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[21] Appl. No. **35,360**
[22] Filed **May 7, 1970**
[45] Patented **Jan. 4, 1972**
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a part interest

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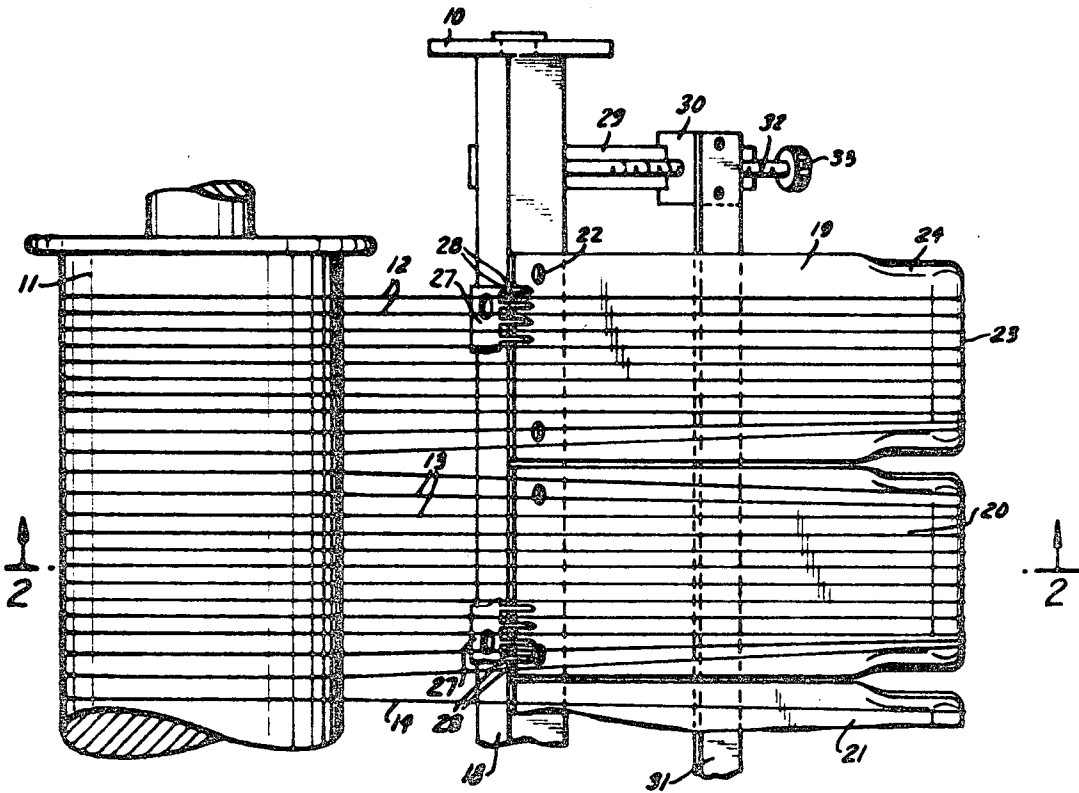
[54] YARN-TENSIONING MEANS FOR WARP-KNITTING MACHINES 6 Claims, 2 Drawing Figs.	512,174	7/1952	Belgium	66/86 R
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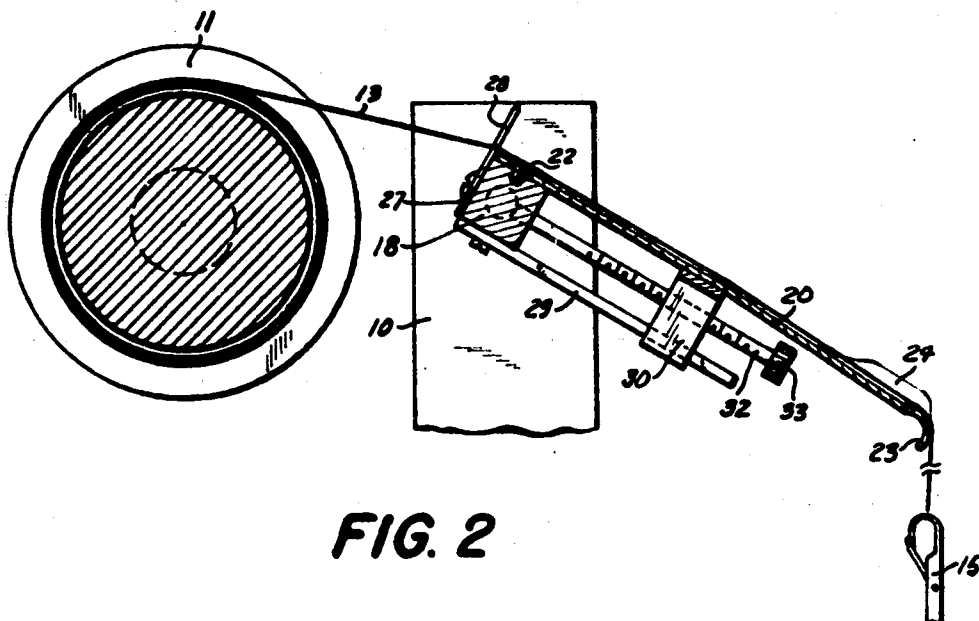
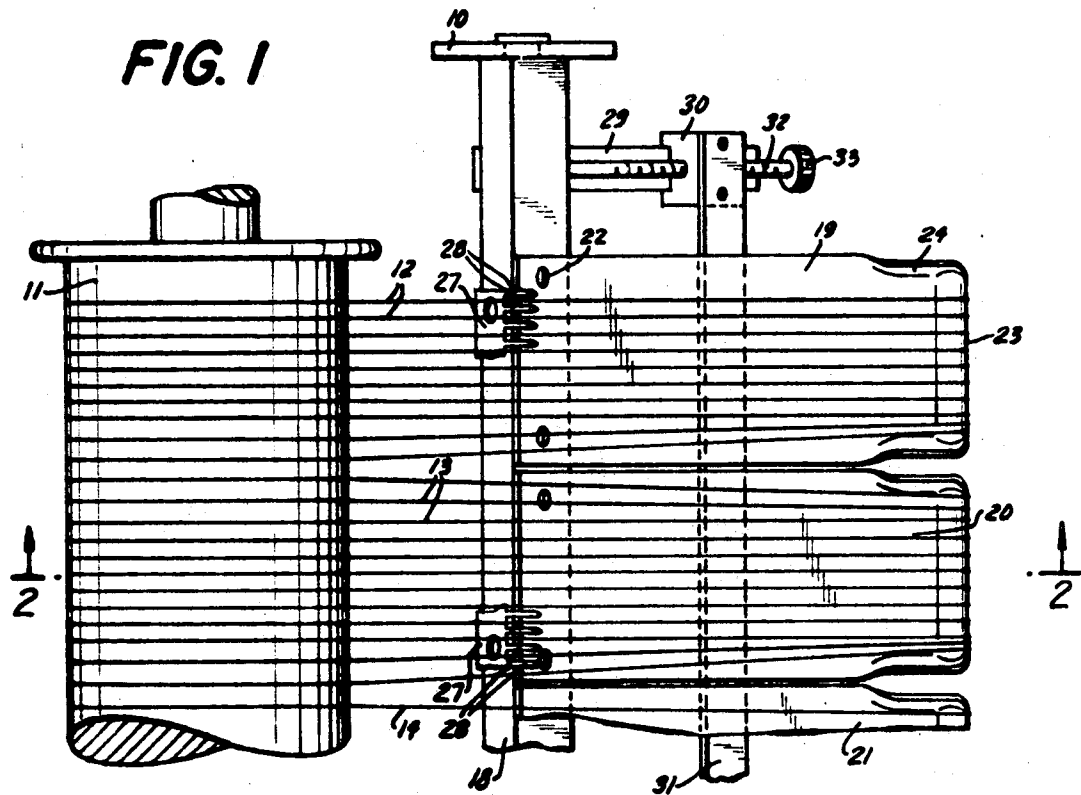
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[52] U.S. Cl.....	66/86 R, 66/146
[51] Int. Cl.....	D04b 27/12, D04b 27/14
[50] Field of Search.....	66/86, 86 A, 146, 86 R

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ABSTRACT: Threads to be laid-in are supported between the warp beam and the knitting instrumentalities by individual resilient thread support members, which may be plates of resilient material, such as sheet metal. Each thread support provides tension in a different group of threads. Means are provided to vary the resiliency of the thread support members.





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YARN-TENSIONING MEANS FOR WARP-KNITTING MACHINES

This invention relates to warp-knitting machines, and more particularly to the tensioning of threads which are laid-in while such machines are in operation.

In these machines, at least some of the threads used to knit the foundation structure of the fabric are engaged by the hook-shaped upper ends of the knitting needles. However, those threads used to provide the fabric with a pattern, and sometimes some of the threads used to form the foundation, move beneath the needle latches and hence are not engaged by the hooked ends of the needles. Such threads are referred to as being laid-in.

All threads are provided with tension as they move from the warp beam to the knitting instrumentalities. This is ordinarily accomplished by passing all the threads from each warp beam over a single spring biased tension bar, there being, in the usual case, a separate tension bar for each warp beam. While this scheme works satisfactorily for threads which are knitted-in, it presents problems in the case of laid-in threads. The position a tension bar occupies at any particular moment depends upon the force exerted on it by the threads passing over it, the thread force of course being in opposition to the relatively constant biasing force on the tension bar. Thus, the average tension in the threads as a group determines the position of the tension bar.

It has been found that as the machine operates, the tension in some laid-in threads varies from the tension in other laid-in threads, or in other words the tension in some threads varies from the average tension of all the threads. No problem arises from those threads whose tension remains at or near the average tension of all the threads. However, those threads having greater than average tension are pulled too tightly by the tension bar. These overly taut threads displace the knitting needles they engage, thereby straining the needles, and the threads may even break due to the excess tension in them. On the other hand, those threads having less than average tension hang loose. As a result, the filaments comprising such a thread tend to separate and if some of these filaments are caught by a needle they break. Since all the threads pass over a single tension bar, no adjustment is possible to compensate for both the tight and loose threads.

It is an object of the present invention to overcome this problem by replacing the conventional tension bar by independent tension plates, each of which supports only some of the threads from each warp beam.

By segmenting the thread tensioning means, as provided for by this invention, the threads are divided into separate groups which having its own average tension. Since each thread of each of these groups has a proportionately greater effect upon the position of its respective tension plate than each thread passing over the conventional tension bar, the tension in a typical thread is closer to the average tension of all the threads in its group than the tension in a typical thread passing over a conventional tension bar is to the average tension in all the threads passing over the tension bar. Consequently, when the present invention is employed, fewer threads are either tight enough or loose enough to cause the problems mentioned above.

Additional objects and features of the invention will be apparent from the following description, in which reference is made to the accompanying drawings.

In the drawings:

FIG. 1 is a fragmentary top plan view of a knitting machine incorporating the present invention, and

FIG. 2 is a vertical cross-sectional view taken on line 2—2 of FIG. 1.

The knitting machine chosen to illustrate this invention includes a stationary frame, a portion 10 of which is shown in the drawings. A warp beam 11 is rotatably mounted on the machine frame, and a large number of threads 12, 13, and 14 extend from the beam to knitting instrumentalities, including needles 15. Between the warp beam 11 and the knitting instrumentalities, the threads pass over thread tensioning means.

In the embodiment illustrated, the thread tensioning means includes a support bar 18 extending along the entire length of the machine, and fixed to the machine frame. Thus, at one end support bar 18 is secured to frame portion 10, and at its other end it is secured to another frame portion (not shown) similar to portion 10. A series of thread support members, or tension plates 19, 20 and 21 are arranged side-by-side along the length of bar 18, one end of each plate being fixed to bar 18 such as by screws 22. Plates 19—21 are formed of a resilient or springy material; thin sheet metal has been found suitable. The free end 23 of each plate may be rounded as shown, to provide a smooth edge over which the threads pass, and the sides of each plate adjacent to the free end may be turned up to define lips 24 for preventing any thread from slipping off its respective plate.

A comblike member 27 is fixed to support bar 18, and has a plurality of very thin teeth 28 projecting upwardly from it, the thickness of the teeth being exaggerated in FIG. 1 for the sake of clarity. A single thread passes between each two adjacent teeth 28, the teeth serving to keep the threads separated and prevent their becoming tangled with one another.

Fixed to the lower face of bar 18, near each of its ends, is a rigid strip 29 serving as a rail. Slidably mounted on each rail 29 is a block 30 having a channel in its bottom face for slidably accommodating the rail. Fixed to each block 30 is one end of a rigid strip 31 which extends beneath all the plates 19—21, the lower face of each plate resting on strip 31. A threaded hole in each block 30 accommodates an externally threaded rod 32, having a handle 33 at one end and being rotatable held in bar 18 at its other end. Strip 31 serves as a movable support for the plates 19—21 and it will be seen that by rotating handles 33, and hence rods 32, blocks 30 are moved along rails 29 toward and away from bar 18. In this way, strip 31 can be moved toward or away from bar 18 to vary the effective length of the plates. If strip 31 is moved closer to bar 18, each plate becomes more resilient, and contrarily if strip 31 is moved farther from bar 18, each plate becomes less resilient. If a relatively large number of threads are passed over each plate, strip 31 is spaced relatively far from bar 18, and if a small number of threads are passed over each plate, strip 31 is spaced closer to bar 18.

The number of plates provided, and the number of threads passing over each plate are determined to a large extent by the particular knitting machine being used, and the number of threads being supplied by the particular warp beam with which the plates are associated. A typical installation has included 56 plates, each plate carrying 40 threads. However, as few as seven plates, each carrying as few as 10 threads, may prove useful in some situations.

In the drawings, only one spool of the warp beam is shown, but it is to be understood that the warp beam 11 comprises, as usual, a plurality of spools. A group of threads 12 pass over plate 19, a second group of threads 13 pass over plate 20, a third group of threads represented by thread 14 pass over plate 21, and so forth, each plate supporting a separate group of threads. As indicated, more than one tension plate is ordinarily provided to support the threads from a single spool. Each group of threads tends to bend its respective plate in a clockwise direction in FIG. 2, and the inherent resilience of the plate tending to straighten the latter produces tension in the threads.

Although only a single warp beam 11 and a single set of plates 19—21 are illustrated, it is to be understood that a separate set of plates, having its own support bar and movable support, similar to bar 18 and strip 31, respectively, is furnished for each warp beam supplying threads to be laid-in. It should also be mentioned that although the present invention is primarily for tensioning threads to be laid-in, it can if desired be used as well with threads which are knitted in.

The invention has been shown and described in preferred form only, and by way of example, and many variations may be made in the invention which will still be comprised within its spirit. It is understood, therefore, that the invention is not limited to any specific form or embodiment except insofar as such limitations are included in the appended claims.

What is claimed is:

1. A warp-knitting machine comprising a frame, a warp beam rotatably mounted in said frame, a bed of knitting instrumentalities spaced from the beam, and thread-tensioning means for supporting and tensioning a large number of threads in the region between said beam and said instrumentalities, said means comprising a support fixed with respect to the machine frame, a plurality of individual resilient thread support members, each of said thread support members being carried by said fixed support independently of all the other thread support members, and each of said thread support members having a width equal to an axial length of said warp beam occupied by a plurality of threads, separate groups of threads being supported by each of said thread support members, each said group consisting of a plurality of threads, and means for simultaneously varying the resiliency of all said thread support members, said varying means including a

movable support for said thread support members, and means for adjusting the distance between said fixed and movable supports.

2. A machine as defined in claim 1 including at least seven of said thread support members.

3. A machine as defined in claim 1 wherein each of said thread is dimensioned to support members supports at least 10 threads.

4. A machine as defined in claim 1 wherein each of said thread support members comprises a plate of resilient material.

5. A machine as defined in claim 4 wherein said plates are formed of sheet metal.

6. A machine as defined in claim 1 including means fixed with respect to the machine frame for separating each thread from the threads adjacent to it.

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