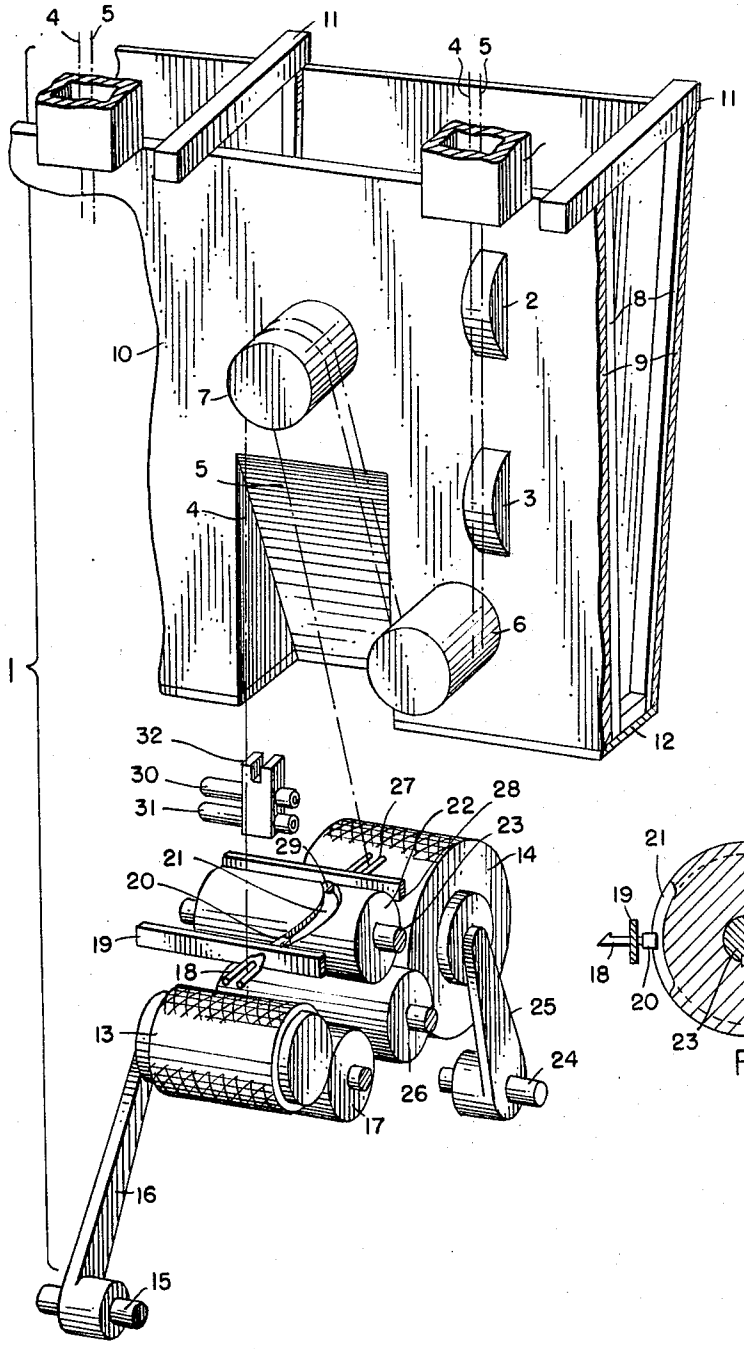
Oct. 18, 1966 H. SCHIPPERS ET AL 3,279,711

WINDING APPARATUS FOR MELT-SPUN OR DRY-SPUN FILAMENTS

Filed Dec. 17, 1964 2 Sheets-Sheet 1

FIG. 1



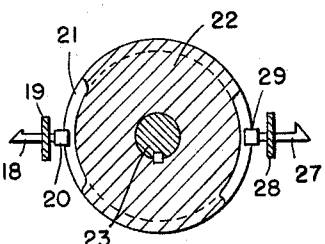


FIG. 2

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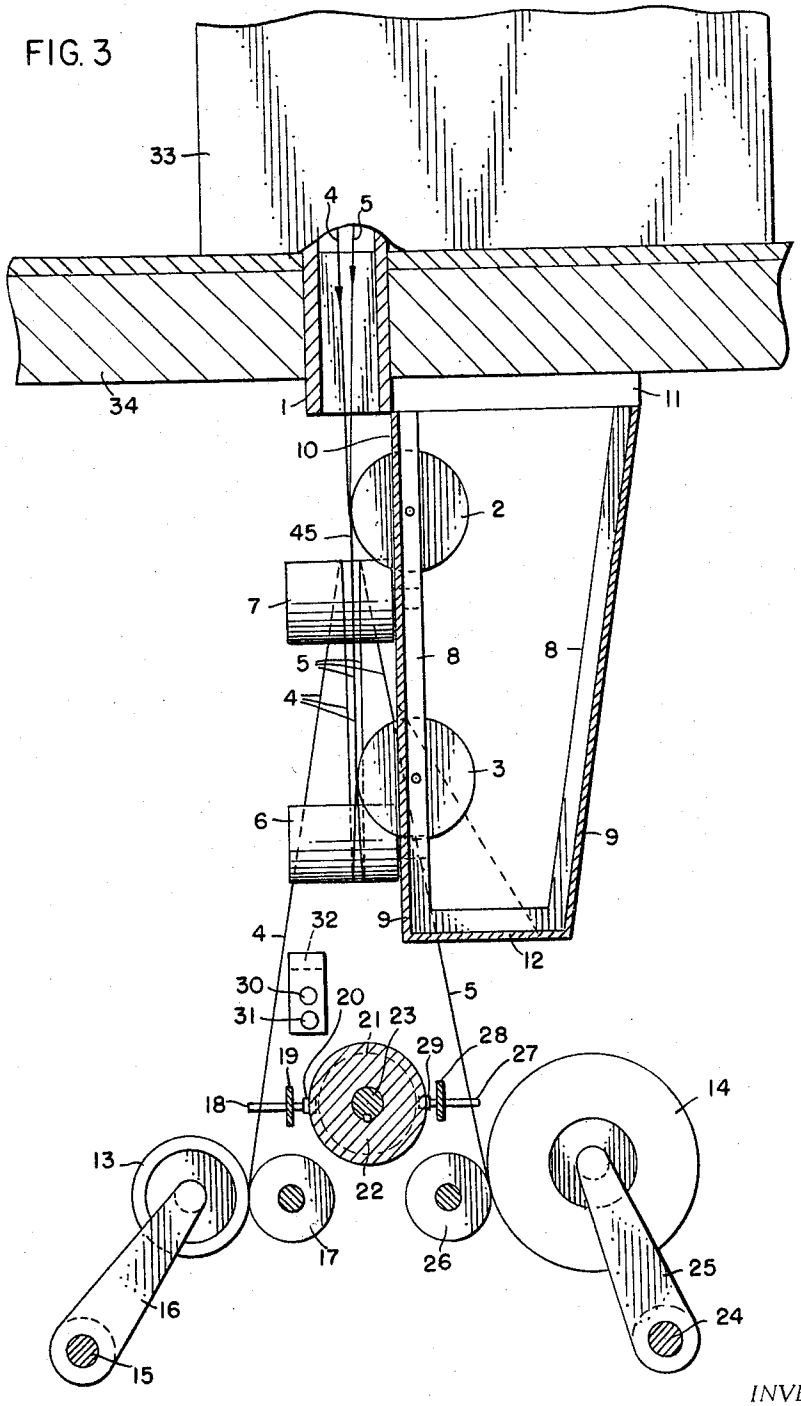
Filed Dec. 17, 1964 2 Sheets-Sheet 2

FIG. 3



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United States Patent Office 3,279,711 Patented Oct. 18, 1966

3,279,711

WINDING APPARATUS FOR MELT-SPUN OR DRY-SPUN FILAMENTS

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Filed Dec. 17, 1964, Ser. No. 419,135
Claims priority, application Germany, Dec. 24, 1963, B 74,811
6 Claims. (Cl. 242—35.5)

The present invention relates to improvements in the take-up mechanism of spinning machines for the production of continuous synthetic threads by the melt or dry spinning processes, in which machines the spinning units are arranged in a row with draw-off godets situated below. The invention particularly relates to spinning machines in which a plurality of threads produced by one single spinning head are jointly led over draw-off godets and subsequently wound separately and individually on bobbins or other take-up elements.

In the production of continuous synthetic threads by the melt or dry spinning processes, the thermoplastic chips, such as polyamide, polyester, polypropylene chips or the like, are melted in a melting device. By means of a metering device the melt is fed to the spinning nozzle or spinneret through the holes of which the molten plastic is pressed and formed into a monofilament or multifilament thread. While still in a plastic state the thread runs down a vertical shaft or chimney where it is blown with air for the purpose of cooling and solidifying it. At the lower end of the chimney the thread is then drawn off at high speed and is wound. In general, several godets are arranged below each spinning shaft, which godets rotate at equal or essentially equal circumferential speed and transport the threads which are wrapped around them at a constant rate to a take-up device onto which the thread is wound into cylindrical, conical or biconical packages with the aid of a traversing thread guide. In such an arrangement the constant circumferential speed of the yarn package even with increasing package diameter is maintained by pressure contact with a driving roll which is driven at a fixed rate of revolution.

In such spinning machines, a plurality of spinning and winding points are arranged in rows and grouped into larger units. It is frequent practice to place two such alignments in a back-to-back arrangement to form a two-sided spinning installation.

It is common knowledge that the construction of such spinning machines has developed along two general lines. In one case the bobbin axes are arranged parallel to the length of the machine, in the other at a right angle. Both arrangements have their respective advantages and disadvantages, either constructional or operational or in the effective use of available space.

With a view to practical requirements, the general trend of development points to increasing the running length of the threads by increasing package weight on the take-up bobbins and to accommodate as many spinning and winding points over the existing length of the machine. Increasing the number of spinning points on the spinning machine should be possible without great difficulty. A method is also being followed in which two, four or more threads, instead of only one, are being spun in each individual spinning shaft.

In the winding portion of the machine the conditions are more complicated. On the one hand, requirements call for an increase in bobbin weight, while on the other hand the number of winding points is to be increased. The most effective way to increase take-up capacity is

to increase the outer package diameter of the take-up bobbin. In machines with winding packages arranged at a right angle to the machine axis the limit is reached when, at predetermined spacing, the bobbins nearly touch each other or adjacent driving rolls. This difficulty does not arise with bobbins arranged parallel to the machine axis since in this case the package diameter can be enlarged ad libitum in the lateral direction. Similarly, though less efficiently, the winding capacity can be increased at constant package diameter by increasing the length of the take-up tube. The amount of such increase of the tube length is obviously limited by the machine dimensions in the case of the parallel winding element, while it would create no basic difficulties where the take-up tubes are arranged at a right angle to the machine axis.

One obvious and frequently followed method for increasing the number of take-up points consists in providing two rows of winding points, one above the other. It is feasible in the case of both parallel and lateral bobbin axes, but generally presents difficulties in passing the thread to the lower bobbin. With this double-deck arrangement, the scope for increasing package diameters and hence the spacing of the rows of bobbins is limited in that the distance between the point of departure of the thread from the bodet and the traversing thread guide of the upper winding point must be sufficiently great in view of the "traverse motion triangle" and the changes in thread length resulting from it during a traverse stroke, and further in that the overall height of the machine, for reasons of accessibility during operation, must not exceed a certain measure.

Arrangements are furthermore known in which two bobbins placed one above the other are driven by one common driving roll, in which case the thread running to the lower bobbin passes between the upper bobbin and the driving roll. The disadvantage of such an arrangement lies above all in the fact that the thread to be wound onto the lower bobbin loses some of the spin-finish to the upper bobbin package. Furthermore, the drag on the lower thread on its way around the driving roll causes a shortening of the traverse stroke and results in narrower packages on the lower bobbins as compared to those of the upper row. Finally, there is the danger in such systems that individual filaments of the thread may be split off and carried away by the other thread, causing much dreaded denier variations.

In addition, two-sided spinning machines are known to the trade, i.e., machines which could be divided into two inversely symmetrical, regular one-sided machines by separation along the imaginary longitudinal symmetrical plane. All essential parts such as spinning pumps, spinnerets, spinning shafts, as well as godets and winding points, are present in double execution and arranged in separate sets. The two halves have merely parts of the machine frame and possibly the drive mechanism in common. The disadvantages of such a two-sided arrangement include poor accessibility of certain parts of the machines and difficult arrangement of the blowing air supply pipes between the two rows of spinning shafts.

The present invention provides a means to increase the production efficiency of melt or dry spinning machines by increasing the number of winding points without affecting their winding capacity. In further improvement of the known arrangements, it is proposed by the present invention that the winding elements in a spinning machine, wherein the spinning points are arranged in one row with drawing-off godets arranged underneath, be executed in twin form, comprising two parallel rows of winding points with separate drives, in which the bobbin axes are preferably arranged parallel to the longitudinal axis of the spinning machine.

Contrary to the known, two-sided spinning machine, only the winding parts of the machine are presented in double or twin form in this arrangement while the entire spinning devices and draw-off godets are single arrangements. The advantages of this arrangement are obvious since the number of winding points as compared to the one-sided one-deck machine is doubled without appreciable additional space requirements. As compared to the two-deck-winding machine, the advantage lies in the easy accessability and operation of each winding point and in the possibility to increase the package diameter to any desired degree, especially in systems with the bobbin axes parallel to the machine axis. Furthermore, the thread paths to the two bobbins can be made completely symmetrical or approximately so, and there is no need to compromise with the previous disadvantages of the thread path to the lower deck bobbins.

As compared to the two-sided spinning machine, the construction according to the present invention is considerably simplified and cost reduced by the elemination of the second row of spinning shafts and the second set of draw-off godets since the one row of spinning shafts now simply spins double the number of threads.

In order to keep the width dimension of the winding apparatus as narrow as possible and to reduce the angle of deflection of the thread from the vertical middle plane of the machine, the desirable arrangement of the driving rolls for each twin set of winding bobbins is to place the driving rolls as closely together as possible, to keep their diameters as small as possible and to have the bobbins press against them from the outside. It is, therefore, further proposed that each pair of winding bobbins be allocated a common traverse motion for the thread guides and to arrange it above or between the bobbins. Thus the thread guides of both winding points may be driven simultaneously by one single traverse groove cylinder situated partly above and partly between the pair of driving rolls. In a preferred execution, the twin winding points are arranged symmetrically to the plane of the spinning point arrangement.

It is further proposed that the draw-off godets, yarn stretching devices or means for the application of finishes, other accessories to the spinning machine, as well as their supporting elements, be arranged separately from the winding parts proper. They may e.g. consist of a special rack supporting the front panel on which these parts are mounted. In view of the space required for such supports, it is finally proposed that this part of the framework be entirely eliminated and that the said upper draw-off and finishing devices be mounted on a frame secured to and hanging from the ceiling of the work room; this is a particularly advantageous arrangement since this part of the machine is not heavy in itself, while mounting in the said manner would greatly facilitate supervision and accessability of the twin winding points.

One illustrative but by no means limitative example for a preferred embodiment of the present invention is described hereunder with reference to the accompanying drawings, in which:

FIGURE 1 is a perspective view of a section through one of a plurality of respective spinning and winding stations arranged in respective rows thereof in the spinning machine equipped with twin winding points each served by one common single arrangement of godets and finish application;

FIGURE 2 shows in section the joint traverse motion for the thread guides serving the twin winding points; and

FIGURE 3 is an end elevation, partly in section, of said machine.

Referring now to the drawings, wherein like character and reference numerals represent like or similar parts, at the lower end of the spinning shaft **1** of a spinning machine **33** the continuous monofilament or multifilament threads **4** and **5**, produced in a known manner by the melt or dry spinning process and each led over a moistening and a finish applying roller **2** and **3**, are drawn off jointly at high speed by means of the draw-off godets **6** and **7**. The rollers **2** and **3**, godets **6** and **7**, as well as any possible further accessories of the machine, such as yarn stretching devices, are mounted on a support **10** consisting essentially of a supporting frame **8** and side panels **9**. The support, in turn, is suspended from ceiling **34** of the work room on rails **11** and has its lower portion formed into face **12**.

Threads **4** and **5**, jointly drawn-off and transported up to and around godet **7**, are separated in that thread **4** now continues to take-up bobbin **13** and thread **5** to take-up bobbin **14**. Bobbin **13**, held by a bobbin spindle, is mounted freely rotatable on swivel arm **16** mounted on shaft **15** of the machine frame, and is driven in a known manner by driving roll **17**. The traverse motion of thread **4** is accomplished by means of thread guide **18** mounted on traverse rod **19** and moved by the control roller **20**, extending from the traverse rod into the control groove **21** of the revolving traverse cylinder **22**. Cylinder **22** may be driven by drive shaft **23**. At the opposite winding point, the take-up bobbin **14**, held by a bobbin spindle, is mounted freely rotatable on swivel arm **25**, mounted on shaft **24** of the machine frame, and is driven in a known manner by driving roll **26**. Thread guide **27**, serving this winding point, is fixed to traverse rod **28**, whose movements are controlled in the same manner as described above by control roller **29** extending into control groove **21** of traverse cylinder **22** from the opposite side. The drive of the driving rolls and traverse cylinder of an individual winding station or pair of bobbins may be executed either as collective, group or individual drives. Also, the driving rolls and cylinders of the several winding stations or pairs of bobbins may be commonly driven or separate drive means may be provided for each winding station or pair of bobbins. The take-up bobbins, moreover, may be provided with individual slave drives to reduce stress on the package surface.

In order to facilitate separate threading of the jointly delivered threads **4** and **5** to either of the take-up bobbins **13** or **14**, devices may be provided for the temporary accommodation of the threads and from which they are removed individually and led on to the bobbins. For example, a waste godet may be provided at the lower end of support **10** in a known manner, to which the threads can be diverted, or a suction device of known construction may be arranged as shown in the accompanying drawings, including compressed air duct **30** and exhaust duct **31**, as well as a suction opening **32** into which the threads are introduced.

It is apparent from the illustrated embodiment of the present invention that the twin arrangement of the take-up bobbins to serve one single row of spinning points allows doubling of thread output, especially where the arrangement of the bobbin axes parallel to the machine axis permits sizeable increases in package diameter, while in addition the overall design of the machine is simplified and space requirements are reduced.

The invention is hereby claimed as follows:

1. A spinning machine with thread take-up bobbins which comprises a plurality of thread spinning devices arranged in a single row, each spinning device adapted to produce a plurality of separately-spun filaments of a synthetic polymer by one of the melt spinning and dry spinning processes, passage means for discharging said filaments downwardly from the respective spinning devices, frame means extending longitudinally below said row, a set of draw-off godets on said frame means below the passage means of each spinning device for drawing the respective separately-spun filaments in common thereover while maintaining the separation of said filaments, winding means characterized by a pair of winding bobbins below said frame means for each of said sets of godets, the pairs of winding bobbins being arranged in

two, horizontally spaced, longitudinal rows which are substantially symmetric with a vertical plane through said passage means and said godets, each row composed of one of the bobbins of the respective pairs, and means for rotatably driving each bobbin.

2. A machine as claimed in claim 1 wherein the bobbin axes are parallel with the longitudinal axis of said machine.

3. A machine as claimed in claim 1, a reciprocable thread guide adjacent each bobbin for reciprocating the thread as it is wound on the respective bobbin, and means providing a common, reciprocal drive for the thread guides of the respective bobbin pairs.

4. A machine as claimed in claim 1 wherein said winding means is supported independently of said frame means.

5. A winding machine as claimed in claim 1 wherein said frame means is suspended from a ceiling of a room below a support floor for said thread spinning devices, and said winding means is supported independently of said frame means.

6. A spinning machine in combination with thread take-up bobbins comprising a support deck floor, a plurality of thread spinning devices supported on said floor and arranged in a row thereon, each spinning device adapted to produce a plurality of separately-spun filaments of a synthetic polymer by one of the melt spinning and dry spinning processes, passage means for discharging said filaments downwardly from the respective spinning devices, frame means suspended from said floor and extending longitudinally below said row, a set of draw-off godets on said frame means below the passage means of each spinning device for drawing the respective separately-spun filaments in common thereover while maintaining the separation of said filaments, winding means characterized by a pair of winding bobbins below said frame means for each of said sets of godets, the pairs of winding bobbins being arranged in two, horizontally spaced, longitudinal rows which are substantially symmetric with a vertical plane through said godets and said passage means, the axes of rotation of said bobbins being parallel with the longitudinal axes of said horizontally spaced, longitudinal rows, a pair of drive rollers between each pair of winding bobbins and providing individual drives on the respective thread windings of respective bobbins when the respective bobbins or the windings thereon are in driving contact with said drive rollers.

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