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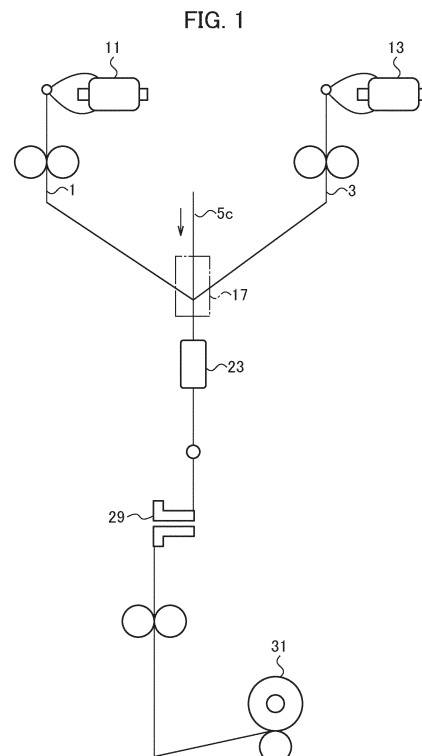
(72) Inventors:
• **MATSUMOTO Hajime**
Inazawa-shi, Aichi 492-8162 (JP)
• **WAKITA Mitsuhiro**
Inazawa-shi, Aichi 492-8162 (JP)
• **ICHIKAWA Chiaki**
Inazawa-shi, Aichi 492-8162 (JP)

(71) Applicant: **Aiki Riotech Corporation**
Inazawa-shi, Aichi 492-8162 (JP)

(74) Representative: **Grünecker Patent- und Rechtsanwälte**
PartG mbB
Leopoldstraße 4
80802 München (DE)

(54) **FANCY YARN PRODUCTION APPARATUS**

(57) A production device for producing a fancy yarn from first and second yarns, which interlace with each other and thereby form a main yarn, and a decorative yarn is provided with: a first feeding creel for feeding the first yarn; a second feeding creel for feeding the second yarn; a confluence region to make the first yarn and the second yarn flow together along an axial direction; a cutter to intermittently cut the decorative yarn into decorative fibers; an ejection nozzle for feeding the decorative fibers to the confluence region; and a processing device to bundle the first yarn, the second yarn made to flow together with the first yarn, and the decorative fibers.



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Description**TECHNICAL FIELD**

[0001] The following disclosure relates to a device for producing a fancy yarn constituted of a main yarn and decorative fibers interlaced with the main yarn.

BACKGROUND ART

[0002] For the purpose of causing decorative effects on fabrics or knits, or for any other purposes, changes such as slubs or loops formed at regular or irregular intervals are often given to yarns. A yarn with such changes is often referred to as a fancy yarn. A variety of fancy yarns had been proposed in the past.

[0003] As no definite production method for fancy yarns exists, one is produced by giving changes during a spinning process and another is produced by further processing a yarn once produced through a spinning process. Even in cases where once produced yarns are further processed to produce fancy yarns, one is produced by processing a single yarn and another is produced through a process where one yarn is interlaced with another yarn.

[0004] PTL 1 discloses a related art.

Citation List**Patent Literature**

[0005] PTL 1: PCT International Publication WO 2020/044493 A1

SUMMARY

[0006] According to the art disclosed in PTL 1, decorative fibers are supplied sideways onto a running main yarn and further a sub yarn is interlaced with them to produce a fancy yarn with the decorative fibers tangled therein. Although this art enables production of a fancy yarn by a simple device, decorative fibers could happen not to get tangled in desired sites in the main yarn and, in a worst situation, fail to get tangled in the main yarn and then fall off.

[0007] The device disclosed hereinafter has been created in view of the above problems.

[0008] According to an aspect, a production device for producing a fancy yarn from first and second yarns, which interlace with each other and thereby form a main yarn, and a decorative yarn is provided with: a first feeding creel for feeding the first yarn; a second feeding creel for feeding the second yarn; a confluence region to make the first yarn and the second yarn flow together along an axial direction; a cutter to intermittently cut the decorative yarn into decorative fibers; an ejection nozzle for feeding the decorative fibers to the confluence region; and a processing device to bundle the first yarn, the second

yarn made to flow together with the first yarn, and the decorative fibers.

BRIEF DESCRIPTION OF DRAWINGS

[0009]

FIG. 1 is a schematic elevational view of a device for producing a fancy yarn according to an embodiment.

FIG. 2 is a schematic elevational view of an ejection nozzle for feeding decorative fibers.

FIG. 3 is a schematic perspective view of a guide for guiding a main yarn and the decorative fibers.

FIG. 4 is an elevational sectional view illustrating an interlace nozzle as an example of a processing device, and yarns under being processed.

FIG. 5 is an elevational sectional view schematically illustrating how the main yarn and the decorative yarn tangle together in the guide.

FIG. 6A is a schematic drawing showing an aspect of the main yarn and the decorative fibers after passing the confluence region.

FIG. 6B is a schematic drawing showing an aspect of the main yarn and the decorative fibers before passing the twisting device.

FIG. 6C is a schematic drawing showing a fancy yarn after passing the twisting device.

DESCRIPTION OF EMBODIMENTS

[0010] Exemplary embodiments will be described hereinafter with reference to the appended drawings. Throughout the following description and the appended claims, terms "upstream" and "downstream" are defined with respect to a direction where a main yarn runs and a term "axial direction" means the same direction unless otherwise described.

[0011] A device according to the present embodiment is preferably applicable to production of a fancy yarn at least including a main yarn 1, 3 and decorative fibers 5c, into which a raw fiber is intermittently cut, interlaced with the main yarn, as shown in FIGs. 6A through 6C. The fancy yarn 10 may be used in fabrics or knits for example to give decorative effects thereto.

[0012] Referring mainly to FIG. 1, the device is in general provided with first and second feeding creels 11, 13 for feeding first and second yarns 1, 3 constituting the main yarn, a confluence region 17 where the yarns 1, 3 and the decorative fibers 5c get to flow together, a twisting device 23 and a winder 31. The yarns 1, 3, after forming a confluent flow, run through a confluence region 17 to a processing device 29.

[0013] These feeding creels 11, 13 are not necessarily disposed symmetrically as illustrated whereas preferably these elements are so disposed that the yarns 1, 3 run in an axial-symmetrical form at least in the confluence region 17. Any yarn guides such as rings or rollers may

be properly arranged to guide the yarns 1, 3 in such a form.

[0014] Referring to FIG. 2 in combination with FIG. 1, the device is further provided with an assembly for feeding the decorative fibers 5c to the confluence region 17. This feeding assembly is for example provided with a third feeding creel 15 for feeding the decorative yarn 5, an ejection nozzle 19 for guiding an airflow A1, and a cutter 21. The decorative yarn 5 fed from the third feeding creel 15 is made to pass through the ejection nozzle 19, intermittently cut by the cutter 21 into the decorative fibers 5c, and then fed by the airflow A1 to the confluence region 17, thereby forming a confluent flow with the yarns 1, 3.

[0015] The ejection nozzle 19 is for example an elongated hollow tube, one end of which is connected to an air-blast device such as a blower and the other end of which is opened toward the confluence region 17. When the device is in operation, generally the air flow A1 by the air-blast device steadily flows through the ejection nozzle 19 from the one end to the other. The decorative yarn 5 is drawn out of the decorative yarn creel 15, introduced through the upper end into the ejection nozzle 19, rides on the airflow A1, and is then expelled from the lower end.

[0016] The cutter 21 is disposed for example between the ejection nozzle 19 and the confluence region 17. The cutter 21 is for example an edged hook. Although FIG. 2 illustrates that the cutter 21 is disposed outside the ejection nozzle 19, alternatively it may be inside the ejection nozzle 19. The decorative yarn 5 is steadily given tension by the airflow A1 and is, when touching the cutter 21, readily cut off.

[0017] To promote cutting, the decorative yarn 5 may be intermittently fed and, for this purpose, the decorative yarn creel 15 may be provided with a servomotor. Alternatively, the roller guiding the decorative yarn 5 may be provided with a servomotor. Still alternatively, an intermittently working clamp may be used. The clamp may be disposed outside the ejection nozzle 19 or built in the ejection nozzle 19. The running decorative yarn 5, when being halted by these means, touches the cutter 21 and is thereby cut.

[0018] The cutter 21 may be alternatively scissors or clippers instead of the edged hook, and may be provided with a driver device such as a motor or a solenoid mechanism for driving them. Still alternatively, any thermal means or a laser may be used to cut the decorative yarn 5.

[0019] Furthermore, the device for cutting the decorative yarn 5 may be disposed upstream of the ejection nozzle 19.

[0020] Moreover, downstream from the cutting device, the device may be provided with a clamp for temporarily holding the decorative fibers 5c. According to this construction, the decorative fibers 5c cut in advance get ready there and are, as this clamp releases them, fed to the confluence region 17 in sequence.

[0021] The cut off decorative fibers 5c ride on the airflow A1 and fly toward the confluence region 17. The

ejection nozzle 19 should be so oriented that the decorative fibers 5c reach a field just where yarns 1, 3 get to flow together. This particularly urges the decorative fibers 5c to tangle with the yarns 1, 3 without falling off.

[0022] The direction of the ejection nozzle 19, the direction of the airflow A1 and the direction where the yarns 1, 3 run after the confluence may be made mutually consistent. This further urges the decorative fibers 5c to tangle with the yarns 1, 3. In particular, the direction of the ejection nozzle 19 or the direction where the yarns 1, 3 run or both may be made vertical and in this case the ejection nozzle 19 may be disposed vertically upward from the confluence region 17. These configurations may further urge the decorative fibers 5c to tangle with the yarns 1, 3. Of course, to be vertical is not essential but they may be oblique or horizontal and even in this case the decorative fibers 5c could ride on the airflow A1 to reach the confluence region 17.

[0023] Such a single feeding assembly may be used whereas the device may be provided with plural sets of feeding assemblies. In a case where the device is provided with the plural feeding assemblies, they may respectively feed mutually distinct kinds of yarns in terms of colors, thickness or any other properties.

[0024] As long as the positional relation as described above is established, the confluence region 17 may be an open space or properly confined. In a case where the confluence region 17 is confined, as shown in FIG. 3 for example, a guide for guiding the yarns 1, 3 and the decorative fibers 5c may be used.

[0025] The guide is provided with a hollow cylinder 39 elongated in its axial direction for example. The cylinder 39 is opened at one end (normally its lower end) where the introduced yarns 1, 3 along with the decorative fibers 5c are expelled out. Referring to FIG. 5 in combination with FIG. 3, the interior of the cylinder 39 is provided with an internal space elongated along the axial direction, which is so dimensioned as to allow the yarns 1, 3 to swirl to some degree around the axial direction. The cylinder 39 may be, on its side faces for example, further provided with openings 41, 43 for respectively introducing the yarns 1, 3.

[0026] The decorative fibers 5c are introduced through the other end (normally its upper end) of the cylinder 39 and guided to the yarns 1, 3. The other end of the cylinder 39 may be continuous to the ejection nozzle 19 in order to introduce the fibers or may be opened away from the ejection nozzle 19.

[0027] Still alternatively, the other end of the cylinder 39 may be as shown provided with tubes 45a, 45b and 45c. A single tube, or a plurality of tubes 45a, 45b, 45c correspondingly to the plural sets of feeding assemblies as shown, may be used. The tubes 45a, 45b, 45c may be continuous respectively to the ejection nozzles 19 or may be opened away from the ejection nozzles 19. The tubes 45a, 45b, 45c are all continuous to the cylinder 39 and also in spatial communication with its internal space. The cutter 21, and also the aforementioned clamps, may

be built in the tubes 45a, 45b, 45c or interposed between the tubes 45a, 45b, 45c and the cylinder 39. The combination of the tubes 45a, 45b, 45c and the cylinder 39 guides the decorative fibers 5c to the yarns 1, 3.

[0028] To urge the yarns and the fibers to flow and tangle together in the confluence region 17, applicable is a swirling nozzle 23, which is disposed just downstream from the confluence region 17, particularly from its guide. The swirling nozzle 23 is an air nozzle creating an airflow swirling around the yarns. By using the swirling nozzle 23, the yarns 1, 3 swirl in the confluence region 17 and the decorative fibers 5c are urged to get in the yarns 1, 3.

[0029] To bundle the yarns and the fibers that get to flow together, a processing device 29 may be used and one of its examples is an interlacing nozzle. The interlacing nozzle is disposed downstream from the confluence region 17, and from the swirling nozzle 23.

[0030] Referring to FIG. 4, any publicly known interlacing nozzle is applicable to the processing device 29. The interlacing nozzle is for example provided with a guiding hole 51 through which the yarn passes and an air duct 53 in communication with the guiding hole 51. The air duct 53 is connected to an external air-blast device such as a blower and is made thinner at least at its end toward the guiding hole 51, thereby ejecting relatively high-speed air flow A4 into the guiding hole 51. The air flow A4 ejected in the guiding hole 51 creates relatively high-speed turbulent flow around its outlet, which gives interlacement to the yarns passing through the guiding hole 51. To strengthen the interlacement, the interlacing nozzle may be provided with a water nozzle for applying a small amount of water to the yarns, or the water nozzle may be installed upstream from the interlacing nozzle.

[0031] As the yarns 1, 3 and the decorative fibers 5c given water pass through the interlacing nozzle, the yarns 1, 3 are bundled together and are, along with the decorative fibers 5c, interlaced with each other, thereby the fancy yarn 10 as shown in FIG. 6C is provided. The fancy yarn 10 is taken to the winder 31.

[0032] Alternatively, in place of the interlacing nozzle as described above, a publicly known interlace nozzle may be instead used, or any false-twist device such as a combination of a hollow spindle or a friction-type twisting device and a heater may be used.

[0033] Alternatively, in place of these false-twist devices, any real-twist device is applicable. A real-twist device is a combination of a twister and a spindle for example. In this case, the spindle can also function as a winder. A real twist can cause the decorative fibers 5c to securely tangle in the yarns 1, 3, and thus the yarns 1, 3 are more tightly bundled together.

[0034] Further alternatively, in place of or in addition to use of these twisting means, heating and adhesion are applicable. As heating means, a heater, a laser oscillator and an ultrasonic generator may be exemplified.

[0035] Referring again to FIG. 6C, the fancy yarn 10 according to the present embodiment has structures with relatively long naps constituted of shortly cut decorative

fibers 5c. Although each structure resembles naps, they less likely fall off as real naps do because they firmly tangle in the yarns 1, 3.

[0036] The magnitude of this structure can be arbitrarily changed depending on the length of cutting the decorative yarn and intervals between adjacent structures can be arbitrarily changed by changing intervals of cutting the decorative yarn. Needless to say, each structure may have each modified magnitude and modified interval. Moreover, as described already, as two or more decorative yarns can be used, distinct colors could be given to the respective structures.

[0037] According to the present embodiment, into the yarns 1, 3 that are swirling and simultaneously form a confluent flow, and just to sites where the yarn 1 and the yarn 3 tangle together, the decorative fibers 5c are thrown. Therefore the decorative fibers 5c are prevented from failing to tangle with the yarns exactly at desired positions or falling off.

[0038] Although certain embodiments have been described above, modifications and variations of the embodiments described above will occur to those skilled in the art, in light of the above teachings.

INDUSTRIAL APPLICABILITY

[0039] A production device is provided, which provides a new option for the art of fancy yarns.

Claims

1. A production device for producing a fancy yarn from first and second yarns, which interlace with each other and thereby form a main yarn, and a decorative yarn, the device comprising:

- a first feeding creel for feeding the first yarn;
- a second feeding creel for feeding the second yarn;
- a confluence region to make the first yarn and the second yarn flow together along an axial direction;
- a cutter to intermittently cut the decorative yarn into decorative fibers;
- an ejection nozzle for feeding the decorative fibers to the confluence region; and
- a processing device to bundle the first yarn, the second yarn made to flow together with the first yarn, and the decorative fibers.

2. The production device of claim 1, wherein the ejection nozzle is oriented in a direction in agreement with the axial direction.

3. The production device of claim 2, wherein the axial direction is oriented vertically and the ejection nozzle is disposed vertically upward as compared with the

confluence region.

4. The production device of claim 1, further comprising:
a hollow guide disposed in the confluence region and
including an internal space elongated in the axial di- 5
rection and allowing the first yarn and the second
yarn to swirl around the axial direction, and a path-
way spatially communicated with the internal space
to guide the decorative yarn toward the first yarn and 10
the second yarn.
5. The production device of claim 1, wherein the ejec-
tion nozzle is configured to eject an airflow toward
the confluence region to put the decorative yarn on 15
the airflow.
6. The production device of any of claims 1 through 5,
wherein the processing device includes any one or
more selected from the group consisting of a twisting 20
nozzle, an interlace nozzle, a hollow spindle and a
real twister.

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FIG. 1

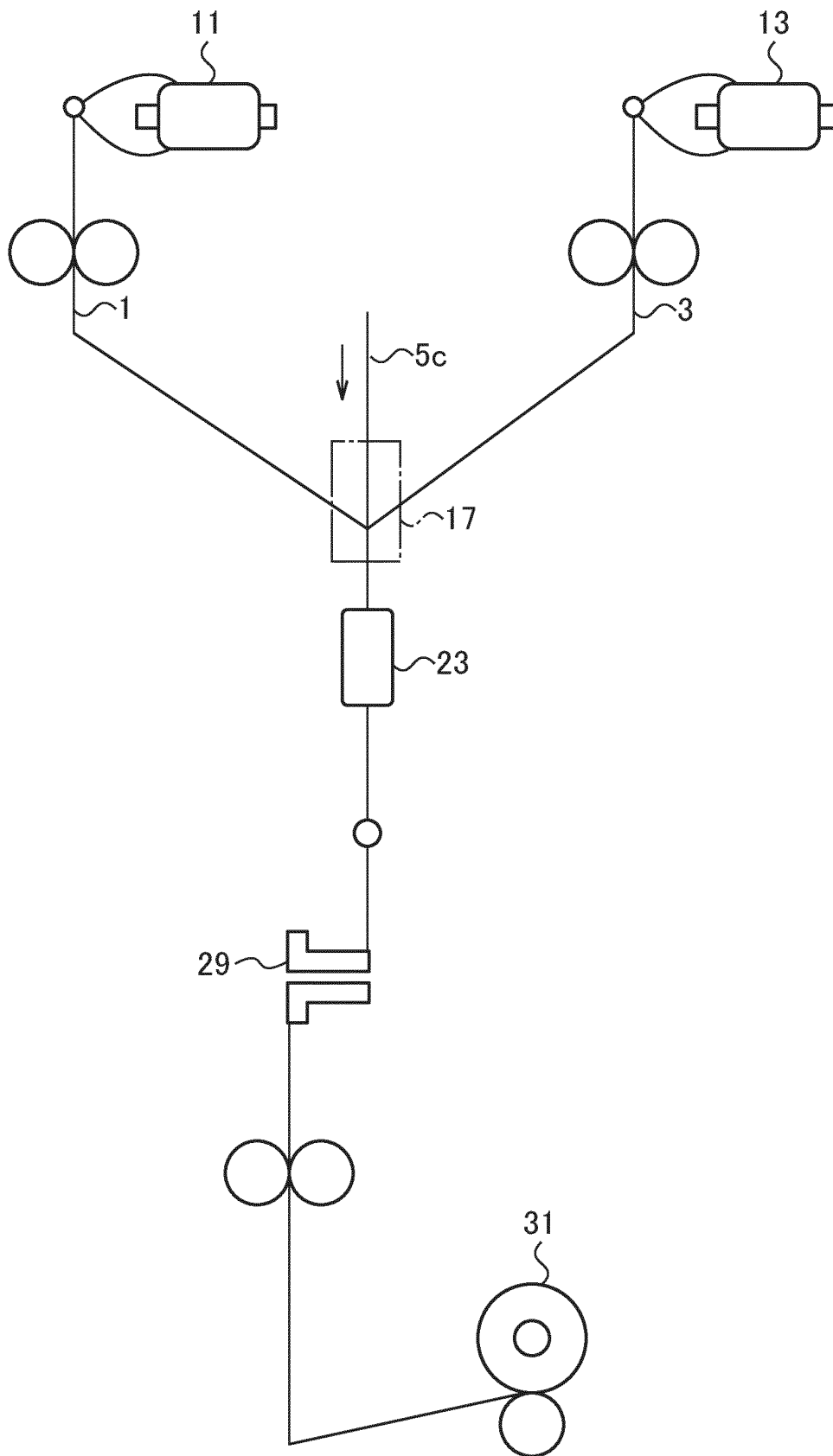


FIG. 2

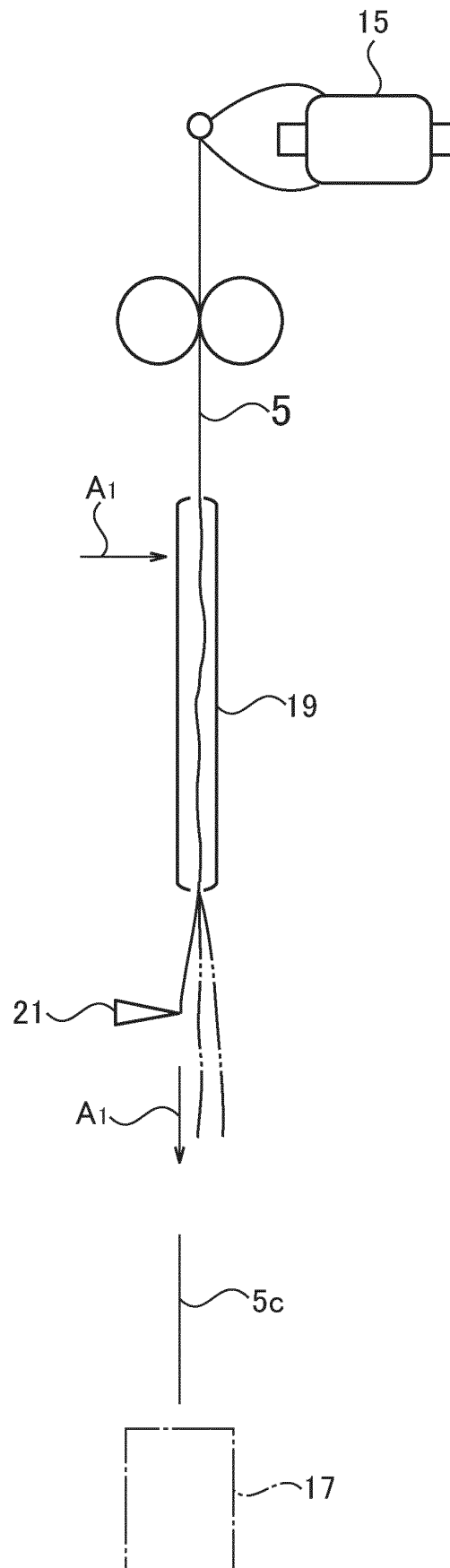


FIG. 3

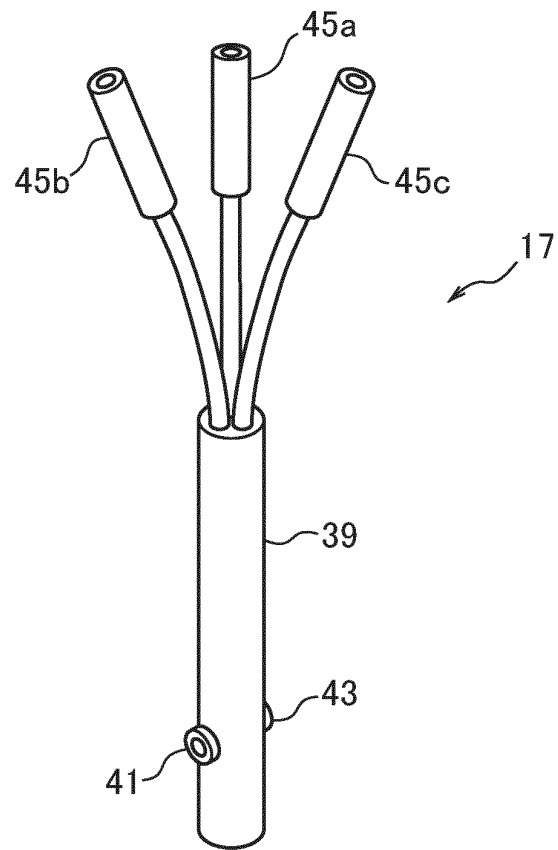


FIG. 4

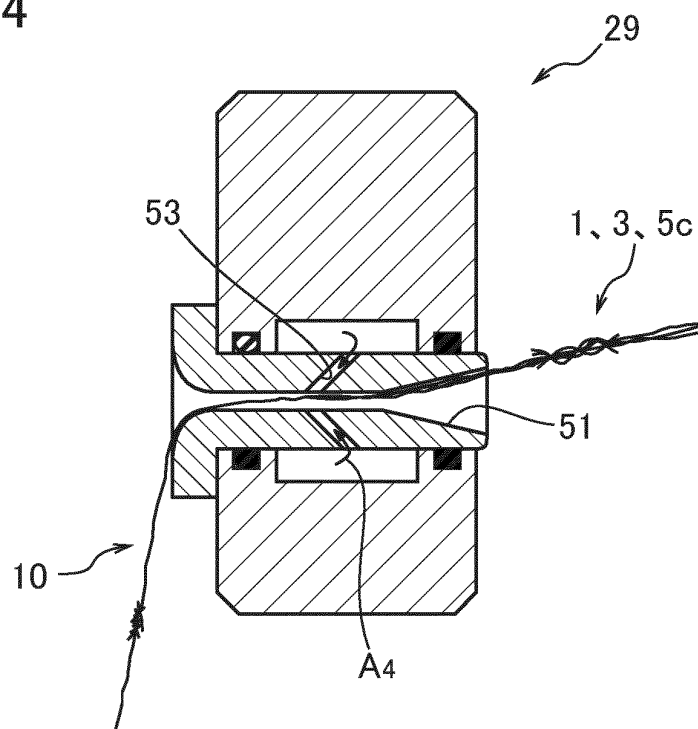


FIG. 5

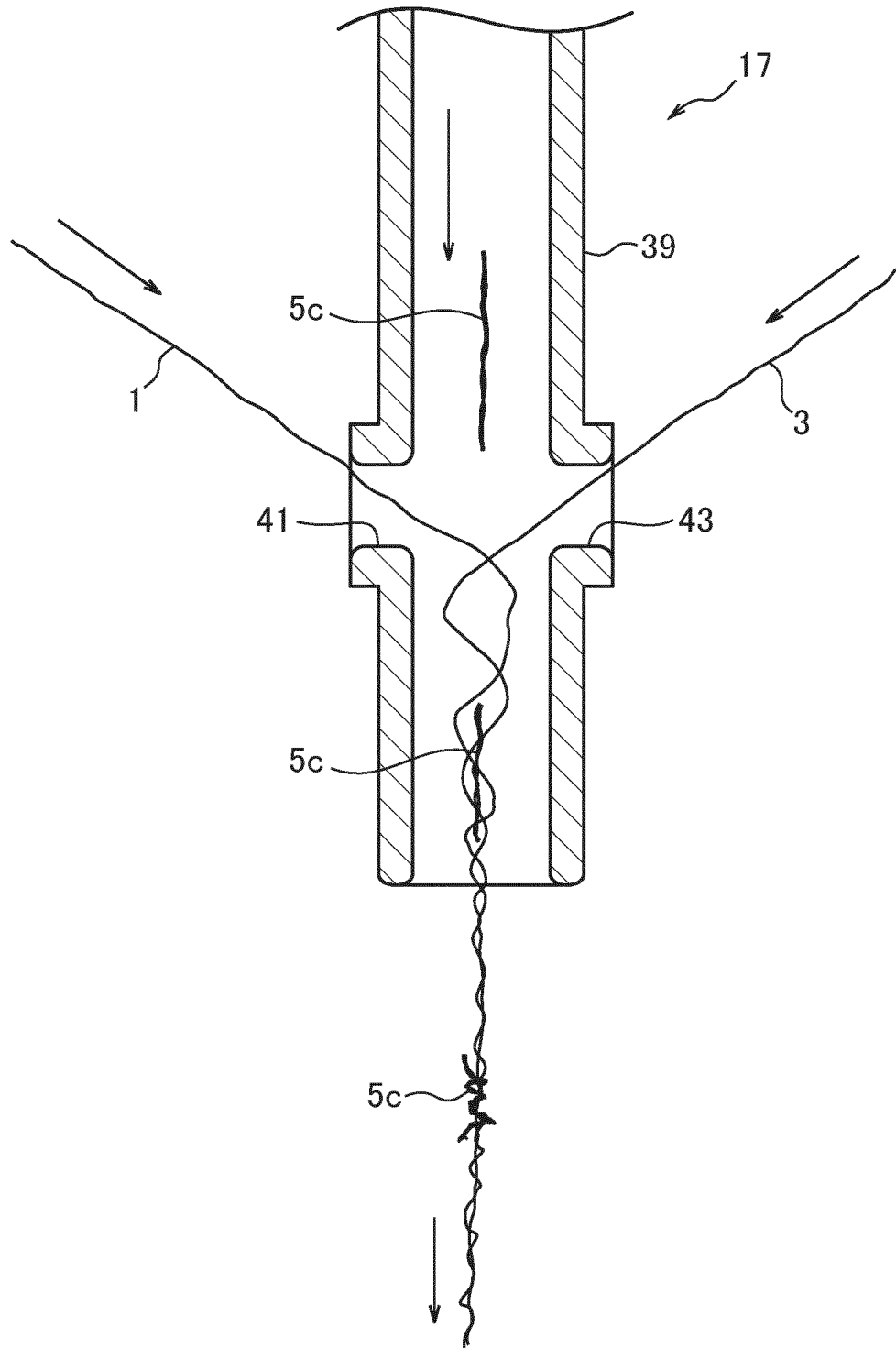


FIG. 6A

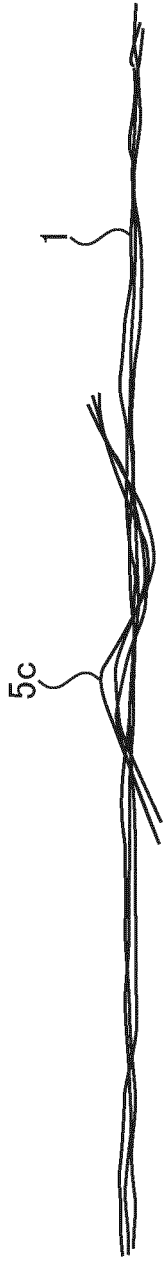


FIG. 6B

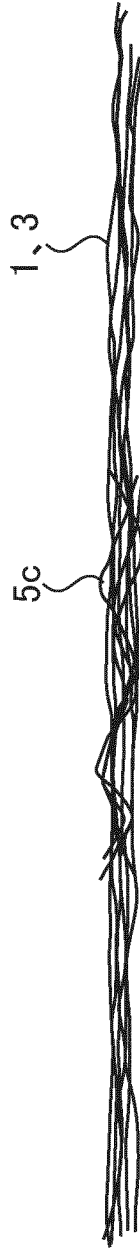
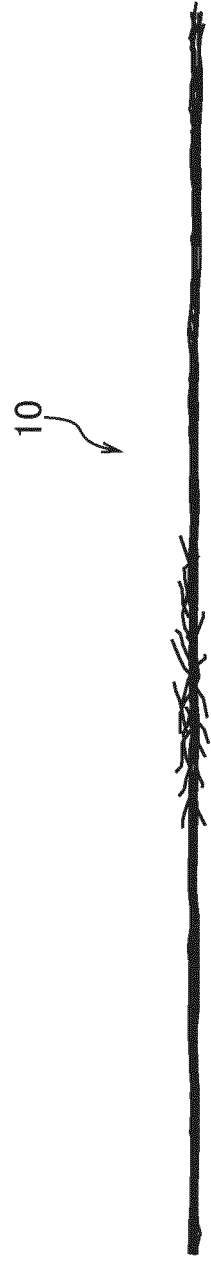


FIG. 6C



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2020/042480

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. D02G3/34 (2006.01) i

FI: D02G3/34

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl. D02G3/34

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2020

Registered utility model specifications of Japan 1996-2020

Published registered utility model applications of Japan 1994-2020

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2020/044493 A1 (AIKI RIOTECH CORPORATION) 05 March 2020 (2020-03-05), claims 1-8, paragraph [0015], fig. 1	1, 5, 6
A	entire text, all drawings	2-4
A	JP 62-97936 A (MITSUBISHI RAYON CO., LTD.) 07 May 1987 (1987-05-07), entire text, all drawings	1-6
A	JP 48-9055 A (TONEN KK) 05 February 1973 (1973-02-05), entire text, all drawings	1-6
A	JP 60-139840 A (UNITIKA LTD.) 24 July 1985 (1985-07-24), entire text, all drawings	1-6
A	JP 56-134226 A (UNITIKA LTD.) 20 October 1981 (1981-10-20), entire text, all drawings	1-6

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☐ Further documents are listed in the continuation of Box C.
☒ See patent family annex.

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* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search

18 December 2020

Date of mailing of the international search report

28 December 2020

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Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No. PCT/JP2020/042480
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WO 2020/044493 A1	05 March 2020	(Family: none)
JP 62-97936 A	07 May 1987	(Family: none)
JP 48-9055 A	05 February 1973	(Family: none)
JP 60-139840 A	24 July 1985	(Family: none)
JP 56-134226 A	20 October 1981	(Family: none)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2020044493 A1 [0005]