

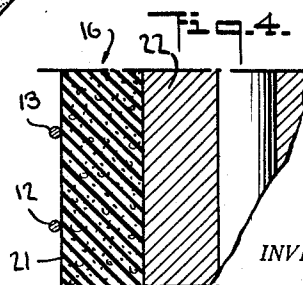
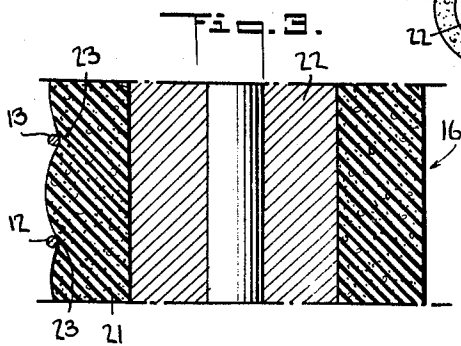
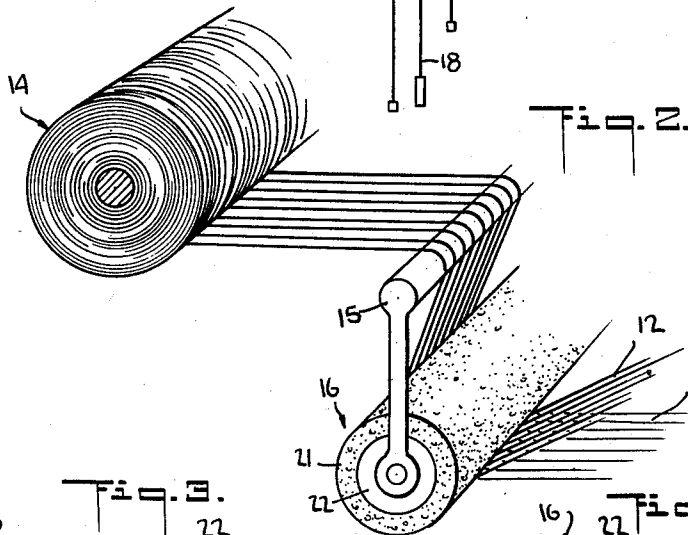
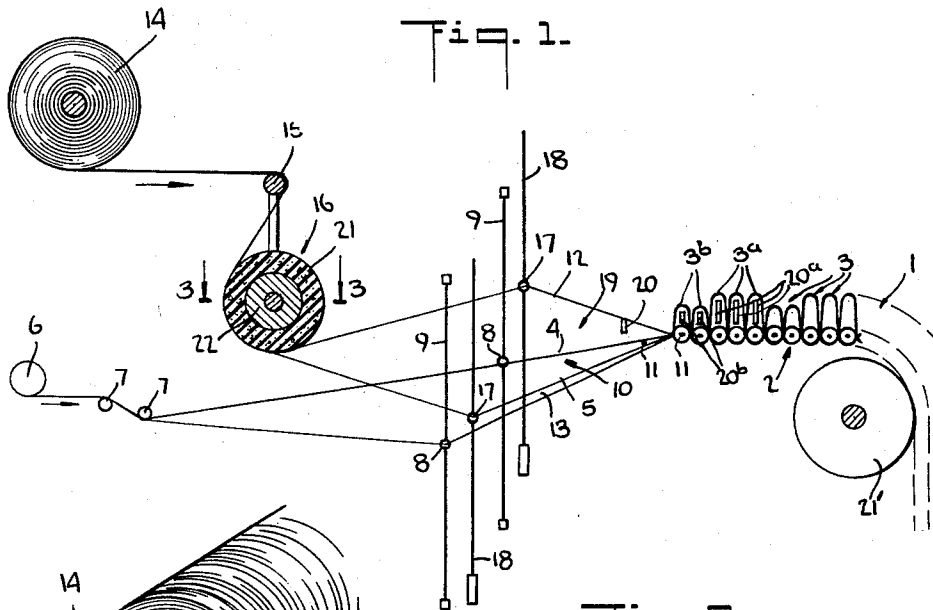
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YARN TENSIONING MECHANISM

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YARN TENSIONING MECHANISM

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1 Claim. (Cl. 139—97)

The present invention relates to a yarn tensioning mechanism and more particularly to a yarn tensioning mechanism for use on machines for weaving pile fabrics, such as velvet carpets.

In weaving pile fabrics, it is the practice to form loops from the pile yarn by spreading the pile yarn apart to form a shed, inserting pile wires in the shed formed by the pile yarn, and reversing the shed so that the pile yarn is looped over the pile wires. When the pile wires are withdrawn, loops will be formed by the pile yarn. Such loops form the face of the pile fabric.

In weaving certain types of pile fabric, such as velvet carpets, the loops formed by the pile yarn are of unequal height. In order to obtain these loops of unequal height, pile wires of different heights are used. It has been found that since the pile wires of lower height require less pile yarn to form the loops of lower height, the pile yarn will tend to become slack. This slack in the pile yarn produces a pile fabric in which the loops are not tightly packed, thereby detracting from the appearance of the pile fabric and reducing its resistance to wear.

One object of the present invention is to provide an improved machine for weaving pile fabric in which the pile yarn is under constant tension.

Another object of the present invention is to provide a yarn tensioning mechanism for a weaving machine which will automatically keep the pile yarn under tension.

Another object of the present invention is to provide a yarn tensioning mechanism for a weaving machine which will keep the pile yarn under constant tension regardless of the presence of pile wires of unequal heights.

A further object of the present invention is to provide a yarn tensioning mechanism which is simple to operate and inexpensive to manufacture and maintain.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claim, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein:

Fig. 1 is a diagrammatic elevational view, partly in section, showing a machine for weaving pile fabric embodying the present invention, portions of which are greatly exaggerated for convenience of illustration;

Fig. 2 is an enlarged fragmentary perspective view of the loom shown in Fig. 1 showing the pile yarn being fed to the yarn tensioning mechanism of the present invention;

Fig. 3 is a fragmentary top sectional view, greatly exaggerated, of the yarn tensioning mechanism of the present invention taken along line 3—3 of Fig. 1 showing the tensioning mechanism in its normal position when there is no slack in the pile yarn; and

Fig. 4 is a sectional view similar to Fig. 3 showing

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the position of the yarn tensioning mechanism when a slack occurs in the pile yarn.

Referring more particularly to Fig. 1, the pile fabric 1 is generally comprised of a backing 2 and a plurality of loops 3 which form the face of the fabric.

The backing 2 is formed in the conventional manner by the binder yarn 4 and 5 which are drawn from a binder yarn beam or roll 6. The binder yarn 4 and 5 is drawn in the direction of the arrow over guide rollers 7 and through eyelets 8 on shed-forming binder yarn heddles 9. As is conventional in the art, the binder yarn heddles 9 are moved vertically relative to each other to spread the binder yarns 4 and 5 apart to form a shed 10. Weft thread 11 is then inserted in the shed 10 by a shuttle (not shown) between the binder yarn 4 and 5 at right angles thereto and heddles 9 are moved relative to each other in the opposite direction to reverse the shed 10 and loop the binder yarn 4 and 5 around the weft thread 11 to form the backing 2.

The loops 3 which form the face of the pile fabric 1 are formed in a similarly conventional manner by pile yarn 12 and 13. The pile yarn 12 and 13 is fed by a pile yarn beam 14 in the direction of the arrow and is passed around a cradle pivot 15 and a guide roller 16 depending therefrom. The yarn 12 and 13 is fed by rotating the beam 14 by any conventional or desired mechanism. The pile yarn 12 and 13 is passed through eyelets 17 in pile yarn heddles 18 so that when the heddles are moved vertically in one direction relative to each other, a shed 19 will be formed. In this position the weft thread 11 and a pile wire 20 is inserted in the shed 19 generally at right angles to the pile wires 12 and 13 and the pile yarn heddles 18 are vertically shifted relative to each other in opposite directions to reverse the shed 19 and to permit the pile yarn 12 and 13 to be looped over the pile wire 20 to form the loops 3. The pile wires 20 may be inserted by any conventional or desired mechanism. The pile fabric 1 formed in the manner described is removed from the loom by a take-off roller 21.

It will, of course, be understood that the method described above is only one of the many methods used for making pile fabric, and it will be further understood that it is within the scope of the present invention that the pile fabric 1 be made by any desired or conventional method.

In order to form a pattern on the face of the pile fabric, as is common in velvet carpets, the loops 3 are formed of different heights. For example, in the drawings, loops 3a are of one height and loops 3b are of a lower height. In order to form loops 3a and 3b of different heights, the pile wires 20 which are inserted in the shed 19 to form the loops are of different heights. Thus, in the drawings, pile wires 20a of one height are inserted in shed 19 to form the higher loops 3a when the shed is reversed, and pile wires 20b of a lower height are inserted in the shed 19 to form the lower loops 3b when the shed is reversed. This produces a pile fabric having loops of different heights to form a pattern on the face of the fabric.

In order to prevent the pile yarn 12 and 13 from becoming slack when the lower pile wires 20b are inserted in the shed 19 to form the lower loops 3b, a resilient tensioning sleeve 21 is provided around the core 22 of the guide roller 16 (Figs. 1 and 2). The core 22 of the guide roller 16 may be of metal, such as steel, and has the resilient sleeve 21 affixed thereto by any suitable means, such as by cementing the sleeve 21 thereto.

As seen more fully in Fig. 3, the pile yarn 12 and 13 is passed around the resilient sleeve 21 of the guide roller 16 under such tension so as to compress the resilient sleeve 21 into a series of valleys 23. The sleeve 21 normally remains in this position until a low pile wire 20b.

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(Fig. 7) is inserted in the shed 19 to form the low loops 3b. When the low pile wire 20b is inserted in the shed 19, less pile yarn 12 and 13 will be used to form the low loops 3b, thus creating a slack in the pile yarn. When this slack occurs, the resilient sleeve 21 will expand (Fig. 4) to take up the slack and automatically tension the pile yarn 12 and 13. When a higher pile wire 20a is again inserted in the shed 19 to form the higher loops 3a, the pile yarn 12 and 13 will again be pressed into the resilient sleeve 21 to form the valleys 23 therein, as shown in Fig. 3. In this manner the resilient sleeve 21 automatically keeps the pile yarn 12 and 13 under constant tension and prevents any slack therein.

The resilient sleeve 21 surrounding the metal core 22 of guide roller 16 which keeps the pile yarn 12 and 13 under tension may be of any suitable material which has the property of contraction and expansion. Preferably, the tensioning resilient sleeve 21 is made of sponge rubber which has a natural tendency to contract and expand and which is soft so as not to damage the pile yarn 12 and 13. It will, of course, be understood that any material having a natural tendency to contract and expand may be used for the sleeve 21. The resilient sleeve 21 is of sufficient thickness so that a slack in the pile yarn of any degree will always be taken up by the resilient sleeve 21 to keep the pile yarn 12 and 13 under constant tension.

In operation, binder yarn 4 and 5 and pile yarn 12 and 13 is fed to the shed-forming heddles 9 and 18, respectively. The binder yarn 4 and 5 (Fig. 1) is spread by heddles 9 to form shed 10 and is woven with the weft threads 11 to form the backing 2 of pile fabric 1 by inserting the weft threads 11 into the shed 10 between binder yarn 4 and 5 and reversing the shed 10 to loop the binder yarn 4 and 5 over and under the weft threads 11.

The pile yarn 12 and 13 is passed over pivot 15 and tension roller 16 and spread by heddles 18 to form the shed 19. The higher pile wires 20a and the lower pile wires 20b are inserted in the shed 19 between pile yarn 12 and 13 and when the shed is reversed, the pile yarn 12 and 13 is looped over the pile wires 20a and 20b to form higher loops 3a and lower loops 3b. In order to prevent the pile yarn 12 and 13 from becoming slack because of the presence of shorter pile wires 20b, the pile yarn 12 and 13 passes over the sponge rubber sleeve 21 of the roller 16 with sufficient tension to compress the resilient rubber sleeve 21 into valleys 23 (Fig. 3). When the shorter pile wire 20b is inserted in shed 19 and the shed is reversed, less pile yarn 12 and 13 is used to form

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the shorter loops 3b, thereby causing the pile yarn 12 and 13 to slacken slightly. As soon as the pile yarn 12 and 13 slackens, sponge rubber sleeve 21 will expand (Fig. 4) to take up the slack and automatically tension the pile yarn 12 and 13.

When a higher pile wire 20a is again inserted in shed 19, the pile yarn 12 and 13 will again be tensioned and will compress the sleeve 21, as seen in Fig. 3. Hence, the pile yarn 12 and 13 is kept under constant tension and any slack will be automatically taken up by the expansion of the sponge rubber sleeve 21.

It will be seen from the above that the present invention provides a machine for weaving pile fabric in which the pile yarn is always under tension, which will automatically tension any slack in the pile yarn, and which is simple to operate and inexpensive to manufacture and maintain.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

In a mechanism for weaving pile fabric, a pile wire assembly having pile wires of different heights thereon for forming loops of different heights, a beam for supplying pile yarn to said assembly, means for forming said pile yarn into a shed, means interposed between said shed-forming means and said beam including a guide roller having a resilient surface, and means for passing all of said pile yarn over said guide roller in sufficient tension to normally compress the resilient surface of said guide roller, portions of the resilient surface of said guide roller being adapted to expand to take up the slack in the pile yarn used to form loops when raised over the lower pile wires of said different height pile wires while the remaining portions of said resilient surface remain compressed by the pile yarn used to form loops when raised over the higher pile wires of said different height pile wires.

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