

[54] **METHOD OF TAKING UP YARNS OF SYNTHETIC FIBERS**

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[22] Filed: **July 6, 1970**

[21] Appl. No.: **52,255**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 726,156, May 2, 1968, abandoned.

Foreign Application Priority Data

May 9, 1967 Japan.....42/29364

[52] U.S. Cl.....242/18 EW, 57/34 TT, 242/18 PW, 242/26.1

[51] Int. Cl.B65h 54/34, B65h 54/00

[58] Field of Search57/34 TT, 156, 157 R; 242/18 EW, 18 PW, 26.1-26.45

[56]

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Primary Examiner—John Petrakes

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[57]

ABSTRACT

A method of taking up waste yarns of non-uniform quality occurring at the start and stoppage of taking up yarns onto waste yarn take-up members situated below, and coaxially with, take-up bobbins in a yarn take-up apparatus having many spindles, characterized in that the waste yarns are traversed on the said members.

4 Claims, 5 Drawing Figures

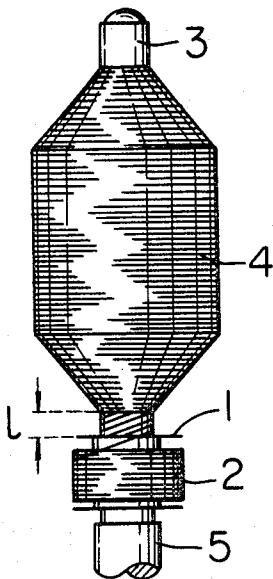


Fig. 1

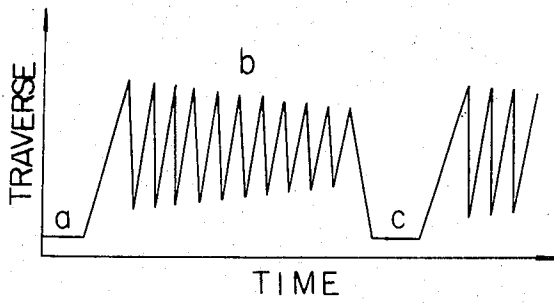


Fig. 2

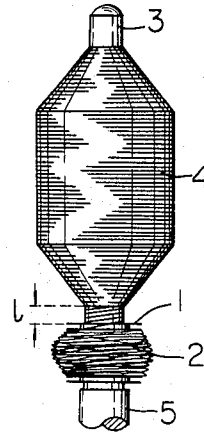


Fig. 3

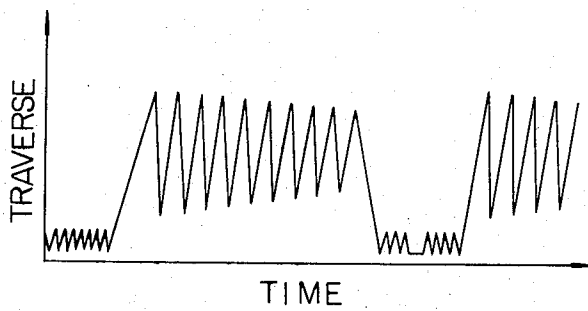
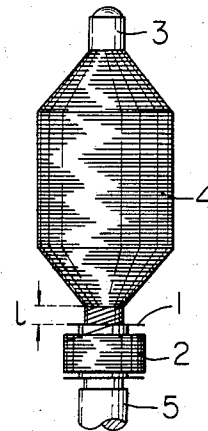


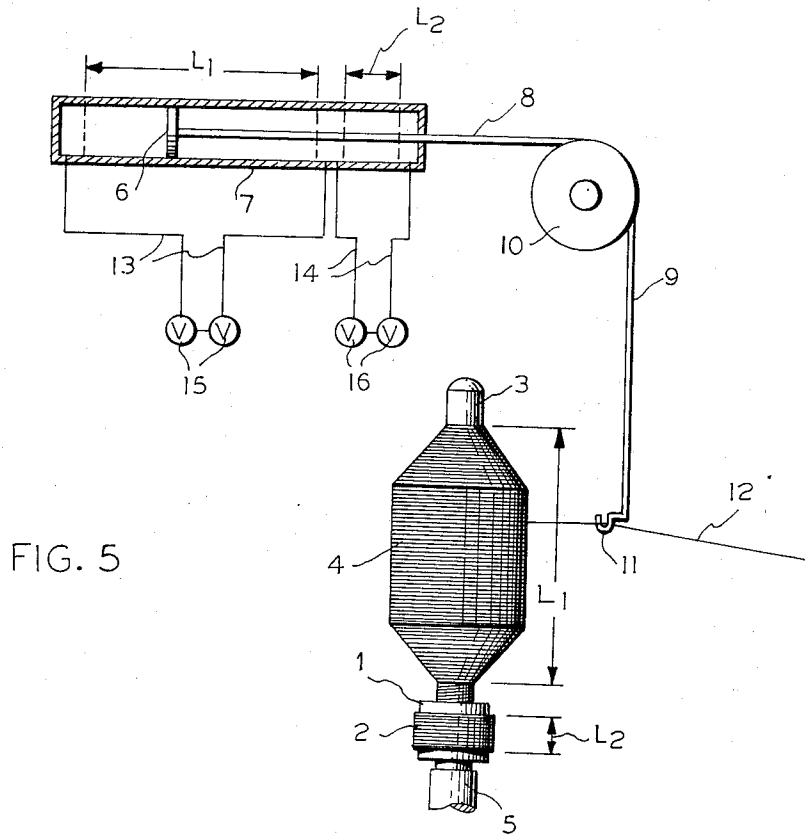
Fig. 4



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METHOD OF TAKING UP YARNS OF SYNTHETIC FIBERS

This is a continuation-in-part of application Ser. No. 726,156, filed May 2, 1968, now abandoned.

This invention relates to a method of taking up yarns of synthetic fibers. Particularly, the invention relates to a method of taking up waste yarns onto separately provided waste spools or portions on bobbins apart from the packages of normal yarns with regularity by traversing them when the yarns are finally wound up onto take-up bobbins after having been treated by an apparatus for heating, drawing, treating otherwise, and then winding up, such as a ring twister, draw twister, heat-treating twister, bulk-processing twister and doubling twister. The production of such waste yarns is derived from unusual passing speed of the yarns both at the time of substituting empty bobbins for full bobbins and of newly preparing the apparatus for operation.

When yarns of synthetic fibers are processed with the above-mentioned machines, the yarns are wound up onto take-up bobbins. When the take-up bobbins become full a traverse mechanism goes out of a normal traverse zone, and after a while, the full bobbins are exchanged with new ones. Then, the operation of the machine is resumed, and as soon as the processing is done in normal conditions, the traverse mechanism is returned to the normal traverse zone.

In the exchanging of bobbins in this way, the speed of the yarns passing the yarn processing zone of the machine changes from the normal speed to a decreasing (low), zero, again low, then normal speed. It is usual that during the change of the speed, too, the yarns are continuously processed in the processing zone of the yarn-processing apparatus. For this reason, the yarns which pass through the processing zone, for instance, heating zone, during or about the time of exchanging the bobbins, are subjected to an abnormal treatment as compared with the passing of the yarns during the normal period. Such abnormally treated yarns become waste yarns. If the waste yarns are wound up onto a bobbin together with normal yarns, the wound-up package contains yarns of inferior quality, and becomes commercially valueless. Therefore, the waste yarns are wound up onto separately provided waste spools by transferring the traverse mechanism out of the normal traverse zone, or even when they are wound up onto the same bobbins, the waste yarns are wound up onto the positions which are apart from the normal packages where the waste yarns are exclusively taken up. In this case, the bobbins for normal yarns must be made separate from the bobbins for taking up waste yarns.

In the conventional yarn processing apparatuses, however, waste yarns are wound up onto waste spools or another position on bobbins without any traversing. When the exchanging of bobbins is effected many times, and a great quantity of waste yarns is wound, the package of the waste yarns finally collapses, resulting in the loosening of the yarns, the coming out of the yarns from the traveller, or the breakage of the yarns. Thus, it is impossible to effect a normal take-up by again returning the traverse mechanism to a normal position. On the other hand, it is not efficient to remove waste yarns every time bobbins have been exchanged.

According to this invention, a traverse is given to the yarns wound up onto waste spools. Even if a great quantity of waste yarns is wound up, the package does not collapse, and hence, the yarns are prevented from coming out of the traveller or from breaking.

This invention is characterized by winding up waste yarns on take-up members while traversing them by using a yarn processing take-up apparatus comprising many winding units in which the take-up members are positioned below, and coaxially with, take-up bobbins.

It is an object of the present invention to attain significantly more times of waste yarn winding than is experienced heretofore, avoid a failure of simultaneous resumption of take-up operation of many spindles, prevent the yarn breakage and to avoid the contamination of final products, all by taking up waste yarns while traversing them.

With reference to the accompanying drawings:

FIG. 1 is a graph showing the traverse and the take-up of a waste yarn in the conventional take-up operation;

FIG. 2 is a view showing a package on a bobbin and a waste yarn take up onto a waste spool in the conventional take-up operation;

FIG. 3 is a graph showing the traverse of the take-up method of the invention and the traverse for the taking up of a waste yarn;

FIG. 4 is a view showing a package wound up by the invention and a package of a waste yarn; and

FIG. 5 is a partially schematic view of one form of traverse mechanism for use in performing the present invention.

In the drawings, the same reference numerals indicate the same parts.

In FIG. 1, the abscissa represents time, and the ordinate, the width of traverse. The portion *a* shows a state at the time when the traverse mechanism is under the normally wound up package and waste yarns are taken up onto a waste spool. As the traverse mechanism remains stationary at this position, the straight line *a* continues for some time as shown in the drawing. A waste yarn on a waste spool 1 therefore forms a disorderly arranged package, as is seen from FIG. 2 in which a waste spool is fitted on a spindle 5, a bobbin 3 is fitted on the same spindle at a position above the waste spool, and a normal yarn being wound up onto this bobbin. The reference numeral 4 shows a package of the normal yarns.

The portion *b* of FIG. 1 shows the state of a normal traverse in which the yarn take-up is carried out while forming a package 4. With the progress of the take-up, the width of the traverse becomes gradually decreased, and a package of the shape shown in FIG. 2 is formed on the bobbin 3. When the normal take-up operation is completed and the bobbin 3 becomes full, the traverse mechanism is displaced to a downward position. Although the operation of the machine is suspended, the state shown by *c* in FIG. 1 continues for some time by the moment of inertia of the machine, and the yarn is further wound up onto the waste spool 1 by some length, until the machine comes to a complete halt. Then, the full bobbin is removed away by cutting the yarn at a portion hanging between the bobbin and the waste spool, and is exchanged with a new bobbin. When the operation of the machine is resumed, the traverse mechanism remains at the downward position for a while and causes some length of the yarn to be wound up onto the waste spool. When the yarn becomes a normal yarn and advances to the waste spool, the traverse mechanism again returns to the upward normal take-up position and forms a normal package on the bobbin 3. The above-mentioned cycle is repeated, and the yarn take-up is performed. While the traverse mechanism is at the downward position in the above cycle, the yarn advances in the processing zone (not shown) at an abnormal speed. At the time of newly starting the operation of the machine, too, the yarn advances in an abnormal state (by-passes a part or whole of the treating zone). Hence, the yarn taken up onto the waste spool during this time is a so-called waste yarn which differs in quality from the yarn wound up onto the bobbin at an upward position. When the traverse mechanism changes its operation range either upwards or downwards, some length of the yarn stays about the position shown by *l* in FIG. 2. In exchanging the bobbin, the yarn at this position is cut off and the bobbin is taken away from the spindle. At the time of the first exchange of the bobbin, only a relatively small amount of the waste yarn occurring at the time of newly starting the operation of the machine is wound onto the waste spool. It is usual therefore that the waste spool is not exchanged every time, but is exchanged after the bobbin has been exchanged several times and a considerable amount of the waste yarn has been wound up onto the waste spool. If the waste spool is exchanged every time the bobbin is exchanged, the operation of the machine should be newly started every time, thus resulting in the decrease of operational efficiency.

Heretofore, in the prior art a yarn has been disorderly wound up onto a waste spool without any traversing, and therefore, the package has collapsed even if an amount of the

waste yarn on the waste spool slightly exceeds the prescribed amount. The yarn is then loosened, and is swung around in bundle, thus causing the yarn from the traveller to come off from it, or to be broken. Even when the traverse mechanism rises to the normal yarn take-up position, the yarn take-up cannot be resumed. Frequent exchanging of the waste spool in an attempt to make the amount of the yarn to be wound onto the waste spool smaller, and thus remove the above-mentioned defects has resulted in a remarkable decrease in operational efficiency.

The present invention has been accomplished with a view to removing these defects of the prior art. As shown in FIG. 3 even when the traverse mechanism is situated at a downward position, the traversing is effected at a stroke smaller than that of a normal traverse, and an orderly package is formed on a waste spool. This small width traverse is the only difference between the take-up method shown in FIGS. 3 and 4 and FIGS. 1 and 2.

It is to be understood that any conventional yarn traverse mechanism could be readily adapted to traverse both the yarn take-up bobbin and the yarn waste bobbin. However, one such apparatus will be described now with reference to FIG. 5 of the drawings.

A yarn traverse bar 9 having a thread guide 11 at its end is positioned to reciprocate parallel to the axis of bobbins 3 and 1. Traverse bar 9 may conveniently be of a flexible material and if necessary may extend around a guide roll 10. The upper portion of traverse bar 9 may be integral with or attached to a piston bar 8. The other end of piston bar 8 is attached to a piston 6 which is adapted to reciprocate within a cylinder 7. Specifically piston 6 is adapted to reciprocate within two lengths, L_1 and L_2 , in cylinder 7. Fluid conduits 13 provide access of fluid into lengths L_1 of cylinder 7. Suitable control valves such as electromagnetic valves 15 selectively allow access of fluid from liquid feed in storage tanks (not shown) to and from fluid lines 13. Thus, piston 6 is caused to selectively reciprocate within cylinder 7 through the length L_1 . It will be apparent that as piston 6 is reciprocated through length L_1 , thread guide 11 and therefore yarn 12 will likewise be reciprocated through length L_1 on bobbin 3, thereby winding up the yarn.

Fluid lines 14 are similarly arranged to allow access of fluid into length L_2 of conduit 7. Suitable valves such as electromagnetic valves 16 alternately and selectively allow fluid to enter and leave cylinder 7 through conduits 14 from liquid feed and storage tanks (not shown). It will be apparent that piston 6 may be selectively moved from length L_1 to length L_2 of cylinder 7. When this is done, the piston 6 will be reciprocated along the length L_2 . This reciprocation will of course be transferred to thread guide 11 and thus yarn 12. A waste yarn will thus be traversed along waste spool 1 in the manner of the present invention.

When piston 6 is shifted from length L_1 to length L_2 , a switch (not shown) is manually pushed to stop the action of a valve to the righthand (length L_2) side of valve 15. Since in this case fluid does not flow through the valve to the right side of valve 15, piston 6 will not move left but moves from length L_1 to length L_2 . Conversely when piston 6 is shifted from length L_2 to length L_1 , another switch (not shown) is pushed by hand to stop the action of a valve to the left hand (length L_1) side of valve 16.

It will be readily apparent that piston 6 may be shifted from length L_1 to length L_2 and vice versa in any suitable or desirable manner. Thus, the position of thread guide 11 will be simultaneously shifted.

It will further be apparent to those skilled in the art, that a conventional traverse ring may be substituted for the thread guide 11. The shifting and reciprocation of the traverse ring will be accomplished in the same manner as above described.

According to the invention, traversing is effected even when the traverse mechanism is situated at a lower portion and the yarn is being wound up onto a waste spool. Hence, the yarn is orderly wound up without any resulting collapse of the

package, coming off of the yarn from the traveller and also without any yarn breakage. This makes it possible to take up a great quantity of yarn on a waste spool, reduce the number of exchanging of the waste spool, and to enhance the operational efficiency as a whole.

EXAMPLE 1

The method of the invention was compared with the prior art in respect of a method of taking up waste yarns at the start of yarn hooking and the start of take-up when drawn yarns (150 denier/47 filament) of polyethylene terephthalate were twisted and taken up. The results are shown in the following table.

In both methods, the normal take-up speed is 500 m/min. At the time when the operation of the machine is newly started, the processing speed is decreased to 250 m/min., and waste yarns are taken up onto waste-spools. At the end of passing yarns onto all spindles, the speed was returned to a normal one, and the normal take-up onto bobbins was started. An amount of the yarn wound up onto a bobbin was 2.1 Kg. The waste spool was provided with a collar at both ends, and had a diameter of 62 mm and a length of 48 mm. The width of a small traverse was 50 mm.

	After the operation is newly started, percent—			
	1st doffing	2nd doffing	3rd doffing	4th doffing
Conventional Method:				
Ratio of success in simultaneous start.....	98	96.5	92	85
Ratio of yarn breakage during operation.....	0.8	0.9	1.2	1.3
Ratio of contamination of final products.....	0.3	0.7	0.8	1.5
Method of the invention:				
Ratio of success in simultaneous start.....	100	99.5	100	98
Ratio of yarn breakage during operation.....	0.5	0.8	0.4	0.5
Ratio of contamination of final products.....	0.2	0	0	0.3

It is seen from the above results that by a small traverse of the invention, the degree of success in simultaneous start is very excellent, and the ratio of the yarn breakage and the contamination of the products are very small. This is because waste yarns are orderly wound up onto waste spools, and no disorder or collapse occurs as in the conventional method.

What is claimed is:

1. A method of collecting waste of nonuniform quality onto a waste take-up member located coaxially below a yarn take-up bobbin in a yarn take-up apparatus, said waste occurring at the starting and stopping of said yarn take-up apparatus, said method comprising traversing said waste back and forth along the length of said waste take-up member, whereby said waste is collected in an orderly manner and prevented from collapsing and breaking.

2. The method according to claim 1 wherein said waste yarn is traversed on the said take-up member by reciprocating a ring.

3. The method according to claim 1 wherein said waste yarn is traversed on the said take-up member by reciprocating said waste yarn take-up member.

4. An apparatus for collecting the waste on the waste yarn take-up member as set forth in claim 1 comprising a traverse bar having a thread guide at its free end and being positioned to reciprocate in a direction parallel to the axis of the bobbins, a piston with a piston bar attached, conveniently located relative to said traverse bar and actuated by fluid pressure to permit the piston bar to periodically make in a container cylinder its reciprocating motions corresponding to both normal yarn traversing motions and waste yarn traversing motions, said piston bar being connected to the upper portion of the traverse bar and valves alternately and selectively allowing the fluid to enter and leave the cylinder.

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