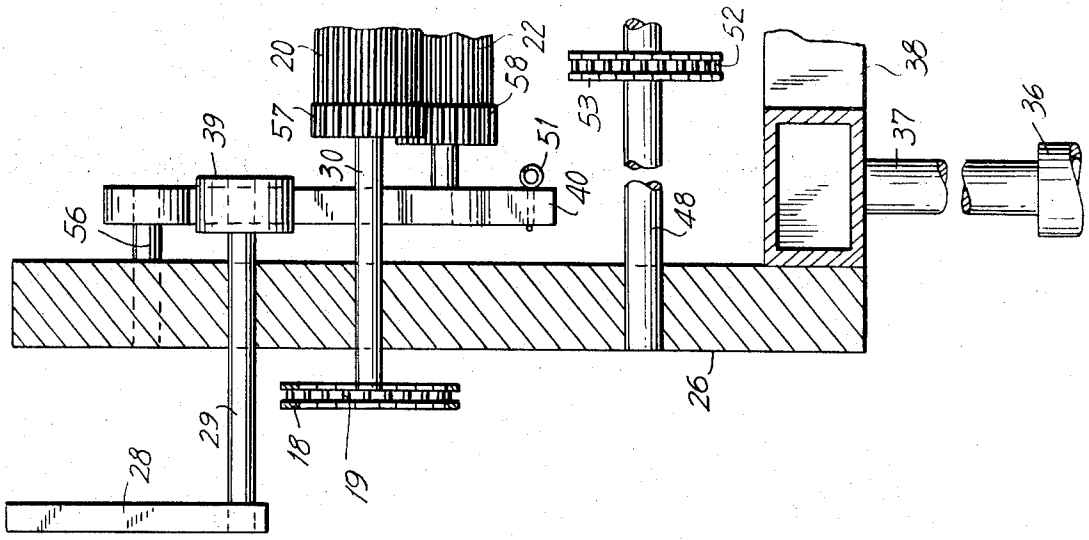

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FIG. 6

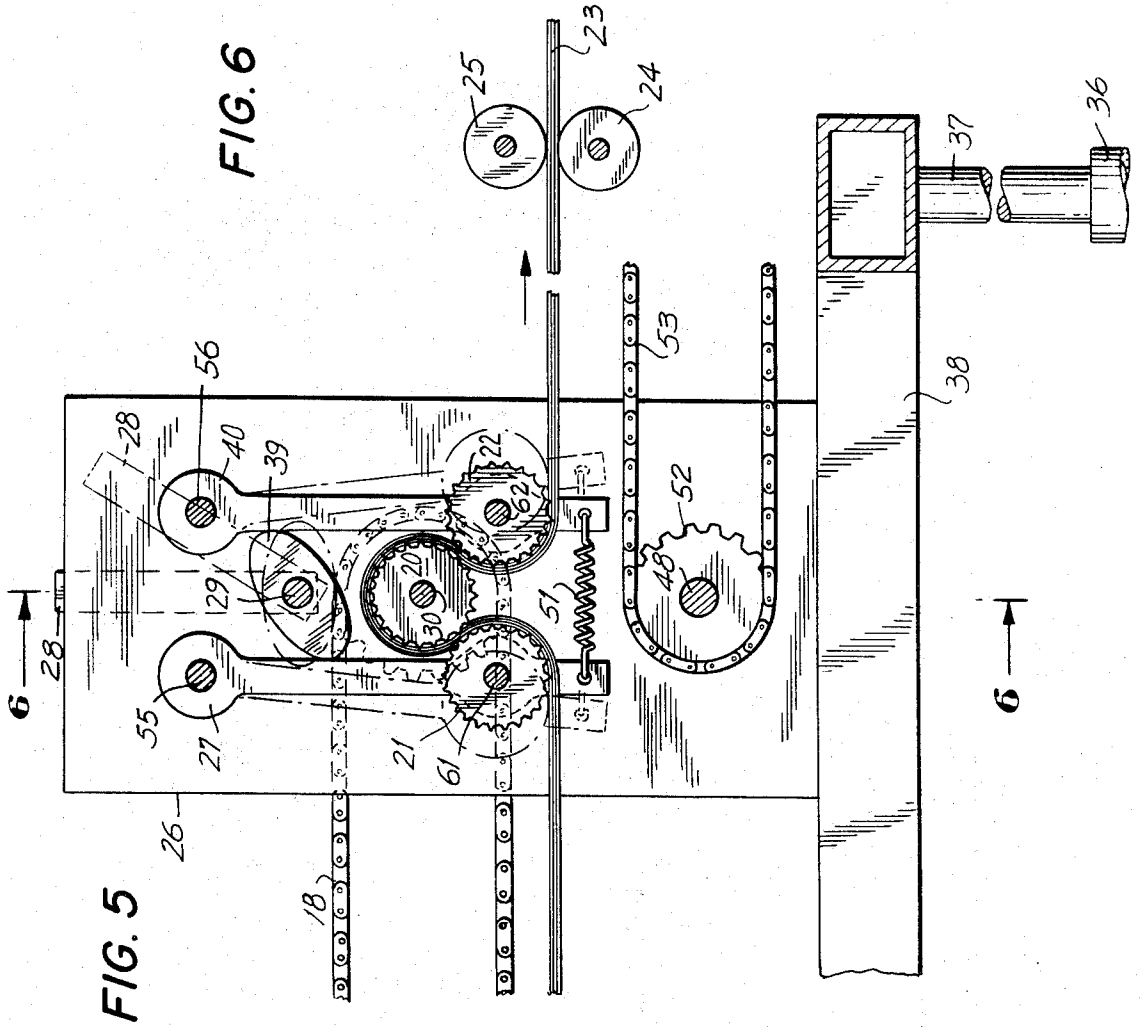

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FIG. 5

FABRIC TENSIONING APPARATUS

This invention relates to a fabric tensioning apparatus particularly suitable for stretching synthetic fabrics between roller assemblies in a continuous manner.

More specifically, this invention relates to a fabric tensioning apparatus having a first assembly of profile rollers for receiving a continuous fabric sliver, and a second, spaced-apart tripod roller assembly coupled to the first roller assembly for stretching the fabric sliver uniformly and in a continuous manner.

In manufacturing certain products from cut pieces of fabric material, it is often difficult to obtain uniform cut lengths of fabric particularly where the fabric has been previously crimped to improve its texture and composition. For example, in the manufacture of carpeting, particularly from synthetic fibers, such as nylon, the synthetic fibers are crimped under pressure to improve their nap and texture. The synthetic strands are then cut to uniform lengths before being automatically combined for a carpet surface. Because of the crimping operation, it is difficult for the cutting apparatus to produce uniform lengths of parallel fibers required for a smooth carpet surface. Accordingly, the present invention provides an apparatus capable of receiving a plurality of fabric slivers and continuously tensioning these slivers by stretching them between separated roller assemblies so that the slivers can be cut to uniform lengths with parallel fibers for ultimate use.

In the present invention, the tensioning apparatus utilizes a first pair of splined or profile rollers for receiving one or more continuous slivers of fabric. A second roller assembly consisting of three splined rollers in triangular engagement are coupled to the first or feed roller assembly and along the path of the travelling fabric. The fabric engages all three rollers of the triangular or tripod assembly, and is stretched between the tripod assembly and the feed rollers. The feed rollers are driven at a slightly slower speed than the triangular rollers so that a tensioning and stretching of the fabric slivers take place as the slivers move continuously through the apparatus. Means are provided for reversing the drive to the triangular rollers, and further means are provided for releasing the tripod rollers from engagement with each other under emergency conditions. The apparatus of the present invention also includes a housing having adjustable legs so that the height of the apparatus can be adjusted with respect to the cutting apparatus customarily mounted at the output.

It is therefore an object of the present invention to provide a fabric tensioning apparatus having spaced-apart roller assemblies for continuously tensioning one or more slivers of fabric.

It is another object according to the present invention to provide a fabric tensioning apparatus which is simple in design, easy to manufacture, and reliable in operation.

Other objects and features of the present invention will become apparent from the following detailed description considered in connection with the accompanying drawing which discloses the embodiments of the invention. It is to be understood, however, that the drawing is designed for the purpose of illustration only and not as a definition of the limits of the invention.

In the drawing, wherein similar reference characters denote similar elements throughout the several views:

FIG. 1 is a perspective view of the fabric tensioning apparatus according to the invention;

FIG. 2 is a cross-sectional view taken along section 2—2 of FIG. 1;

FIG. 3 is a cross-sectional view taken along section 3—3 of FIG. 1;

FIG. 4 is a cross-sectional view taken along section 4—4 of FIG. 3;

FIG. 5 is a cross-sectional view taken along section 5—5 of FIG. 1; and

FIG. 6 is a cross-sectional view taken along section 6—6 of FIG. 5.

Referring to FIG. 1, there is shown the fabric tensioning apparatus 10 according to the invention placed in front of fabric storage barrels 11 for receiving one or more fabric slivers 12. Fabric slivers 12 are initially fed through sliver guides 13 mounted on the forward part of frame 38 between a pair of elongated splined feed rollers 14 and 15. Shafts 45 and 46 of rollers 14 and 15 are pivotably mounted in end blocks 44 and 43 respectively which are slidably retained within a vertical channel formed in end mounts 16 as shown in FIG. 2. Mounts 16 are secured near the end of frame 38 adjacent to sliver guides 13. The tops of each mount 16 are closed by a plate 41 which is secured in place by bolts 42. A coil spring 40 is disposed in the top of each mount 16 and engages slide block 44 in order to urge splined roller 14 against roller 15 while the fabric passes between the rollers.

At one end of profile roller 15 and coupled to its drive shaft 46 is a sprocket wheel 17 driven by correspondingly engaged chain 18.

Frame 38 includes a second tripod roller assembly having three rollers, 20, 21 and 22, triangularly arranged adjacent to the opposite end of the housing. The surface of rollers 20, 21 and 22 may be profiled similar to feed rollers 14 and 15. As shown in detail in FIG. 6, the ends of rollers 20, 21 and 22 may include engaging gears 57, 58 and 54. Since gears 54 and 58 are each engaged to gear 57, rollers 20, 21 and 22 preferably rotate at the same angular velocity, with all engaging gears having the same number of teeth.

Splined roller 20 is mounted on a shaft 30 which is pivotably supported between bearing blocks 26 and 31 on housing 38. At one end of shaft 30 is mounted a sprocket 47, as shown in detail in FIG. 6, engaged to chain drive 18. At the opposite end of shaft 30 is mounted a gear 32 as shown in detail in FIG. 4, for engagement with gears 33 or 34, pivotably mounted on a reversing lever 50. Reversing lever 50 is pivotably mounted to block 31 on axis 54 so that when rod 49 displaces reversing lever 50 into its position as shown in broken line, only gear 34 is engaged between gear 32 and 35. Gear 35, which is mounted on shaft 48, includes a sprocket 52 mounted between the longitudinal arms of housing 38. Sprocket 52 is coupled to a drive chain 53 which may be driven by an electric motor, or a fabric cutting apparatus located at the output of tensioning apparatus 10. The cutting apparatus, which is not shown in detail, may include its own feed rollers 25 and 24 for receiving the tensioned fabric 23. Chain 53 would then drive tensioning apparatus 10 at a speed so that tension fabric 23 could be cut into uniform lengths without a pileup of excess fabric accumulating between the cutting apparatus and the tensioning machine.

When reversing lever 50 is in its solid line position as shown in FIGS. 1 and 3, gear 35, which is driven on

shaft 48, engages gear 34 which in turn engages gear 33 to drive gear 32 on shaft 30. Shaft 30 is directly connected to elongated roller 20, and transmits rotational energy to rollers 21 and 22 by means of engaging gears 54, 57 and 58.

Mounted on bearing block 26 is a tension release handle consisting of arm 28 connected to shaft 29 so that a caming surface 39 mounted on the opposite end of shaft 29 will engage levers 27 and 40. As shown in detail in FIG. 5, lever 27 is pivoted in block 26 by means of axis 55 while lever 40 is pivoted in block 26 by means of axis 56. Roller 21 is pivotably mounted adjacent to the end of lever 27 by means of axis 61 and roller 22 is pivotably mounted adjacent to the end of lever 40 by means of axis 62. Apertures are formed in the ends of levers 27 and 40 to receive a compression spring which draws the ends of the levers together so that gears 54 and 57, and 57 and 58 will be urged into respective engagement. By rotating handle 28, oval caming surface 30 will engage pivotably mounted levers 27 and 40 so that the ends of the levers will spread apart to disengage profile rollers 20, 21 and 22 as shown in broken line. The opposite ends of rollers 21 and 22 are similarly trunnioned to vertical levers which are pivoted in bearing block 31.

Housing 38 is supported on each of its four corners by means of cylindrical feet 36 which have telescoping extension rods 37 so that the frame can be adjusted to any desired height. In operation, chain 53 draws sprocket 52 to rotate shaft 48 mounted between blocks 26 and 31. On the end of shaft 48, gear 35 rotates to drive idler gears 34 and 33. Gear 33 is engaged to gear 32 on shaft 30 when reversing lever 50 is in its solid line position. Shaft 30 supports profile roller 20, which is geared to rollers 21 and 22. Thus, the rotation of roller 20 also causes rollers 21 and 22 to rotate in an opposite direction. The other end of shaft 30 includes a sprocket 19 engaged to drive chain 18. Drive chain 18 is coupled to sprocket 17 on shaft 46 in order to rotate feed roller 15.

Sprockets 17 and 19 are designed so that tripod rollers 20, 21 and 22 rotate about 25 per cent faster than feed rollers 14 and 15, in order to stretch slivers 12. The pressure on springs 40 can be varied in order to control the slippage between feed rollers 14 and 15.

The apparatus of the present invention is designed to take steam-crimped synthetic slivers and stretch the fibers of the slivers so that they will be uniform in length and parallel to one another for precision cutting to any predetermined length. The apparatus has been found to remove 10–15 percent of the crimp from the fabric slivers during the stretching operation. It is obvious that the amount of stretching can be changed by changing the size of the sprockets on the end of the feed and tripod rollers. Synthetic fabrics which have been crimped under steam and pressure and stretched using the apparatus of the present invention have been found particularly suitable for use in carpet backing, clothing such as women's undergarments, draperies, towels and the like.

While only a few embodiments of the present invention have been shown and described, it will be obvious that many changes and modifications may be made thereunto without departing from the spirit and scope of the invention.

What is claimed is:

1. A tensioning apparatus particularly suitable for tensioning fabrics and the like comprising in combination:

a base;

feed roller means mounted on one end of said base and comprising a first elongated splined roller and a second elongated splined roller each disposed so as to mesh along a parallel axis and including biasing means for urging the pair of rollers together in order to grip at least one incoming fabric sliver therebetween;

tripod roller means spaced apart from said feed roller means and positioned on the other end of said base for gripping at least one fabric sliver, said tripod roller means including a third and a fourth idler profile roller mounted parallel and adjacent to each other, and a fifth elongated profile roller engaging and mounted between the third and fourth profile rollers, the third, fourth and fifth rollers each including a gear mounted at a common end, the gear on the fifth roller engaging each gear of the third and fourth rollers; and

means for driving said tripod roller means faster than said feed roller means to stretch the fabric sliver suspended therebetween.

2. The tensioning apparatus as recited in claim 1 wherein said means for urging comprises a spring disposed at each end of the first roller and reacting against said base for urging the axis of the first roller against the second roller.

3. The tensioning apparatus as recited in claim 2 wherein said driving means comprises a first coupling joining the fifth roller and the first roller and a second coupling joining an external rotational power source to the fifth roller.

4. The tensioning apparatus as recited in claim 2 wherein said tripod roller means additionally comprises spreader means coupled to each end of the third and fourth rollers for separating the axes of the third and fourth rollers with respect to the fifth roller.

5. The tensioning apparatus as recited in claim 4 wherein said spreader means comprises a first pair of vertical levers pivotably coupled to said base and pivotably receiving the ends of the third roller, a second pair of vertical levers pivotably coupled to said base and pivotably receiving the ends of the fourth roller, means for urging said first and second pair of vertical levers together to enable the third and fourth rollers to engage the fifth roller, and at least one release lever having a cam surface disposed between adjacently disposed levers so that rotation of said release lever will cause said cam to urge against said vertical levers and spread the axes of the third and fourth rollers.

6. The tensioning apparatus as recited in claim 1 wherein said base additionally comprises a plurality of telescoping legs mounted on said base to permit said base to be adjusted in height.

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