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Pike

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[54] **APPARATUS AND PROCESS FOR AIR TEXTURIZING OF YARNS**

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[73] Assignee: **J. P. Stevens & Co., Inc.**, New York, N.Y.

[22] Filed: **Dec. 11, 1972**

[21] Appl. No.: **314,070**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 213,274, Dec. 29, 1971, abandoned.

[52] **U.S. Cl.** ..... **57/34 B**, 28/1.4, 57/77.3, 57/157 F

[51] **Int. Cl.** **D02g 1/16**

[58] **Field of Search** ..... 57/157 TS, 157 F, 34 B, 57/77.3, 77.33, 77.35, 77.37; 28/1.4, 72.12

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[57] **ABSTRACT**

A jet texturizing or twisting apparatus having a texturized chamber with an adjustable direction changing rod extending across the chamber at right angles to yarn travel and having an axis offset with respect to the axis of the chamber, means for introducing yarn to be texturized, plied or both at an acute angle into a zone in which compressed air is introduced tangentially, causing a vortex which spins a loop or crank-shaped portion of the yarn, imparting to it a false twist. There can be either one yarn inlet at an angle or there may be two inlets. After the false twist, if it is desired to texturize, the direction of the yarn is changed by the adjustable rod and the yarn partially untwists as it moves across the rod, thus changing its direction. If there are two yarn inlets and hence two yarns introduced and the rod can be withdrawn to the point where there is no change in direction, then instead of texturizing, plying of the two yarns takes place. By introducing the rod part way, plying and partial texturizing can be effected. A process modification is also described in which the yarn before entering the apparatus is moistened. Heat may be also applied, either to the wet yarn before it enters the exit of the texturizer or after leaving the texturizer or both. This results in a partial setting of the loops where the rod has been introduced sufficiently to effect change of direction and hence texturizing. The process is usable even with very fine denier yarn of synthetic thermoplastic, and high operating speeds and, therefore, large outputs are obtained.

7 Claims, 5 Drawing Figures

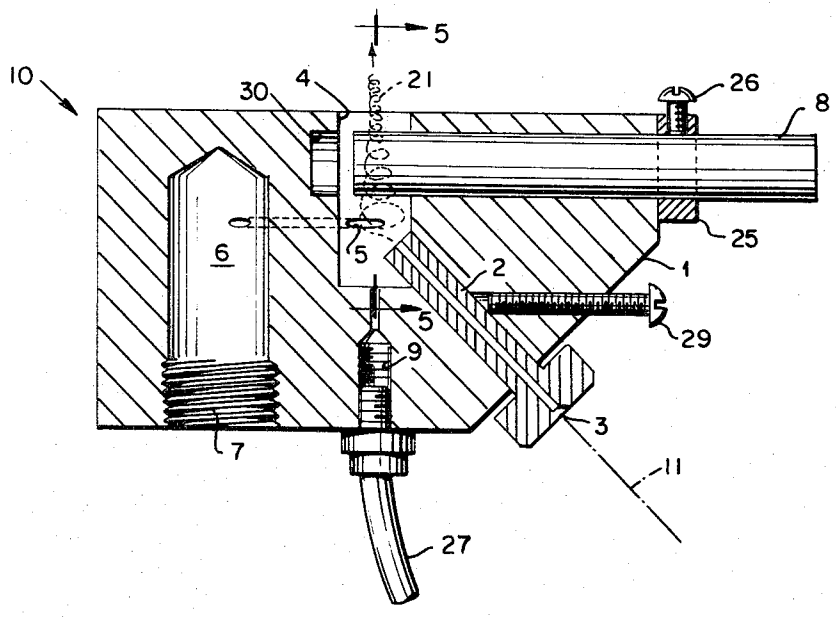


FIG. 1

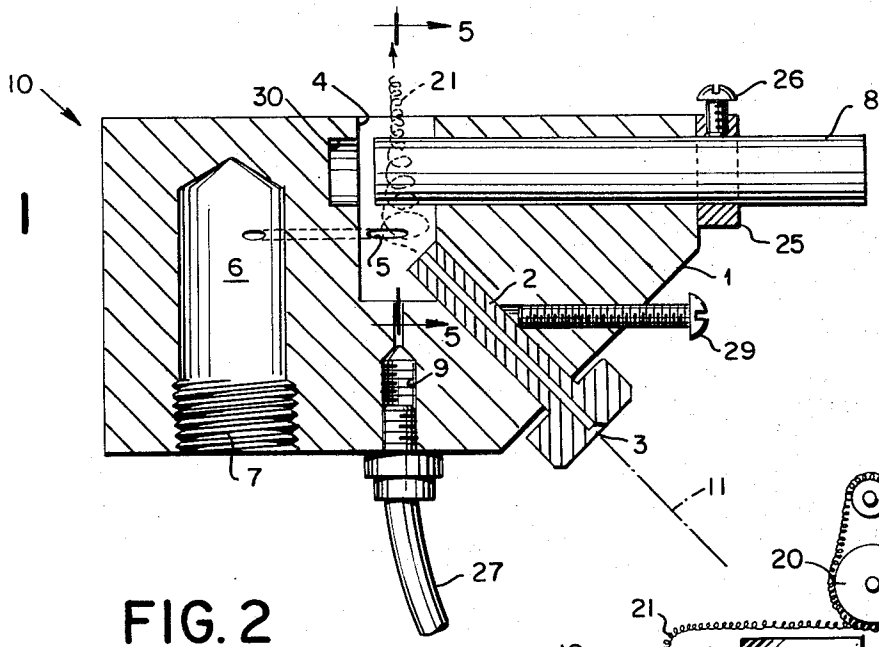


FIG. 2

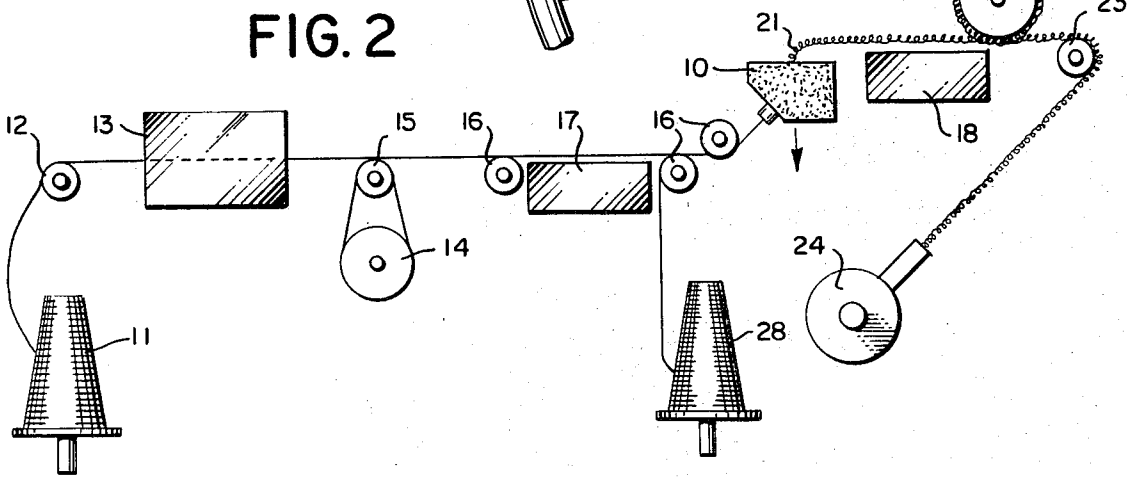


FIG. 3

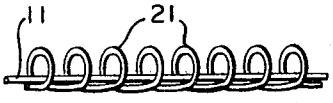


FIG. 4

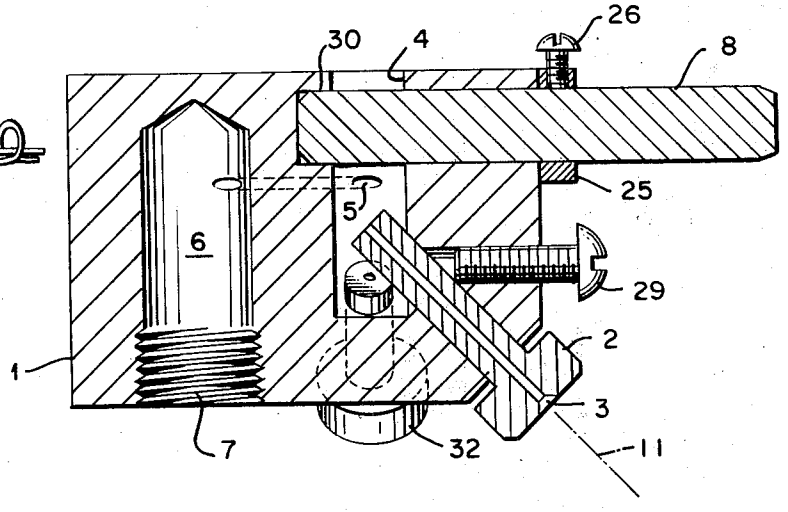
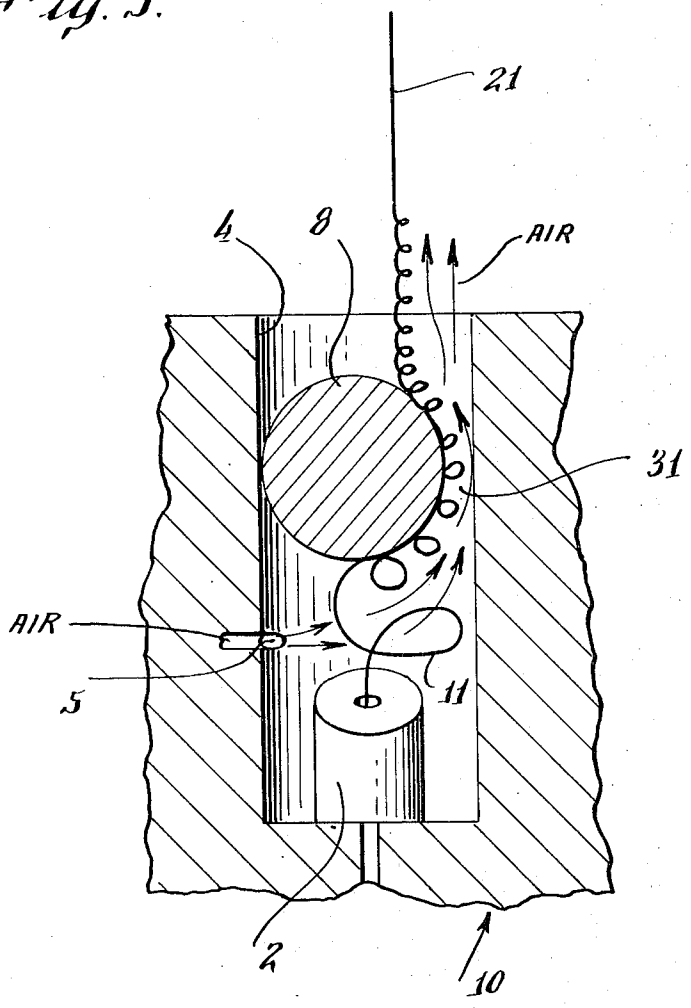


Fig. 5.



APPARATUS AND PROCESS FOR AIR TEXTURIZING OF YARNS

RELATED APPLICATIONS

This application is a continuation-in-part of my copending application 213,274, filed Dec. 29, 1971, and now abandoned.

BACKGROUND OF THE INVENTION AND OTHER RELATED PATENTS

Air texturizing of spun yarn is known. In one type of apparatus air is blown along with the yarn passing through the apparatus, causing it to flutter, which imparts a certain amount of false twist that is then relaxed, preferably with a change in direction, the relaxing twist forming loops which constitute the texture. Improvements on air texturizing apparatus are described and claimed in my U.S. Pat. No. 3,653,196, Apr. 4, 1972. In this patent yarn is introduced at an angle into a zone where a blast of air in a tangential direction produces a spinning vortex, which causes the yarn to spin as a loop or crank-shaped protion, imparting a false twist which is more extensive than that obtainable by an air blast along the yarn which causes it to flutter. The false twist is then permitted to untwist with an abrupt change of direction, which is illustrated in the patent, as the yarn leaves the texturizing chamber. Another texturizing apparatus is described and claimed in my U.S. Pat. No. 3,700,391, Oct. 24, 1972. In this apparatus the abrupt change of direction is effected by a bevelled plate on a micrometric threaded shaft mounted in a flange on the apparatus which locates the bevelled plate over the axial outlet of the texturizer. In both my earlier patents above referred to, the description of preferred embodiments describes change of direction outside of the texturizer proper.

In both my patents above referred to, the amount of false twist imparted is very great, and very rapid yarn movement is possible. As texturizing results in a shortening of the texturized yarn, it is fed into the texturizing chamber at a higher speed than removal of the texturized yarn. This requires overfeed of yarn into the texturizing chamber.

The present invention constitutes an improved apparatus and an improved process for the spinning loop type texturizer described in my related patents above referred to.

SUMMARY OF THE INVENTION

The present invention has two aspects. One is an improved apparatus which uses an adjustable rod or bar for changing the direction of the false twisted yarn, where texturizing is desired, and acts as a slide valve for changing pressure in the texturizing chamber to form texturizing loops. The axis of the rod is displaced slightly with respect to the axis of the texturizing chamber. It will be noted that the texturizing chamber is substantially at right angles to the rod. There may be one or two yarn inlets, each one being at an acute angle, as described in the patents above referred to. The slide valve is preferably in the form of a rod which can be slid into the chamber various distances, including flush with the chamber wall. The rod when it is to be inserted across the chamber and, if necessary, into the recess on the opposite side of the chamber, which is desirable where maximum texturizing is to be effected, the rod

having an axis offset from the axis of the chamber whereby it leaves a space between the chamber wall and the surface of the rod, which is a slot of the width corresponding to the offset of the rod axis. False twisted yarn moves up, with the escaping air from the chamber, as will be described in more detail below, and it is caused to abruptly change direction, first as it strikes the under side of the rod, and has its direction changed so that it can go around the rod through the slot referred to above, and secondly, after passing through the slot, to a more or less direct direction to the outlet of the chamber. The rod is substantially at right angles to the direction of the passage of the yarn through the texturizing chamber, and when it is slid in at least part way, the position causes a change in direction of the yarn as it relaxes and untwists from its false twist. The end of the rod also approaches the other side of the texturizing chamber and can be used as a valve to allow a definitely adjustable passage. Compressed air in the texturizing chamber passes through the slot between the offset rod and chamber wall, and if the rod is inserted not quite into the recess on the opposite chamber wall, across its end. The rod thus can act also as a slide valve and the passage is therefore controlled precisely by positioning the rod for the amount of air passing out with the texturizing yarn and hence the pressure in the texturizing chamber. Different yarns have different optimum pressures, and the slide valve action, therefore, provides an additional adjustment.

If the rod is withdrawn, so that it no longer projects into the texturizing chamber at all, and if two or more yarn inlets are provided, the spinning loop of all of the yarns false twists them, but as the untwisting does not occur with an abrupt change of direction, primarily the yarns are plied or twisted together, with little or no texturizing. Inserting the rod more and more into the chamber results in texturizing one or both yarns. Various degrees of plying and texturizing can therefore be effected by positioning of the rod. Where only one inlet is used, this is the inlet which is substantially in the plane of the axis of the rod and is at an angle to the point in the texturizing chamber where the loop is whirled. This is the same as in my patents above referred to and, as there, the point at which the yarn enters the tangentially swirling air is somewhat critical, though adjustment is not so critical as to create operating problems. The adjustment is, of course, the same as in my earlier patents and provides for the yarn entering the swirl between 1/16 inch or somewhat less and preferably not over ¼ inch of the swirling loop. Change of direction, where it occurs when the rod projects into the chamber, is inside the chamber and not outside, but the change is just as real and performs the function of texturizing as the false twist of the yarn occurs. As has been stated above, sliding the rod in or out changes the back pressure in the spin chamber and in some cases changes the number of loops formed. The adjustment of this rod is an additional, more precise determinant of the amount of relaxation or untwisting of the false twisted yarn and permits a more precise control of the amount of texturization, when a single yarn inlet is used, than is readily available with the axial outlet of the texturizing chambers described in my patents. In addition, sliding the rod more or less into the chamber with multiple yarn inlets varies the relative amount of texturization and plying, as has been described above.

The process of the present invention applies water or oily softening liquid to the yarn before it is overfed into the texturizing chamber and applies sufficient heat to soften the yarn. The false twisted, wet yarn loses a great deal of its moisture from the centrifugal force of the rapidly rotating texturizing loop or crank, and this is blown out through a vent or drain in the bottom of the texturizing chamber.

After passing over the adjusted slide rod which of course is approximately at right angles to yarn travel and which provides an accurately adjusted amount of relaxation, the texturized yarn, which will normally be still somewhat damp, may be, and in a preferred form is, passed over a heated surface to dry it and to set the relaxed twist with its texturizing loops. The set texturized yarn is then drawn through exit rolls and wound on a winder. These latter operations are not substantially different than in my related patents and will be shown in the more specific description and preferred embodiments further below only for the sake of completeness.

The process and apparatus of the present invention permit operating even with very low denier yarns, for example 300 to 40, and a more bulky texture results. Very high speeds, up to as much as 925 yards per minute, are also achievable.

From the standpoint of the apparatus it is possible to use the feature of the adjustable rod without wetting or heating of the yarn; in this case of course the drainage vent for liquid is not needed. However, it is preferred to operate in conjunction with the process features of the present invention as an improved, more permanent set texture results without adding to cost or slowing down the machine. Therefore, in the preferred form of apparatus the liquid drainage vent is included.

Reference has been made to applying water to the yarn before heating, texturizing and, if desired, heating the relaxed texturized yarn. The purpose is to soften the yarn so that finally a more permanent set of the texturized form results. Water is very satisfactory and economical and is preferred, but of course any other liquid which softens the yarn may be used, and so in its broader aspects the invention is not strictly limited to the use of water. If another liquid is used, of course it must be suitable for the particular yarn being texturized.

The apparatus and process of the present invention are suitable particularly for texturizing and/or plying of synthetic yarns, such as polyesters, but are also applicable to other yarns, such as nylon, acrylic, etc. Blends, of course, are also useful. In general the present invention does not differ from the earlier patents in using a particular yarn, except, of course, that from the process aspect a yarn may be used which can be softened and or swollen by water and heat and set after false twisting and relaxation. As in my prior patents overfeed is necessary, and it is an advantage of the present invention that the amount of overfeed is not critical and may vary over a wide range. Some overfeed is necessary, and therefore the range is from over 1:1 to less than 100:1, which would represent about the practical limit for overfeed. In general for a definite amount of bulking of yarn after texturization, the overfeed will be the same or in the same range.

When the process of the present invention is used a change in the appearance and feel of the texturized yarn can be noted. In other words, the present invention not only produces a more permanent degree of texturization but it also constitutes a different product, which for many purposes has a more desirable texturization.

As the drive of the in-feed rolls is not changed from that of the earlier patents the present invention and the tangential air blast is also not changed, these features will not be illustrated. As far as the process aspect of the present invention goes it does not make any difference whether the slide valve or rod comes in from the side. However, for simplicity in manufacture, which is of importance in the apparatus aspect, the openings for sliding the rod in and for sliding in the yarn in-feed bushing are preferably located at one end, though of course the yarn in-feed bushing is still at an angle. In the same end there can be a tapped hole for a set screw to clamp the yarn in-feed bushing when it has been inserted to the particular point desired for particular yarn. The arrangement of openings makes it possible to drill out an aluminum block to form the texturizing chamber and then anodizing it, which is a very rugged and economical form. A very compact chamber is made possible, for example for texturizing certain very fine yarns a block having the dimensions of about 1½ inches × 1 inch. Other materials which are wear resistant may be used instead of anodized aluminum. Softer materials, such as brass, are not excluded but are less desirable.

At high speeds the apparatus is fairly noisy and so can be mounted in an outer metal housing with soundproofing material. The housing may advantageously carry inlet and outlet yarn guides for the chamber and can fit over the permanently mounted chamber so that it can be easily removed for cleaning out lint. If the process modification is used, which requires a liquid drain valve to the chamber, this may be attached to a flexible tube because it is not necessary that drainage be by gravity since there is sufficient air pressure in the texturizing chamber to blow out liquid thrown off by centrifugal force of the spinning loops regardless of the force of gravity. This is an advantage as sound deadening is increasingly important. It is not essential to use gravity for liquid drainage when the process modification is used, which makes possible a greater flexibility in location of the apparatus.

Texturizing and/or plying can be with any suitable spun or multi-filament yarn, and in its broader aspects, therefore, the process of the present invention is not limited to a particular yarn. For some purposes it is desirable to have two different kinds of yarn treated simultaneously, for example a spun yarn, such as cotton, rayon or other yarn, which acts as a core yarn, and a continuous filament synthetic yarn, such as polyester. The continuous filament yarn wraps itself around the core yarn during texturizing but cannot be unwrapped for any distance because the loops of continuous filament yarn are partially embedded at points in the spun yarn. Especially where the yarns are of different color, very attractive composite texturized yarns can be produced. These yarns may be considered as plied as well as texturized, and where the modification utilizing more than one yarn inlet is used, the degree of plying and texturizing can be adjusted over a considerable range by positioning of the rod in the texturizing chamber.

In related patents, it has been pointed out that sometimes there may be more than one spinning loop

formed in the texturizing zone. The same holds true in the present invention, but for simplicity in the drawings a single loop only will be illustrated, it being understood that the invention is not limited to operating with a single loop.

The double inlet, which will be described below, can be used for texturizing a single yarn. It has been found that the other yarn inlet can be withdrawn from the chamber and texturizing will still take place, although with a small leakage of air from the texturizing chamber through the open hole. If desired, this hole can be plugged or the inlet can remain in the hole and be capped. As it is much more economical to manufacture a single model, the double inlet form ordinarily will be used and sold even though the device may be used for a single yarn, with or without plugging or capping of the other inlet.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a section through a texturizing chamber of the present invention with a single yarn inlet;

FIG. 2 is a purely diagrammatic illustration of the process;

FIG. 3 is an enlarged illustration of a composite yarn produced in FIG. 2,

FIG. 4 is a partial section illustrating yarn plying and texturizing as the rod is not fully retracted so that it projects into the chamber, and

FIG. 5 is a vertical section through the texturizing chamber, partly broken away, along the line 5—5 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a texturizing chamber, which is generically referred to as **10** in FIGS. **1, 2** and **4.** The chamber is provided with a housing **1,** an inclined yarn introducing inlet **2** with a beveled mouth **3.** This inlet, which is at an acute angle to the travel of yarn through the texturizing zone, may be moved in and out to adjust its end relation to the tangential air blast, which will be described, to produce optimum false twist and hence texturization. The positioning of the inlet performs the same function as the corresponding elements in my patents and, therefore, is illustrated here purely diagrammatically.

The yarn leaving the inlet **2** enters into a texturizing chamber proper **4,** which is provided with a tangential opening for compressed air **5,** from chamber **6** which can be connected by internal threading **7** to a source of compressed air, (not shown). A single whirling loop is produced by the tangential air blast, as illustrated, and results in imparting to the yarn a false twist. The yarn then passes over an accurately adjustable slide valve rod **8,** substantially at right angles to the general movement of the yarn through the texturizing chamber, and is allowed to relax and untwist the false twist in the same manner as in my related patents except that this untwisting and change of direction which is necessary to bring out the texturizing loops as the false twist releases, is inside the texturizing chamber instead of a change of direction outside as in my related patents. When the rod **8** is positioned at least partially across the chamber the operation is substantially similar to that of my prior patents, i.e. texturizing takes place, but the adjustment of the position of the rod **8** can be made more precise and so in this portion of the apparatus an improvement in the perfection of adjustment is made possible.

It will be noted that in FIG. **1** the opening for the slide valve rod **8** and the yarn inlet bushing **2** together with its positioning set screw **29** come in the same end of the hard anodized aluminum block in which the texturizing chamber is formed. Of course the bushing **2** is at an acute angle to the passage of the yarn through the chamber. The amount by which the slide valve rod **8** is moved in or out can be adjusted by a collar **25** with a set screw **26.** This adjustment also varies the back pressure in the texturizing chamber **4** as more or less air can pass the end of the rod **8** and emerge with the texturized yarn **21.**

In FIG. **1** the rod is shown projecting partially across the chamber wall and has its axis offset from the central axis of the chamber. This offset produces a slot **31,** which has been referred to in the general portion of the specification. In FIG. **4** the rod is shown extending all the way across the chamber and into a recess **30** on the opposite chamber wall. This results in maximum texturizing.

As will be described in conjunction with FIG. **2,** illustrating the process, a modified yarn going in carries the reference **11** and the texturized yarn leaving the reference numeral **21,** these being the same numerals as applied to the same material in FIG. **1.** FIG. **2** also illustrates that the process applies water or other softening solvent to the yarn before it is overfed into the texturizing chamber, preferably after being passed over a heated surface. The rapidly rotating loop in the tangential air blast throws out a considerable part of the water by centrifugal force, leaving a texturized yarn which while still slightly damp contains less liquid than the yarn entering. This liquid, such as water, is blown out of the bottom of the texturizing chamber **4** through the lower vent **9** into a tube **27** which fastens to a threaded fitting engaging the internal threads in the vent **9.**

Since there is a positive air pressure in the texturizing chamber, the orientation of the block **1** is immaterial. However, if desired the vent **9** may be vertical and drainage aided by gravity. The same design of texturizer can be used without water or other liquid if the moistening and heating of the process is not employed. In this case the vent may remove fly and sizing material stripped off the yarn as it forms a spinning loop. The housing **1** of the texturizing chamber must, of course, be mounted in a suitable framework, but as this is conventional with all texturizing apparatus, the mounting is not shown as it has nothing to do with the present invention. As has been stated above, the present invention permits the use of air at lower pressure than the old co-current texturizing. The pressure is not critical and can be as low as 5 psi.

FIG. **2** represents, in diagrammatic form, the process of the present invention. The incoming yarn **11,** from a conventional yarn package, runs over a guide roll **12** through a wetting container **13** of conventional form in which the yarn passes through water and is throughly wet. It then passes around in-feed rolls **14** and **15** and is fed across a heated surface **17,** being maintained in contact therewith by the guide rolls **16.** The heated wet yarn then passes through the texturizing chamber **10,** which is illustrated in FIG. **1,** and, as there described, water thrown out certrifugally as the loop of yarn is spun by the tangential air blast is blown out through the bottom drain or vent **9.** As FIG. **2** is purely diagram-

matic, the details of the texturizing chamber, including air inlet, are not shown.

FIG. 2 illustrates the texturizing of a composite yarn in which a core yarn of spun material, for example cotton yarn, 11 is joined by a continuous filament polyester yarn 28 just beyond the heating surface. The texturizing of the two yarns together causes them to wrap around each other or, more precisely, primarily for the polyester yarn to wrap around the cotton yarn, and when the false twist untwists or relaxes the two yarns are not wrapped so that they can be unwrapped as at various points the polyester yarn embeds itself in the soft cotton yarn so that complete untwisting cannot be effected.

FIG. 3 illustrates, in semi-diagrammatic form and on an enlarged scale, the looping of the polyester yarn around the cotton core yarn and embedding at various points. To simplify the showing of FIG. 3, the cotton yarn 11 is shown as straight. In an actual texturized yarn there is not a perfect wrapping around of the polyester yarn around the straight core yarn as to some extent they wrap around or ply with each other.

After passing through the texturizing chamber, the texturized yarn, which bears the same reference numeral 21 as in FIG. 1, passes over a heated surface 18 out through exit rolls 19 and 20 and guide roll 23 and is wound up on a package by a conventional winder 24. As the texturized yarn is extensively bulked, it is shortened, and as has been described above, there is a very substantial overfeed, which may, for example, be 3:1. It is effected by running the feed rolls 14 and 15 at the necessary higher speed than the exit rolls 19 and 20. The rolls 14 and 15 feed the yarn in rapidly and may, with suitable yarns, feed it in at a speed of 900 yards per minute or slightly more. The speed is determined to some extent by the nature of the yarn being texturized and in some cases somewhat lower speeds are desirable in order not to put too much of a strain on some delicate yarns. The particular rate at which texturizing takes place is not, by itself, the distinction from the prior art. It is, however, an advantage that considerably higher speeds are practical than with the older prior art which blew air along the yarn and imparted false twist by the fluttering of the yarn in the air stream. Also, as has been described in the related patents substantially lower air pressures are useful in the texturizing chamber. All of these factors result in lowered costs of texturizing, and it is an advantage of the present invention that improved set texturizing is obtained without sacrificing the other factors of cost economy of my related patents.

The heaters 17 and 18 are of conventional design and may advantageously be electric. However, the particular heating of the surface contacting the yarn before and after texturizing is not the distinction of the present invention and any suitable conventional heating means may be used. Obviously, of course, the heated surface should be smooth in order not to damage the yarn and a smooth surface is, therefore, desirable. The temperature of the heated surface is determined by the nature of the yarn. In the case of the heater 17 it is only necessary that the wet yarn be heated to the point where some swelling or softening of the yarn takes place. The temperature is not at all critical and as an illustration with the polyester yarns described, it may be from about 200°F. to 450°F.

Heater 18, which is optional, though preferred, heats the moist but not wet yarn sufficiently to dry it and to thus at least partially set the loops in the texturized yarn which give it its bulky texture. The temperature can advantageously be the same as that of heater 17, for example, with the yarn described from 200°F. to 450°F. The extent of the surface, as is obvious, must be sufficient so that when the texturized yarn is passed over it, it will be dried.

The exit rolls 19 and 20, which run slower than the infeed rolls 14 and 15, as has been described, should also exert only sufficient pressure so that the dried, texturized yarn is fed onto the winder 24 without significant deformation of the texture by the pressure of the rolls. The winder 24 is conventional and can wind the texturized yarn into packages of the desired form. The winding mechanism, as has been stated, does not form any part of the present invention and any conventional winder can be used.

As has been stated above, the purpose of the wetting and subsequent drying and setting is to soften or swell the incoming yarn and then set the texturized yarn. Water is the preferred liquid, but the invention is not limited thereto and any other suitable liquid may be used depending on the nature of the yarn. If liquids other than water are used, it is sometimes necessary to provide the heaters 17 and 18 with hoods or other suitable provision to prevent undesired liquid vapors from escaping and/or to recover the liquids. Such structures are conventional wherever such liquids are used and are, therefore, not indicated on FIG. 2. Because no additional equipment is needed for recovering or venting vapors from the liquid when water is used, this is definitely preferred though the invention does not exclude other liquids.

FIG. 4 illustrates a modified chamber with two yarn inlets. As most of the elements are the same as in FIG. 1 they will be given the same reference numerals. A second yarn inlet also at an acute angle to the travel of the yarn can be seen at 32 receiving a second yarn.

FIG. 3 shows a plied yarn diagrammatically, as has been described above in connection with a single inlet modification shown in FIG. 1. The appearance of the yarn is the same with two inlets and will be further described when so used as follows. In the loop which spins the yarn 11 and a yarn 21 from second inlet 32 are plied together. The plying is shown as a straight plying, and a plied yarn can be produced. If one or other of the yarns is relatively soft or loose and the other yarn less so, there will be some texturizing and one yarn will be buried in the other. The plying is, however, more reliable, and a greater residual twist remains.

If the rod 8 in either FIG. 1 or FIG. 4 is moved further into the chamber, more texutrizing will result, but unless it is introduced all the way across the path of the yarn and into recess 3, there will be some plying as well as texturizing. The exact relative amounts of the two effects can be accurately controlled.

It will be noted that in FIG. 4 the yarn inlet 2, which is the one that is in a plane parallel to the plane of the axis of the rod 8, is above the second yarn inlet 32 i.e., nearer the gas blast inlet 5. While the exact spacing between them is not critical, it is necessary that inlet 2 be nearer the air inlet 5 than yarn inlet 32. As has been stated above, if unused, inlet 32 may, if desired, be removed or capped or otherwise plugged. As capping or plugging is a well known operation, it is not specifically

illustrated on the drawing. It will also be seen that FIG. 4 does not shown any provision for draining out fluids if the yarn is treated with them prior to texturizing or plying. This is done in order not to complicate unnecessarily the drawing since such a drain is very clearly shown in FIG. 1, and can be incorporated in FIG. 4 if needed.

I claim:

1. In a device for applying false twist to at least one yarn and relaxation of the twist, said device including a chamber proper, means for supplying a compressed gas tangentially thereto to produce a gas blast, at least one yarn infeed conduit extending into the chamber at an acute angle to the direction of yarn passage through the chamber, said conduit ending adjacent to but just before the tangential gas blast entrance, whereby the tangential blast spins at least one loop of yarn to impart false twist thereto, the improvement which comprises a surface being adjustably and lockably movable into the chamber and said surface effecting change of direction of the yarn, said surface being within the chamber and located beyond the portion of the chamber in which the tangential gas blast effects false twist of the yarn in the direction of yarn travel, the surface being substantially at right angles to the direction of the passage of yarn through the chamber and being movable from a position flush with the chamber walls to a position all the way across the chamber and means for holding the position of the surface at any point to which its position has been adjusted, the surface and other portions of the device being immovable once the position of the surface has been adjusted.

2. A device according to claim 1 in which the surface is the outer surface of a rod extending substantially at right angles to the passage of yarn through the chamber, said rod having a central axis offset from the axis of the chamber whereby when the rod is inserted fully into the chamber the offset produces a slot between the rod and the chamber wall through which slot the false twisted yarn passes.

3. An apparatus according to claim 2 in which the rod is a circular rod.

4. An apparatus according to claim 3 in which there are two yarn inlets at angles to each other, one of the yarn inlets being in a plane substantially parallel to the axis of the rod, said yarn inlet ending in the chamber in a position nearer the gas blast entrance than that of the second yarn inlet.

5. An apparatus according to claim 3 in which there is a recess in the chamber wall aligned the axis of said rod and of dimensions so that when the rod is fully extended it crosses the chamber and fits into the recess.

6. An apparatus according to claim 2 in which there is a recess in the chamber wall aligned the axis of said rod and of dimensions so that when the rod is fully extended it crosses the chamber and fits into the recess.

7. An apparatus according to claim 2 in which there are two yarn inlets at angles to each other, one of the yarn inlets being in a plane substantially parallel to the axis of the rod, said yarn inlet ending in the chamber in a position nearer the gas blast entrance than that of the second yarn inlet.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,831,363

DATED : August 27, 1974

INVENTOR(S) : Herbert J. Pike

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the ABSTRACT, lines 1 and 2, change "texturized" to -- texturizing --;
In the SUMMARY OF THE INVENTION, Column 2, line 26, change "texturizing" to -- texturized --;
In the DESCRIPTION, Column 6, line 24, change "the process, a modified" to -- a modified process, the --;
In Claim 5, Column 10, line 17, after "aligned" add -- with --;
In Claim 6, Column 10, line 23, after "aligned" add -- with --.

Signed and Sealed this

Tenth Day of August 1976

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks