United States Patent

Pike

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[54] **AIR YARN TEXTURIZER**

[72] Inventor: **Herbert J. Pike**, Martinsville, N.J.

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

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[52] **U.S. Cl.** .....**57/77.3**, 57/77.33, 57/157 F

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[58] **Field of Search** .....57/51.5, 77.3, 77.33, 157 F

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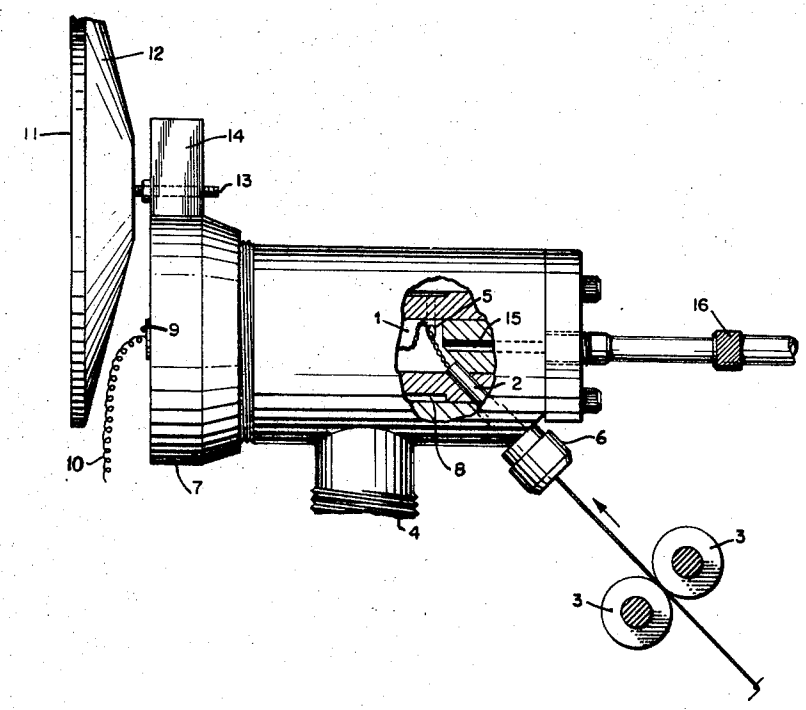
Primary Examiner—Donald E. Watkins

Attorney—Robert Ames Norton, Michael T. Frimer and Saul Leitner

[57] **ABSTRACT**

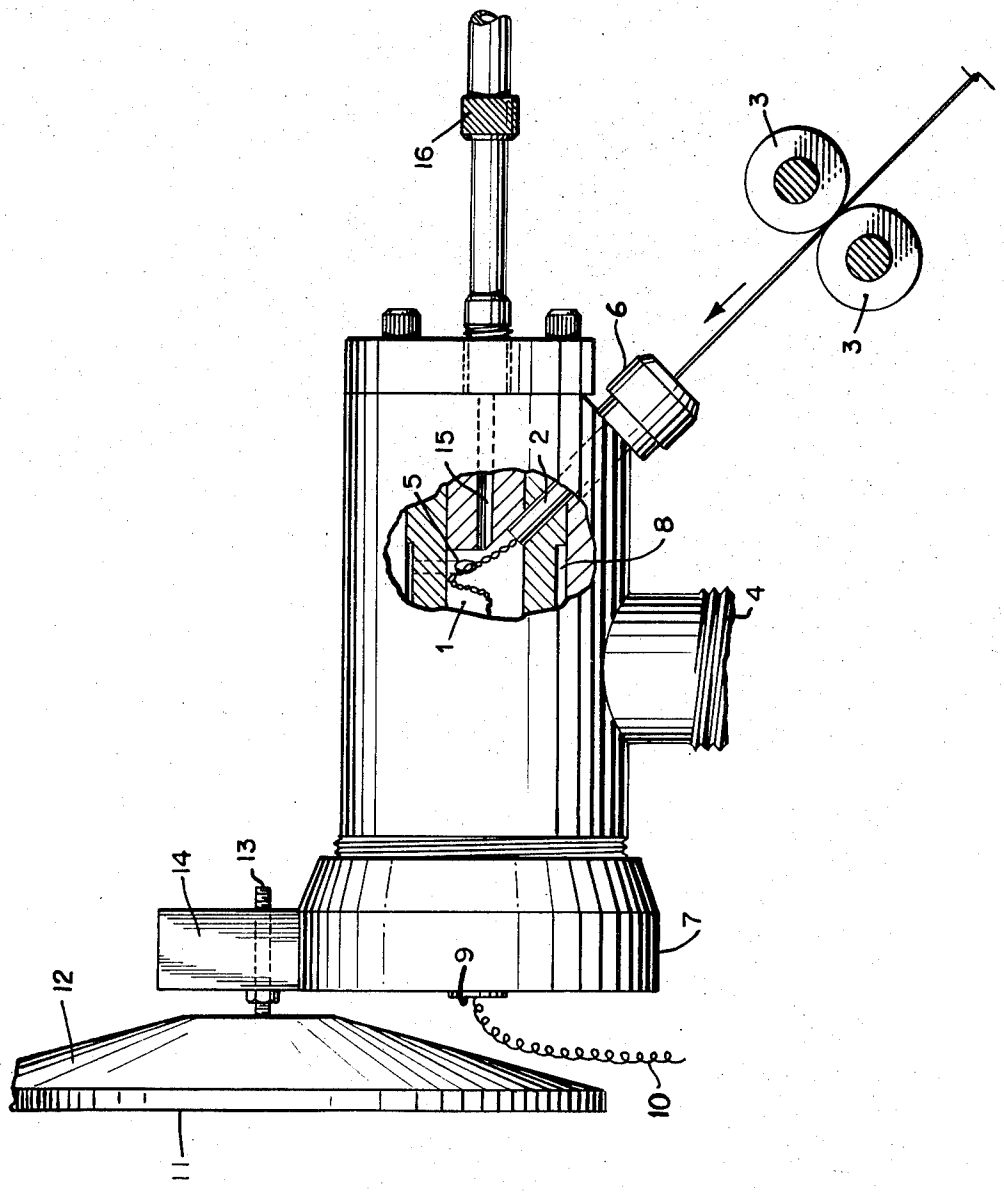
An air texturizer of the type in which the yarn is fed into a chamber with a blast of air, resulting in some twisting of the yarn, and the yarn untwists as it leaves the chamber and is changed in direction, for example at right angles, resulting in the formation of loops as it untwists. More particularly, the present invention is applied to an air texturizer of the type in which yarn is overfed at an angle into a vortex chamber, with a tangential blast of air causing the yarn to spin in the form of a crank or loop and flow out axially with the air and turn its direction. The texturizer is provided with a flange in which a beveled plate on a micrometric threaded shaft is mounted with a polished beveled edge over the axial outlet of the texturizer. This permits a very accurate adjustment of distance which controls the loops on the texturized yarn and permits operating overfeed of yarn. Bulkier yarn can be produced at a high rate of speed.

7 Claims, 1 Drawing Figure



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INVENTOR.
HERBERT J. PIKE
BY
Robert Cruse Morton
ATTORNEY

AIR YARN TEXTURIZER

BACKGROUND OF THE INVENTION AND RELATED APPLICATION

Yarn has been texturized on a large scale by introducing it more or less axially into a blast of air which causes the yarn to flutter and to twist. As the yarn untwists it can form loops, which results in a bulkier yarn of desirable texture.

More recently, an improved texturizer and process has been developed and is described and claimed in my co-pending U.S. Pat. No. 3,653,196, Apr. 4, 1972. In this patent above referred to instead of introducing yarn into a blast of air more or less axially and causing it to flutter, the yarn is introduced at an angle and the air blast is tangential and enters the texturizing chamber just beyond the yarn feed. This results in a rapid spinning of a loop of yarn which resembles a crank or a skipping rope and produces greatly enhanced twisting. The twisted yarn then passes out more or less axially and untwists, and its direction is rather sharply changed, for example 90° or more. The operation results in forming the yarn into loops as it untwists, which texturizes the yarn and bulks it. A better quality and more bulky yarn is produced than in the axial fluttering procedure, and operation can be carried out at high speed, for example 500 meters per minute based on the yarn entering the texturizer. A very considerable amount of overfeed is provided by introducing the yarn between rapidly rotating rolls so that it is introduced into the texturizing chamber more rapidly than it is removed, and a shortening and bulking of the yarn takes place. This is usually referred to as overfeed. It is with improved texturizers of both types described above, but more particularly with an improved texturizer of the type described in my patent above referred to, or an attachment therefor, that the present invention deals and permits a degree of overfeed and a bulking of the yarn markedly in excess of even what could be achieved in the texturizers described in my earlier application.

SUMMARY OF THE INVENTION

While the present invention can be applied to the type of texturizer in which the yarn is fluttered in a blast of air, it is particularly important in a texturizer of the vortex or spinning loop or crank type described in my patent above referred to above referred to and which will be described in the remainder of the specification, although the invention does include in a broader aspect an improved texturizer in which the yarn is fluttered by a blast of air. Essentially the present invention provides a beveled disc or plate having highly polished conical beveled surfaces and micrometrically adjustable to a precise distance from the axial outlet of the texturizer where the yarn changes direction and begins to form loops as it untwists. When properly adjusted, much greater bulking of the yarn is possible, and overfeeds up to 100 percent can be obtained, whereas before, overfeeds were considerably below 50 percent. One of the reasons why the present invention is particularly important with texturizers of the vortex or spinning loop or crank type lies in the greatly increased overfeeds which have just been described. Such large overfeed increases are not achieved with the fluttering yarn type of texturizer, although the quality of the resulting texturized yarn is also improved in this older type of texturizer.

In one respect one might consider that one of the effects of the beveled plate is to slow up the movement of the yarn after it has left the texturizer and changed its direction. Any slowing up of the yarn, even if the speed at which yarn is fed into the texturizer is maintained constant, will result in increasing the overfeed. However, it is usually preferable to associate the beveled disc of the present invention with a higher rate of infeed of yarn, and when both of these adjustments are made, overfeeds up to 100 percent can be obtained and an improved texturized yarn results. However, the present invention is not strictly limited in its broader aspects to a texturizer in which the speed of feed of yarn into the texturizer is increased, as improvements are obtained even though the speed is the same as it was before.

The angle to the horizontal of the highly polished beveled or conical surface of the plate or disc is not sharply critical. In general it should be at not greatly below 10° and should not exceed about 45°. Best results are obtained in the range between about 10° and about 15°.

The spacing of the beveled surface from the yarn outlet should be very accurately set, and so the disc or plate is preferably mounted on a threaded central shaft with a very fine pitch. This screws into a tapped hole in a flange at the end of the texturizer and permits precise adjustment of distance, which will vary somewhat for best results with different yarns. The distance can vary from practically touching the yarn to from one-eighth inch to three-sixteenths inch. Once adjusted for optimum results with a particular yarn at a particular operating speed, the adjustment is held reliably without the need of any special lock nuts or other devices as the blast of air against the conical surface tends to tilt the plate very slightly on its threaded shaft, which has the effect of binding the threads and the resulting friction prevents loosening. This is not to say that the invention cannot be used with lock nuts or other devices preventing loosening of the threaded shaft, but as ordinarily they are not necessary, the fact that such devices can be dispensed with is an added advantage of the present invention.

Reference has been made to the threaded beveled disc being mounted in a flange at the end of the texturizer. Strictly speaking, it is only necessary that there be a shoulder extending at one point sufficiently to take the threaded shaft. However, for structural devices a texturizer or a cap therefor, which is a preferred modification, can be provided very easily and cheaply with a flange concentric with the texturizer, and from an economic standpoint this is sometimes preferable.

It is an advantage of the present invention that the improved texturizing and quality of the yarn is obtained without reducing output and in fact permitting in many cases an increase in output, particularly in the case of the spinning loop type of texturizer described in my patent above referred to. No compromise with the texturizers used before is therefore involved.

The present invention is particularly useful and achieves maximum improved results with spinning loop or crank texturizers of the type described in my earlier application. It is, however, possible to apply it to cer-

tain other air texturizers in which an air blast twists yarn which is then permitted to untwist and change its direction.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawing is an elevation, partly broken away, of a spinning loop or crank texturizer with a beveled plate of the present invention adjacent its axial outlet.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The drawing shows a spinning loop type of texturizer and is partly broken away to show the loop as it spins inside. The texturizer comprises a housing or chamber **1** into which yarn is fed at an angle through a yarn feeding conduit **2** in the direction shown by the arrow. The conduit has an enlarged head **6**. The yarn is introduced very rapidly by two fast-spinning feed rolls **3**. As these are of more or less standard design they are shown only diagrammatically. An air blast is introduced substantially at right angles into an annular chamber **8** in the texturizer, from which it flows into the interior through a tangential hole **5** located just beyond the yarn in-feed conduit opening into the chamber, for example one-eighth inch.

The air introduced tangentially spins very rapidly as a vortex and causes a loop of the yarn to rotate rapidly, similar to that of a crank or a spinning rope. This is the same motion as occurs in the texturizer of my patent above referred to. The rapidly spinning loop twists the yarn, and it is then moved along axially to an axial outlet **9** in a cap **7** which is screwed on the end of the texturizing chamber proper.

The improvement of the present invention takes the form of a beveled or frustoconical plate **11** with highly polished beveled surface **12** having an angle with respect to the horizontal, of from about 10° to about 15°. This plate **11** is mounted on a threaded shaft **13** with an extremely fine pitch of thread and is screwed into a hole in a shoulder **14** extending out from the cap of the texturizer. The plate is screwed down to a point where the polished surface is very near or almost touching the yarn **10**, which has emerged from the axial outlet **9** and has changed its direction and has started to untwist and form loops which result in the desired texturizing. A precise spacing of the polished concal surface **12** from the yarn is effected by turning the conical plate, which results in its screwing into or out of the shoulder **14**. The surface **12** thus forms one boundary of the narrow zone between it and the outlet **9**. The extremely fine pitch of threads, for example about 32 to the inch, makes a very precise adjustment simple. The adjustment is usually between practically touching the yarn and about one-eighth inch.

While the texturizing chamber, except for the conical plate, is substantially identical with the texturizer of my patent above referred to, operating conditions may be somewhat changed. For example, the present invention permits a greatly increased overfeed, and, as has been mentioned above, this is preferably effected, in part at least, by speeding up the rolls **3** and increasing the speed with which the yarn enters the texturizer. 500 meters a minute is a very suitable rate of infeed for many yarns.

As in the texturizer of my patent above referred to, air pressure through the air inlet **4** should be adjusted for good results, but here, as there, the adjustment is not critical and considerably lower air pressures are often usable than were required with the older type in which an air blast fluttered the yarn. The present invention does not change these advantageous factors at all.

As the yarn is often quite flexible it is sometimes a little difficult to thread it in through end **6** of the inlet conduit and to carry it through the texturizer. Therefore it is desirable to provide for self threading means and this is shown on the drawings with a tube **15** controlled by a valve **16**. When a new end of yarn is inserted the valve **16** is briefly opened causing a puff of air to enter the chamber axially through the conduit **15**, this pulls the yarn into the texturizing chamber and starts it moving through the chamber and out through the outlet **9**. As soon as the yarn has been threaded the valve **16** is closed as otherwise a blast of air coming in axially would interfere with the tangental air blast which causes a loop or loops of the yarn to spin and introduces the false twist.

I claim:

1. In an apparatus comprising a texturizing chamber, means for introducing yarn therein and means for introducing a blast of air causing the yarn to twist, the apparatus also being provided with a substantially axial yarn outlet, the improvement which comprises a conical plate with polished conical surface mounted for micrometric adjustment axially of the texturizer and located so that the conical surface is adjacent but not touching, the axial outlet of the texturizing chamber, whereby improved loop formation in the yarn and bulking is effected.

2. An apparatus according to claim **1** in which the means for introducing yarn into the texturizing chamber is at an angle and the means for introducing air comprises means for introducing air tangentially to produce a vortex beyond the point of yarn introduction, whereby the vortex causes the yarn to spin in loop or crank form.

3. An apparatus according to claim **1** in which the conical plate is provided with a fine-pitch, threaded shaft mating with a tapped hole in a shoulder extending out from the texturizer end having the axial outlet.

4. An apparatus according to claim **3** in which the angle of the conical surface is between about 10° and about 15° to the horizontal.

5. An apparatus according to claim **1** in which the angle of the conical surface is between about 10° and about 15° to the horizontal.

6. An apparatus according to claim **1** comprising an axial conduit into the texturizing chamber just behind the yarn inlet and means for producing a brief puff of air when a new end of yarn is first introduced whereby the brief puff of axial air pulls the yarn into the texturizing chamber and directs it out through the axial yarn outlet.

7. A process of texturizing yarn which comprises introducing yarn into a stream of air capable of twisting the yarn, permitting the yarn to untwist, changing its direction and causing it to flow in a narrow zone one boundary of which is an inclined polished surface, introducing a brief puff of air axially behind the yarn and causing a fresh end of yarn to be sucked into the

chamber and led out through the chamber, whereby when a new end of yarn is introduced the brief puff of air exerts a self-threading action, the puff being sufficiently brief so that when yarn is being introduced and moved through the chamber the puff ceases and twisting begins.

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