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Le Chatelier

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[54] **APPARATUS FOR SPINNING LOOSE FIBRES**

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[52] **U.S. Cl.** **57/58.89**

[51] **Int. Cl.** **D01h 1/12**

[58] **Field of Search** 57/58.89, 58.95

[56] **References Cited**

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[57] **ABSTRACT**

Apparatus for spinning thread from loose fibres and in which the twist of the fibres in the thread is increased or decreased by being passed over and in contact with an angular projection in the outlet duct through which the thread passes.

4 Claims, 7 Drawing Figures

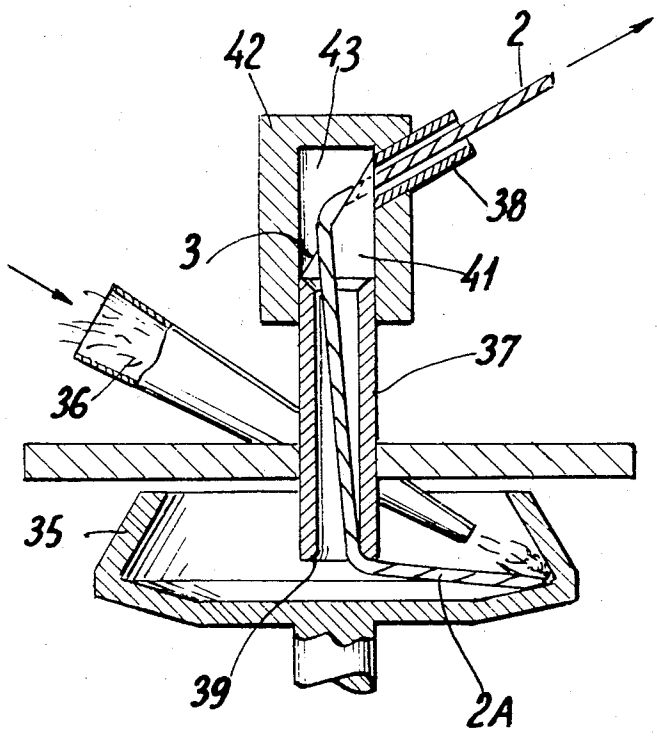


FIG. 1

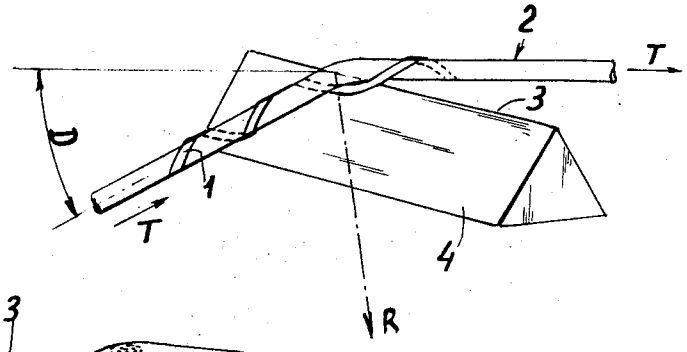


FIG. 2

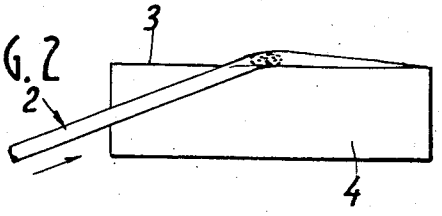


FIG. 3

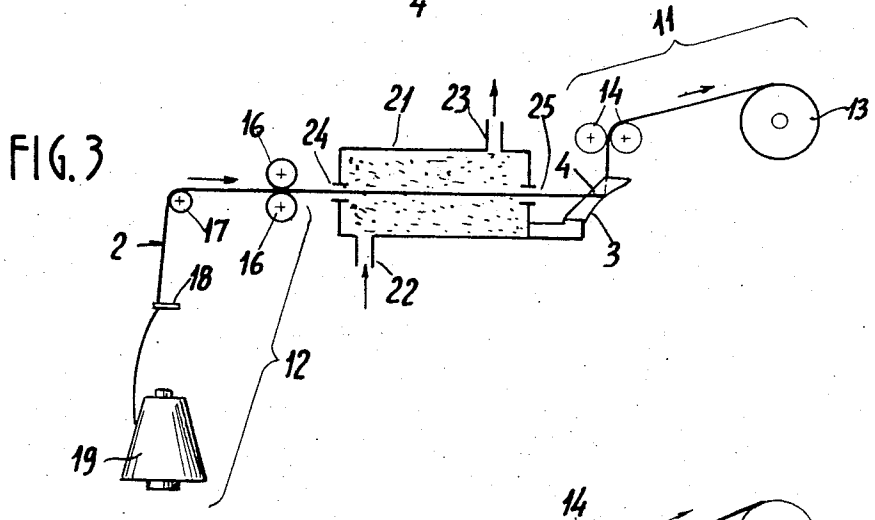


FIG. 4

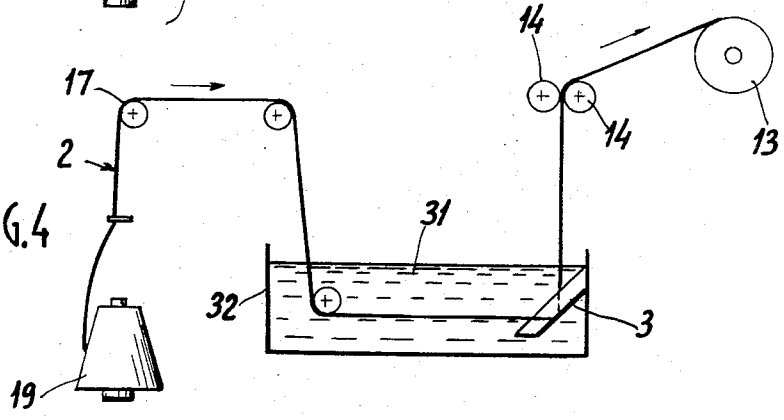


FIG. 5

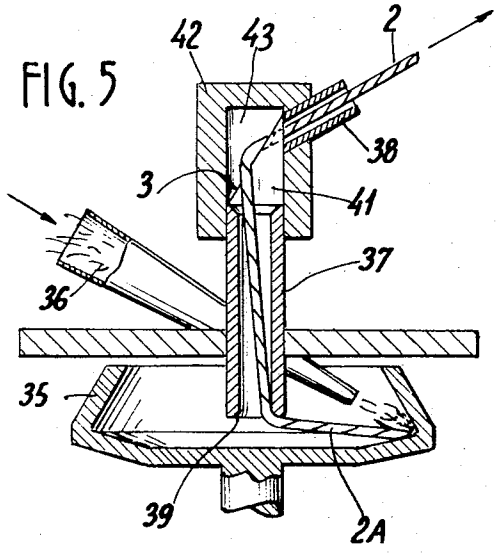


FIG. 6

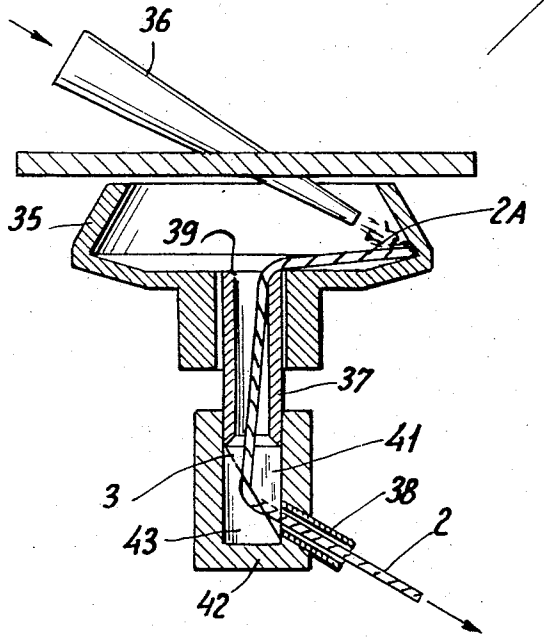
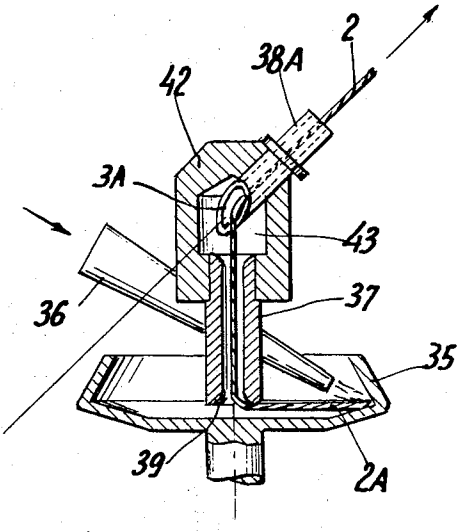


FIG. 7



APPARATUS FOR SPINNING LOOSE FIBRES

BACKGROUND OF THE INVENTION

The present invention relates to improvements in apparatus for spinning loose fibres to form continuous thread, with the thread having a degree of twist that is not obtainable from known continuous spinning apparatus.

Prior Apparatus

In known apparatus for spinning loose fibres to form thread, the thread is reeled on storage spools in the form in which it is formed. Subsequent treatment is necessary if any modification is required to the tension or twist of the thread or compacting of the fibres.

SUMMARY OF THE INVENTION

The present invention is directed to apparatus for spinning loose fibres to form continuous thread and the treatment of the thread to cause modification to the twist of the thread by compacting, straightening or further twisting of the fibres. The invention lacks the cost and complexity of further apparatus and re-reeling of stowed thread to modify thread formed from spun loose fibres.

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming that which is regarded as the present invention, certain details of preferred embodiments of the invention may be more readily ascertained from the following detailed description when read in conjunction with the accompanying drawings in which:

FIG. **1** is a diagrammatic perspective of a flexible thread being drawn over and in contact with an angular projection.

FIG. **2** is a front elevation of the device shown in FIG. **1.**

FIG. **3** is a diagrammatic vertical part section of a plant for gaseous treatment of thread and incorporating an angular projection after treatment.

FIG. **4** is a diagrammatic vertical part section of a plant for liquid treatment of thread and incorporating an angular projection within the liquid reservoir.

FIG. **5** is a vertical cross-section of a spinning device showing inlet and outlet ducts and an angular projection.

FIG. **6** is a vertical cross-section of an alternative spinning device.

FIG. **7** is a vertical cross-section of an alternative spinning device with adjustable angular projection.

DETAILED DESCRIPTION

FIG. **1** shows strands **1** of a spun or twisted flexible thread **2** passed under applied tension T over and in contact with edge **3** of angular projection **4** formed by a transversly arranged prism. The thread **2** is passed over the prism **4** at an oblique angle as shown more clearly in FIG. **2** in such a manner that the direction of movement of thread **2** is changed as indicated by angle D.

Variation of tension T in the thread **2** causes variation of pressure R over edge **3** of the angular projection **4** and deformation of the thread can be controlled as desired. The edge **3** presents a substantially abrupt edge but a small radius is preferrably incorporated. A high pressure R results in an elliptical cross-section of thread. Preferred results are obtained by providing the edge **3** with as small a radius as possible and applicant has discovered that a radius within the range of 0.5 to 20 times the apparent diameter of the thread is most satisfactory. At all times the radius should be sufficiently large to prevent damage to the product. Decrease in angle D results in a smaller deformation of the thread but increases twist in the thread producing a more compact product. Thread pulled over the edge **3** of angular projection **4** results in the fibres in the upper part of the thread being stretched, deformed or pulled out to a greater extent than the fibres on the inner radius, with the inner fibres being contracted rather than pulled out results in increased compacting and additional twist of the fibres.

Referring to FIG. **1,** the thread is moving away from the edge **3** in a perpendicular direction but if the direction of motion is oblique as shown in FIG. **2** the flattening of the thread is accentuated and improved twist compacting is attained.

FIG. **3** illustrates the device shown in FIGS. **1** and **2** incorporated in a plant for treatment of textile thread. The edge **3** of the angular projection **4** is located at an exit **25** of a gaseous reservoir **21,** with the gas entering through opening **22** and exhausting or being recirculated via an outlet **23.** The thread **2** from a feed spool **19** passes through guide **18,** roller **17** and feed cylinders **16,** through a reservoir inlet **24,** over and in contact with edge **3** of the prism **4,** through rollers **14** to a thread receiving spool **13.** Tension is applied to the thread by apparatus **11** comprising items **3, 4, 14** and **13** and a check or brake apparatus is generally indicated at **12** comprising items **19, 17** and **16.** A thread brake device may be incorporated.

Referring to FIG. **3,** the edge **3** of the projection **4** is concave to assist in maintaining a stable position of the thread **2** on the edge **3.** FIG. **4** shows a variant of the plant described with reference to FIG. **3.** Fibre is treated by being passed through liquid **31** in a reservoir **32,** with the edge **3** of the angular projection **4** being substantially immersed in the liquid **31.**

Referring to FIGS. **3** and **4,** if the gas or fluid treatment forms connections or bonds between the spun loose fibres, a strong product is obtained, the fibres being greater or of a higher degree than prior to entry to the gaseous or liquid reservoirs **21** and **32** respectively.

Referring to FIG. **5,** a spinning device is shown which comprises a hollow truncated rotating body **35** fed with loose fibres by a duct **36** tangentially arranged to project within the body **35** which rotates at high speed. The fibres are compounded during spinning to form thread **2A,** with the thread **2A** passing over an end **39** of an outlet duct **37** and over and in contact with the edge **3** of an angular projection **41** housed in a chamber **43,** with the chamber being closed by cap **42.** Thread **2** and **2A** is subjected to tension devices (not shown) and passes through outlet duct **37** located on the axial center-line, coincident with the center-line of the rotating body **35.** After passing over and in contact with the edge **3** of the projection **41,** the treated thread **2** is drawn out through an oblique pipe **38** provided in the wall of the cap **42** and is wound on a storage spool (not shown). As the thread is being formed in part by centrifugal force within high speed rotating body **35** and is also subjected to friction against the end **39** of the out-

let duct **37**, sufficient tension is created over the edge **3**. Spinning is set in motion by introducing a piece of thread in the pipe **38** with the thread being sucked into the chamber **43** and outlet duct **37** to rest against the inner wall of the body **35**.

FIG. **6** shows a variant of the above spinning device which differs in functioning in that the thread **2A** passes downwardly through outlet duct **37** over and in contact with the edge **3** of angular projection **41** and is drawn through oblique pipe **38** located below inlet duct **36**.

FIG. **7** shows a further variant of the device shown in FIGS. **5** and **6**. The edge **3A** is formed as an integral part of the oblique pipe **38A** projecting in the chamber **43**. The position of the annular projection which forms part of pipe **38A** is manually adjustable to suit varying forms and types of thread.

In all the above examples, the thread being formed has a twist coefficient higher than that normally obtained on traditional continuous spinning machines. This is, in part, attained by the degree of centrifugal force applied to the fibres in the rotating body, with the fibres being tightly urged against the inner truncated wall of the rotating body enabling simple and efficient compounding of the fibres to form a length of thread sufficient to enable it to detach itself from the rotating body wall by twisting the thread on itself.

By the use of the word fibre is meant a thread like filament of animal, vegetable, textile or synthetic form or any combination of such filaments. Metal fibres or fibres of glass may be used as additives to natural and/or synthetic fibres.

By the use of the word thread is meant any spun filaments forming thread, cord, string, twine, ribbon, webbing, lacing or long slender flexible body.

While there have been described what are believed to be preferred embodiments of this invention, variations and modifications therein will occur to those skilled in the art once they have become familiar with the invention. It is intended that the appended claims shall be construed to include all such variations and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. An open-end spinning device for spinning a thread, comprising a hollow rotating body having an axis, a fibre inlet duct opening into said hollow rotating body, a thread-guiding duct coaxial with said hollow rotating body, said thread-guiding duct having an inlet end located in said hollow rotating body and an outlet end, a chamber sealed about said outlet end of said thread-guiding duct, said chamber having a thread exit opening offset with respect to said axis of said hollow rotating body, said thread exit opening and said outlet end of said thread-guiding duct defining therebetween a portion of the path of travel of the thread, and an angular projection arranged slanting cross-wise in said portion of the path of travel of the thread.

2. The open-end spinning device as claimed in claim **1**, further including means for adjustably positioning said angular projection in said chamber.

3. The open-end spinning device as claimed in claim **1**, including a tube inserted in said thread exit opening and protruding into said chamber, said tube having an oblique end edge which constitutes said angular projection.

4. The open-end spinning device as claimed in claim **3**, in which said tube is adjustably positioned in said thread exit opening.

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