

[54] METHOD OF AND DEVICE FOR SHAPED EFFECT YARNS WITH OR WITHOUT LADDERS

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[56] References Cited

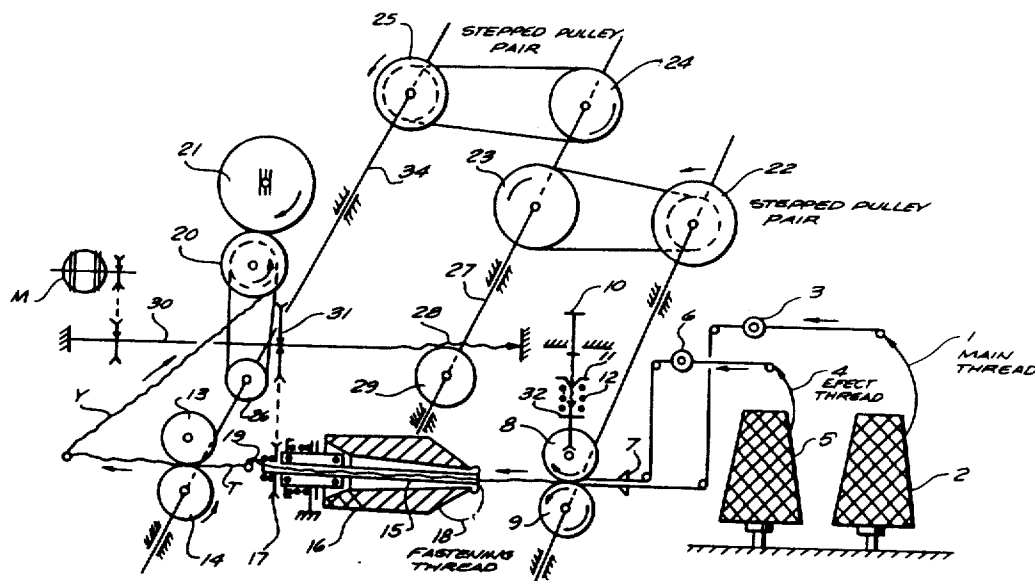
UNITED STATES PATENTS

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[57] ABSTRACT

Method of and apparatus for producing shaped effect yarns with or without ladders. A stretched main thread and an effect thread are fed in parallel relationship through a rotating hollow spindle carrying a yarn body with a fastening thread. The effects are shaped and fastened by the fastening thread after the stretched main thread and the loose effect thread simultaneously pass through a set of rollers whose pressure is continuously regulated. The main and effect threads are not twisted in the hollow spindle with the fastening thread but twist with it between a differentiator-regulator which rotates with the spindle and pulling rollers downstream thereof.

6 Claims, 1 Drawing Figure



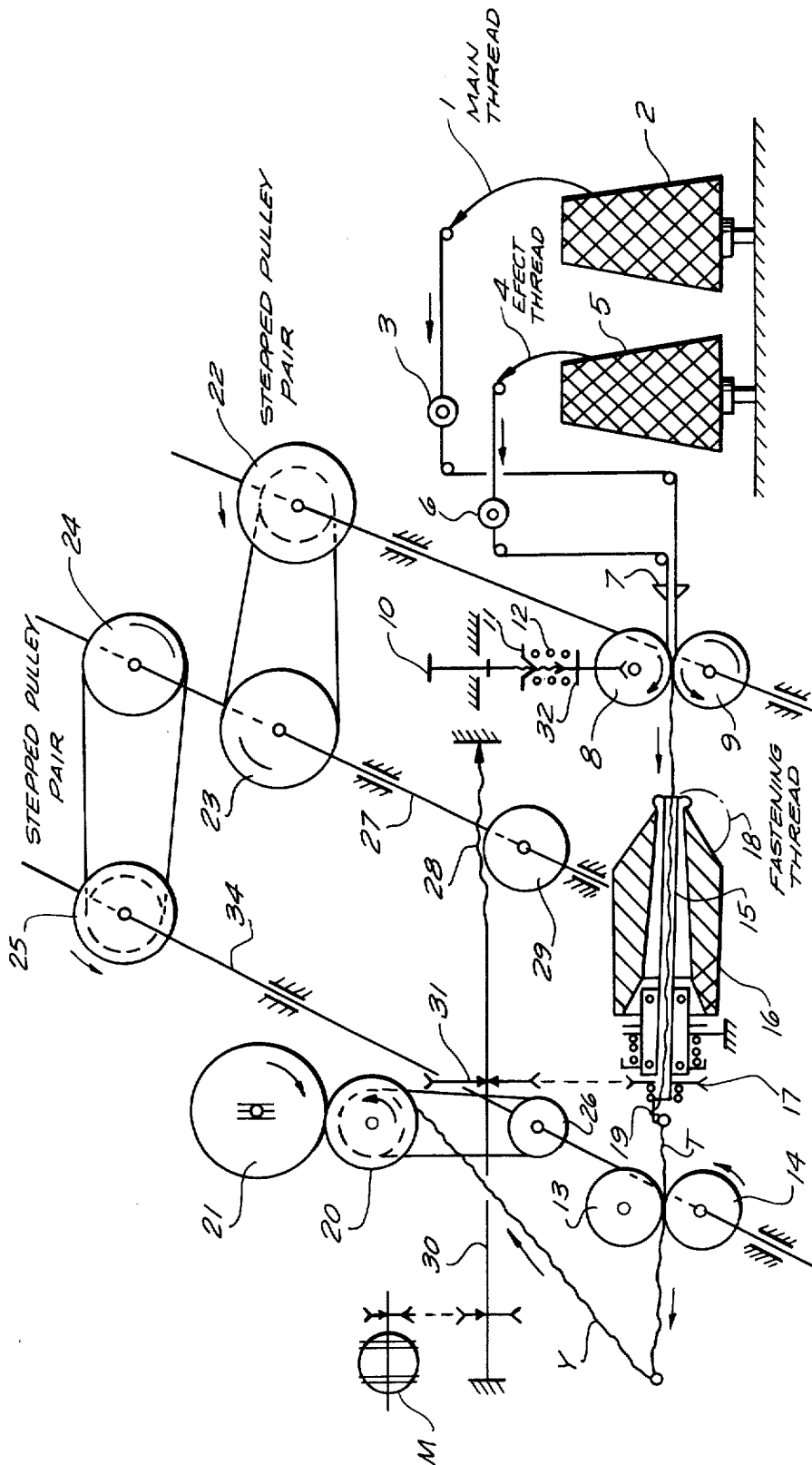


FIG. 1

METHOD OF AND DEVICE FOR SHAPED EFFECT YARNS WITH OR WITHOUT LADDERS

The present invention relates to a method of and an apparatus for obtaining shaped effect yarns with or without ladders.

With certain methods for producing shaped effect yarns where a shaped ring twister is used, a second twisting process becomes necessary in order to make the effects permanent. The productivity diminishes as a result of twisting with the spindle-ring-runner.

The other methods for obtaining shaped effect yarns in a continuous process use a hollow spindle, and a yarn carrier for securing the effects, wherein the main and the effect-shaping thread pass through the hollow spindle, and the effects are secured when the fastening thread does not pass through the hollow spindle but through a tip fixed on its top. The effects are secured when the main, the effecting, and the fastening threads have passed through an immovable thread guide which follows the hollow spindle.

There are also other methods that use a hollow spindle carrying a fastening thread, but the main and the effecting threads are not conveyed by supplying rollers through which the threads pass in a parallel manner.

The main disadvantage of the methods for obtaining shaped effect threads by means of hollow spindles is the limited variety of the effects which are possible; further, with the striking ring twisters the productivity is low.

It is among the objects of this invention to produce various effects as to shape, density and dimensions of the threads by the same devices, with simplified regulation and with high productivity.

The objects are achieved as follows: Through a set of pressure rollers located in front of a hollow spindle there are passed threads with different linear speeds as a result of braking them by various brakes. The effect threads have the linear speed of the feeding rollers, and the main thread has a lower speed because of its being braked. After passing the rollers, the threads pass through the hollow spindle at the outlet of which there is affixed a differentiator-regulator. The latter rotates with the spindle, and twists the threads passing through the feed rollers. The effect thread, which is twisted around the stretched main thread as a result of the rotation of the spindle with the differentiator-regulator, passes along the arm or spiral-open-ring of the latter, thus twisting the threads together to fasten the effect thread to the main thread.

The fastening thread is supplied by a yarn body that rotates simultaneously with the spindle. All the twisted threads are then pulled out by pressure rollers which follow the hollow spindle, the threads being fed through a rotating drum to be wound on a bobbin. A variety of effects is obtained by regulating the stretching of the thread passing through the feeding rollers by changing the speed of feeding of each thread, or of all threads together, which in itself is obtained either by changing the speed of rotation of the feeding and leading rollers by changing the pressure between the feeding rollers, or by changing the braking of the threads in advance of the feeding rollers.

The invention allows a speed of rotation of the spindle to 60,000 revolutions per minute. Stepped pulleys may be employed for driving the feeding roller and the pulling roller, and the systems for regulating the

stretching of the threads, thereby allowing all kinds of fibers to be used in order to obtain an unlimited variety of shaped effect yarns with or without ladders. The effect threads or fibers can also be combined in various colors and thicknesses.

The invention will be more fully understood upon consideration of the illustrative preferred embodiment shown in the accompanying drawing. In the drawing:

The single FIG. schematically illustrates an apparatus in accordance with the invention for practising the method for producing shape effect yarns with or without ladders in accordance with the invention.

A main thread 1 unwound from a bobbin 2 is braked by a brake 3. Effect thread 4 is unwound from a bobbin 5 and is braked in brake 6. The thus braked threads 1 and 2 pass together through a thread guide 7 and pressure rollers 8 and 9 of which roller 9 is driven. The pressure of roller 8 on roller 9 is continuously regulated from e.g. 0.10 kg. to 8 kg. by means of a screw 10 which moves a nut 11 thereon against a coil compression spring 12. The difference in the thickness of the main thread 1 and the effect thread 4 results in the feeding of thread 4 at the linear speed of the rollers 8 and 9; the main thread 1 downstream of its braking in brake 3 slides and has its speed determined by a pair of pulling rollers 13 and 14 disposed downstream of the hollow spindle 15. The hollow spindle is driven by a belt and pulleys 17 and 31. Spindle 15 carries a yarn body 16 which is held non-rotatable by means not shown and is provided with a fastening thread 18 which is fed into the right hand end of the spindle, a differentiator-regulator 19 being mounted on the output end of the spindle. The finished-composite yarn Y is wound on a bobbin 21 driven by a known drum 20 provided with double helical yarn guiding grooves.

The rollers 9 and 14 of the feeding roller pairs 8, 9 and the pulling roller pair 13, 14, respectively, are driven by means of a belt consisting of pulleys 23 and 24 on a shaft 27. Shaft 27 is driven by a worm 28 on a shaft 30, worm 28 meshing with a worm gear 29 on shaft 27. As shown, the pulley 31 is affixed to shaft 30, so that such shaft drives the spindle 15. A motor M drives shaft 30 through a belt and pulleys, as shown, and thus drives feeding rollers 9 and 14, and spindle 15. The winding drum 20 is driven from shaft 34, to which pulley 25 is affixed by a belt entrained over pulley 26 or shaft 32.

Through the rotation of the differentiator-regulator 19 the thread 4 for shaping the effects twists around the main thread 1.

The threads 1 and 4 are passed together with the fastening thread 18, without twisting with it, through the hollow spindle 15 and then through the differentiator-regulator 19. When the spindle 15 rotates, the main thread 1 and the effect thread 4 are twisted with the fastening thread 18 in the zone T between the differentiator-regulator 19 and the nip of rollers 13 and 14. As a result, the fixed effects are shaped and can not be dislocated when the yarn is used in weaving, knitting, etc.

The dimensions of the effects can be changed by changing the linear speed of rollers 8, 9; the thickness and shape of the effects varies according to the degree of pressure between rollers 8, 9 that is, the degree of compression of spring 12 between nut 11 and an arm 32 attached to the bearings carrying roller 8 and pulling between the rollers 8, 9 and the brake 3.

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As noted above, the pulleys 22 and 23, on the one hand, and the pulleys 24 and 25 are preferably stepped, so as to provide for variation in the degree of stretching of the threads between roller pairs 8, 9 and 13, 14. Alternatively, one or both of pulley pairs 22, 23 and 24, 25, may be of the PIV (positive infinitely variable) type such as, for example, a V pulley pair provided with a V belt, the pulleys being continuously changeable in effective diameter in opposite directions.

Although the invention is illustrated and described with reference to a plurality of preferred embodiments thereof, it is to be expressly understood that it is in no way limited to the disclosure of such a plurality of preferred embodiments, but is capable of numerous modifications within the scope of the appended claims.

What is claimed is:

1. Method of producing shaped effect yarns, comprising feeding in parallel relationship a stretched main thread and an effects thread into the inner end of and through a rapidly rotating hollow spindle carrying a yarn bobbin with a fastening thread, introducing the fastening thread into the inner end of the hollow spindle with the main thread and the effects thread, pulling such three threads by a pulling means disposed downstream of the spindle, and twisting the three threads between such pulling means and a differentiator-regulator mounted on the exit end of the spindle and rotating therewith.

2. A method in accordance with claim 1, comprising retarding the main thread and the effects thread by brakes and then passing them simultaneously through a set of pinch rollers disposed in advance of the spindle,

at least one roller of said set of pinch rollers being driven, the pressure between said pinch rollers being continuously regulated.

3. A method in accordance with claim 1, wherein the dimensions of the effects thread vary according to relative difference in the linear speed between the rollers which simultaneously feed the main thread and the effects thread, on the one hand, and the linear speed of the means which pulls the completed yarn from the differentiator-regulator of the spindle, on the other.

4. A method in accordance with claim 1, comprising varying the density of the effects thread and its shape by continuously altering the pressure from 0.10 kg. to 8 kg. between the two feeding rollers which are disposed upstream of the hollow spindle.

5. Apparatus for producing shaped effect yarns, comprising a rapidly rotating hollow spindle, a non-rotating bobbin carrying a fastening thread carried by the spindle, a pair of feeding rollers disposed upstream of the inner end of the hollow spindle for simultaneously feeding the main thread and the effects thread to the spindle, and means for continuously regulating the pressure between said feeding rollers.

6. Apparatus as claimed in claim 5, wherein the means for continuously regulating the pressure between the feeding rollers comprises a coiled compression spring having one end thereof bearing upon the means which mounts one of said pressure rollers, a screw, and a nut which bears upon the other end of said coiled compression spring.

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