United States Patent [19]

Price et al.

[11] **3,881,232**

[45] **May 6, 1975**

[54] **RESONANT BAFFLE FOR YARN TEXTURING AIR JET**

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[22] Filed: **June 26, 1974**

[21] Appl. No.: **483,239**

[52] **U.S. Cl.** **28/1.4**

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

[58] **Field of Search** ..... 28/1.4, 72.12; 57/140, 57/77.3, 34 B

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[57] **ABSTRACT**

The resonant baffle is in the form of a circular disc which is positioned in an enclosed chamber removably supported on the exit end of the air jet. The circular disc has a planar face extending transversely across and spaced from the exit end of the jet. The distance between the exit end of the jet and the planar face of the circular disc may be varied to control the amount of energy from the air which echoes back into the turbulent chamber in the jet and to thereby vary the harmonic frequency and resonance so that the normal turbulence in the chamber is increased. The resonant baffle permits higher operating speed, provides better integration of loops and more uniform loop formation in the textured yarn.

7 Claims, 3 Drawing Figures

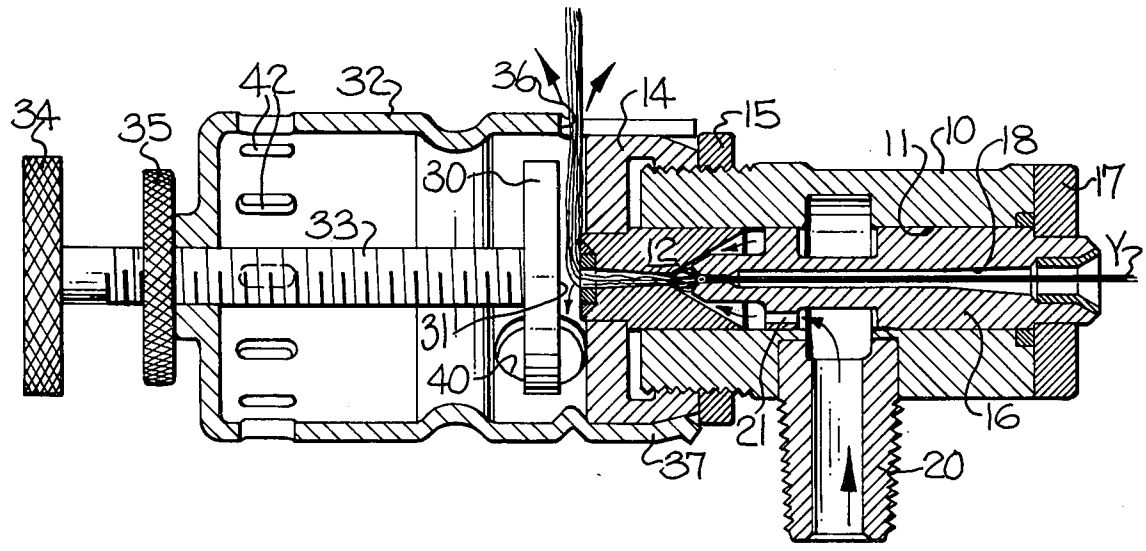
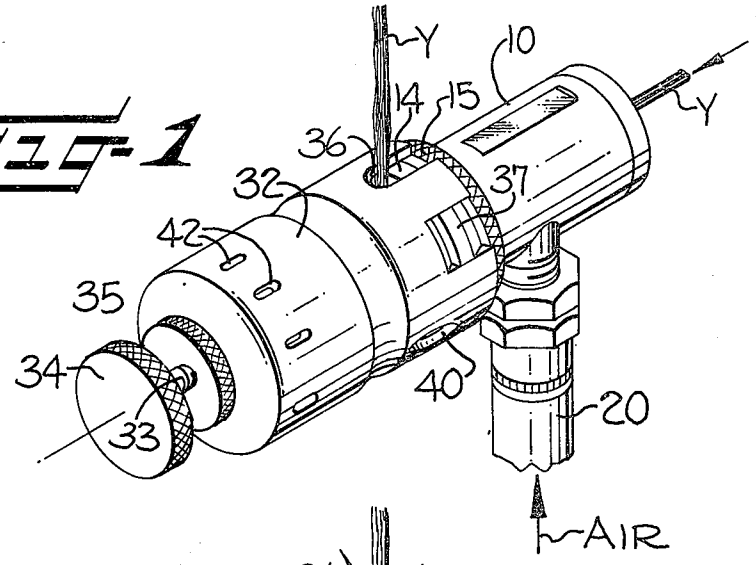


Fig-1



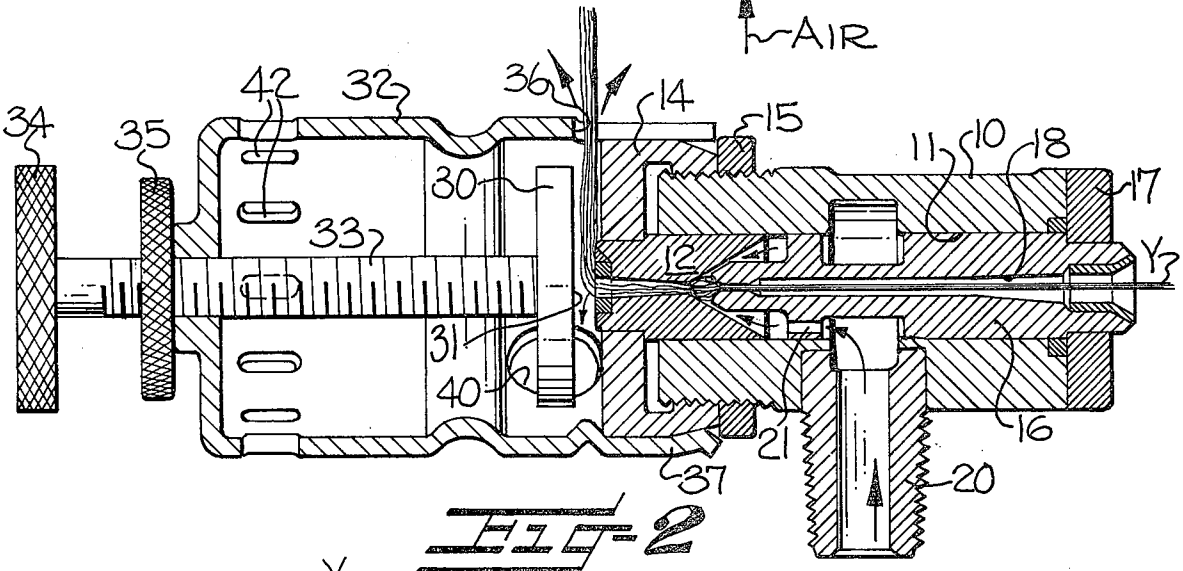


Fig-2

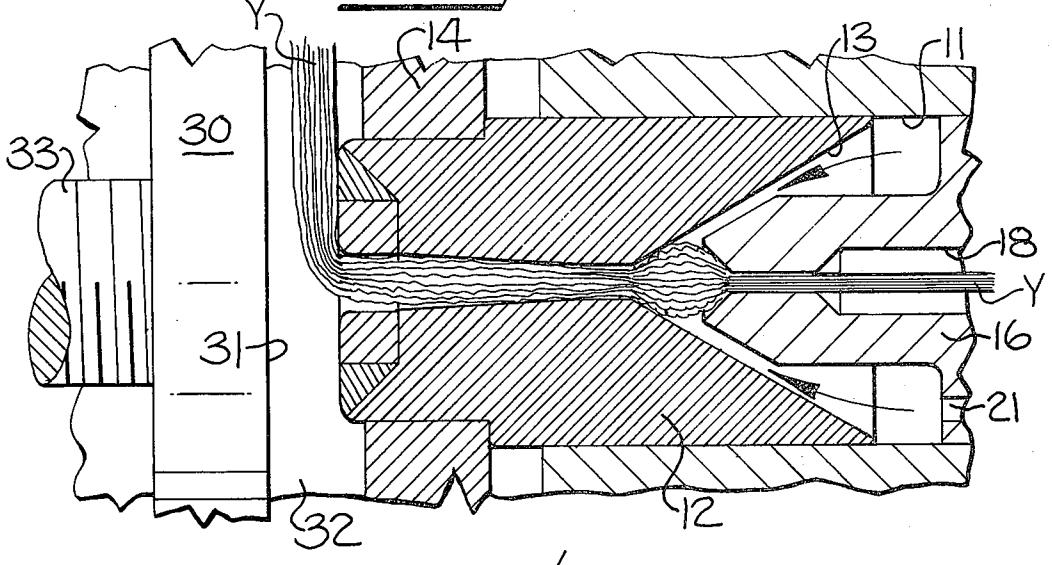


Fig-3

RESONANT BAFFLE FOR YARN TEXTURING AIR JET

This invention relates generally to yarn texturing air jets and more particularly to a resonant baffle for such air jets to enhance the crimps, curls and loops produced in the filaments of the yarn and to permit faster and more economical operation.

The present invention is concerned particularly with yarn texturing air jets of the type having an elongate housing with a venturi supported in one end and a yarn guiding needle positioned in the other end. The exit end of the needle terminates closely adjacent the inwardly tapering conical surface on the inner or entrance end of the venturi to provide a turbulent texturing chamber or zone between the exit end of the needle and the entrance end of the venturi so that crimps, curls and loops are formed in a random fashion in the filaments of the yarn as pressurized air enters the turbulent chamber, passing downwardly along the inner end of the needle. The textured yarn leaving the exit end of the air jet is usually directed at a right angle to the longitudinal path of travel of the yarn through the air jet.

It is an object of the present invention to provide a resonant baffle for a yarn texturing air jet which permits the yarn to be textured at a substantially higher speed than heretofore possible, provides a more efficient use of the pressurized air, and provides better and more uniform integration of the loops by providing a control for the harmonic frequency of the vibrations of the air in the turbulent texturing chamber of the air jet.

In accordance with the present invention, the resonant baffle is supported for adjustment in an enclosed chamber which is removably supported on the exit end of the air jet. The resonant baffle is in the form of a circular disc having a planar face extending transversely across and spaced from the exit end of the jet so that the planar face is engaged by the pressurized air passing outwardly through the exit end of the jet to cause some of the energy of the pressurized air to echo back into the turbulent chamber of the jet and to thereby vary the normal resonance and increase the turbulence in the turbulent texturing chamber of the air jet. Since the circular disc is supported for adjustment toward and away from the exit of the jet, its position can be varied to control the harmonic frequency of the vibrations which are sent echoing back into the chamber so that the most efficient use of the air pressure can be obtained.

Other objects and advantages will appear as the description proceeds when taken in connection with the accompanying drawings, in which —

FIG. 1 is an isometric view of an air texturing jet and illustrating the resonant baffle supported in an enclosed chamber and attached to the exit end of the air jet;

FIG. 2 is an enlarged vertical sectional view through the air jet and resonant baffle illustrated in FIG. 1; and

FIG. 3 is an enlarged fragmentary view of the central portion of FIG. 2, to illustrate the manner in which the crimps, curls and loops are imparted to the yarn in the turbulent chamber of the air jet and to show the relative position of the cylindrical disc baffle relative to the exit end of the air jet.

The resonant baffle of the present invention will be described in connection with a particular type of yarn texturing air jet which forms the subject matter of copending application Ser. No. 436,532, filed Jan. 25, 1974 and assigned to the same assignee as the present

application. However, it is to be understood that the resonant baffle of the present invention may be used with other types of yarn texturing air jets. It has been found that relatively fine denier yarns, of from about 150 to 1,500 denier, can be textured at rates of from two to three times faster than has heretofore been possible without the use of the resonant baffle. While the resonant baffle of the present invention is of some advantage in texturing heavier denier yarns, of from about 2,000 to 4,000 denier, the best results have been achieved with the finer denier yarns mentioned above.

The yarn texturing air jet includes an elongate housing **10** having a central bore **11** extending therethrough and from the entrance end to the exit end of the air jet. A venturi **12** is supported for longitudinal adjustment in the central bore **11** and in the exit end of the housing **10** and is provided with an inwardly tapering conical surface on the inner or entrance end of the venturi to define the exit end of a turbulent chamber. The outer end portion of the venturi **12** is fixed in a venturi cap **14** which is threadably supported on the threaded exit end portion of the housing **10** so that the venturi **12** may be longitudinally adjusted along the central bore **11** by rotation of the venturi cap **14.** A lock ring **15** is threadably supported on the threaded exit end of the housing **10** and adjacent the venturi cap **14** so that the venturi **12** may be locked in adjusted position.

A yarn guiding needle **16** is positioned in the central bore **11** of the housing **10** and its outer or entrance end is fixed in an end flange **17** which is secured to the entrance end of the housing **10** for rotational adjustment of the needle **16** within the housing. An axial yarn guiding channel **18** extends throughout the length of the needle **16** for directing multifilament yarn through the needle **16** and through the venturi **12.** An inlet pipe **20** is connected to the housing **10** for directing pressurized gas or air into the central bore **11** of the housing **10.** One or more passageways **21** are provided in the needle **16** so that the pressurized air is moved along the inner end portion of the needle and into the turbulent chamber or zone provided between the exit end of the needle **16** and the entrance end of the venturi **12.**

The multifilament yarn Y enters the entrance end of the air jet and passes through the axial yarn guiding channel **18** in the needle **16,** through the turbulent chamber defined between the inner or exit end of the needle **16** and the entrance end of the venturi **12,** through the venturi **12** and is then directed at a right angle from the air jet. The yarn Y is wound onto a suitable take-up package, not shown. As is well known, the yarn is usually fed through the air jet with some percentage of over feed, that is, the rate at which the yarn is fed into the air jet is somewhat greater than the rate at which it is withdrawn from the air jet to permit the formation of crimps, loops and curls in the yarn as the turbulent air engages the filaments in the turbulent chamber. While only a single yarn is illustrated in the drawings, as being uniformly textured throughout its length, it is to be understood that so-called core yarns and slub yarns can also be produced on this type of air jet. It has been found that the resonant baffle of the present invention provides advantages when texturing yarn with any of these known processes.

In accordance with the present invention, means is provided for increasing the turbulence of air in the turbulent chamber in the air jet and thereby enhancing the crimps, curls and loops imparted to the yarn in the tur-

bulent chamber. The present invention also provides more uniform loop formations, better integration of loops, and permits high operating speeds so that the yarn may be textured in a more economical manner. To this end, a resonant baffle in the form of a circular disc **30** is provided. The circular disc **30** includes a substantially planar face **31** which is spaced from the exit end of the venturi **12** and extends transversely across the exit end. The circular disc resonant baffle **30** is engaged by the pressurized air passing outwardly through the exit end of the venturi **12** and some of the energy of the pressurized air is echoed back into the turbulence chamber to thereby vary the normal resonance and increase the turbulence in the texturing chamber.

The circular disc **30** is supported for axial adjustment toward and away from the exit end of the venturi **12** and in a cylindrical support housing **32** which is closed at one end and is removably supported on the venturi cap **14** at its other end to provide an enclosed chamber or muffler housing. A threaded stem **33** is fixed at one end to the center of the rear face of the circular disc **30** and threaded means is provided for supporting a medial portion of the threaded stem **33** in the closed end of the circular support housing **32** so that the circular disc **30** may be moved toward and away from the exit end of the venturi **12** by rotation of the threaded stem **33.** A manually rotated adjustment wheel **34** is fixed on the outer end of the threaded stem **33** for imparting rotation to the threaded stem **33** and a lock ring **35** is supported on the threaded stem for locking the circular disc **30** in adjusted position.

A yarn passage opening or slot **36** is provided in the upper portion of the cylindrical support housing **32** to permit the textured yarn to pass upwardly from the exit end of the jet. Crimped spring legs **37** (FIGS. **1** and **2**) are spaced around the inner end of the cylindrical support housing **32** and are adapted to mate with and resiliently hold the cylindrical support or muffler housing on the venturi cap **14** of the air jet. A pair of air escape openings **40** are provided in the cylindrical support housing **32** and adjacent the exit end of the air jet. These air escape openings **40** are larger than the yarn passage opening or slot **36** and are spaced approximately 120° from each other and from the yarn passage opening or slot **36.** Additional air escape openings or slots **42** are provided around the outer end of the muffler housing **32.**

Depending upon the size and type of yarn being textured the circular baffle or disc **30** may be axially adjusted so that it is positioned closely adjacent to the exit of the venturi **12** or it may be positioned as far away as one inch from the venturi exit. Once the yarn is running through the air jet, the lock ring **35** is moved back away from the threaded end portion of the cylindrical support housing **32** and the adjustment wheel **34** is rotated until a stability in the thread line of the yarn leaving the air jet is noted. As the resonant baffle **30** is adjusted axially, a noticeable change in noise level and pitch will occur and with a little practice, the operator can recognize the adjusted position of the baffle at which the proper effect is obtained. When the baffle **30** is properly adjusted, a more uniform loop formation, better integration of loops and enhanced crimps, curls and loops are obtained in the filaments of the yarn and the yarn may be textured at two to three times the normal texturing speed for that particular yarn.

While it is not completely understood why the resonant baffle **30** permits higher operating speeds and enhances the crimp, curl and loops in the yarn, it is believed that the distance it is set from the end of the air jet controls the amount of turbulence in the turbulence chamber in the jet. The baffle **30** apparently sends some of the energy of the air pressure echoing back into the texturing chamber of the air jet to set up vibrations of a particular harmonic frequency in the chamber. The adjustment of the baffle **30** permits the optimum frequency to be set up to texture the yarn at a fast rate and to obtain the enhanced crimps, curls and loops in the filaments.

In the drawings and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation.

That which is claimed is:

1. In a yarn texturing air jet of the type including an elongate housing having a central bore therethrough, a venturi supported in the central bore and in the exit end of said housing, said venturi defining the exit end of a turbulence chamber, a yarn guiding needle positioned in the central bore of said housing and having an inner end portion positioned closely adjacent said venturi and defining the entrance end of said turbulence chamber, and means for directing pressurized air into the central bore of said housing and along said inner end portion of said needle whereby the air passes through said turbulence chamber and outwardly through said exit orifice of said venturi to impart crimps, curls and loops to the filaments as the yarn passes through said turbulence chamber; the combination therewith of means for increasing the turbulence of air in said turbulence chamber and enhancing the crimps, curls and loops imparted to the yarn in said turbulence chamber, said means comprising a resonant baffle including a substantially planar face extending transversely across and spaced from said exit orifice of said venturi, and means for supporting said resonant baffle for axial adjustment toward and away from said exit orifice of said venturi to vary the spacing therefrom, said resonant baffle being solid and extending perpendicular to said central bore so that the pressurized air passing outwardly through said exit orifice of said venturi is engaged by said baffle to cause some of the energy of the pressurized air to echo back into said turbulence chamber and to thereby vary the normal resonance and increase the turbulence in said chamber.

2. A yarn texturing air jet according to claim **1** wherein said resonant baffle comprises a circular disc supported with its center in alignment with said exit orifice of said venturi.

3. A yarn texturing air jet according to claim **2** including a threaded stem having one end fixed to said circular disc, and threaded means supporting to medial portion of said threaded stem so that said circular disc may be moved toward and away from said exit orifice of said venturi by rotation of said threaded stem.

4. A yarn texturing air jet according to claim **3** including an adjustment wheel fixed on the other end of said threaded stem for imparting rotation to said threaded stem.

5. A yarn texturing air jet according to claim **3** including a cylindrical support housing surrounding said circular disc and being removably secured at one end

to said jet housing, said cylindrical support housing including a closed end spaced from said circular disc, and wherein said threaded means is centered in said closed end of said cylindrical support housing.

6. A yarn texturing air jet according to claim **5** including a yarn passage opening in said cylindrical support housing and adjacent the exit end of said jet housing, and air escape openings in said cylindrical support housing and adjacent the exit end of said jet housing.

7. A yarn texturing air jet according to claim **6** wherein said air escape openings are larger than said yarn passage opening, and wherein said air escape openings are spaced approximately 120° from each other and from said yarn passage opening.

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