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(71) Applicants:
- **Baldi, Angelo**
  50047 Prato (IT)
- **Caprilli, Gino**
  50047 Prato (IT)

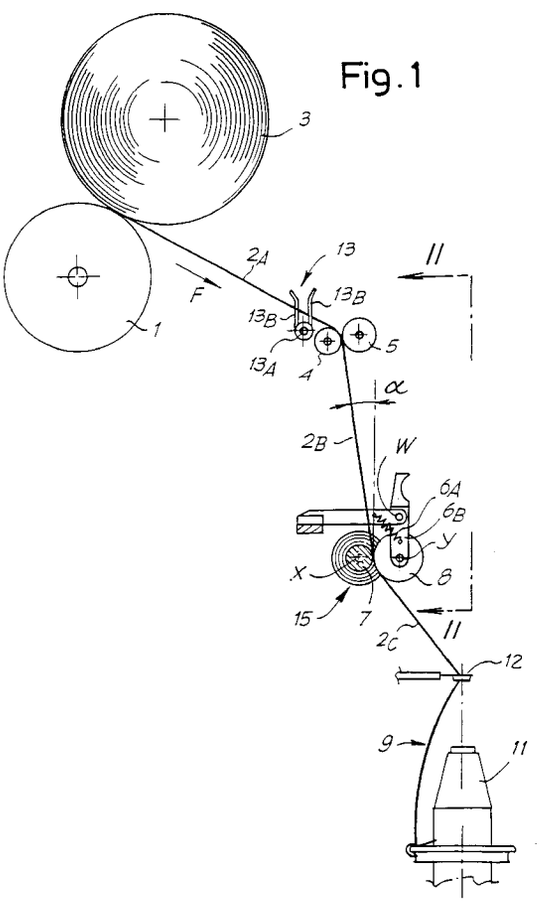
(72) Inventors:
- **Baldi, Angelo**
  50047 Prato (IT)
- **Caprilli, Gino**
  50047 Prato (IT)

(74) Representative: **Mannucci, Michele**
Ufficio Tecnico Ing.A. Mannucci,
Via della Scala 4
50123 Firenze (IT)

(54) Device for drafting and contemporaneous false twisting for a spinning unit, specifically for sliver or slubbing of carded fibres

(57) The device consists of a flange (15) that is solid with a draft roller (7) of the spinning unit. The flange forms a convex surface of revolution coaxial to the said roller (7) and is facing towards the pressure roller (8) placed against the draft roller. An adjustable thread guide (13) imposes to the slubbing (2B) that has to be processed, such a trajectory that the slubbing leans against said convex revolving surface, which in this way imposes an adjustable false twist to the slubbing, in the tract (2B) of path subject to drafting.

Fig.1



EP 0 741 198 A1

Description

On the ring spinning frames and in particular on the ones for woollen yarns, systems have been foreseen to apply a false twist to the drafting zone, with a regularizing effect on the slubbing count during the drafting and on the yarn obtained from the slubbing. Such systems are well known by the technical literature and mostly they require the use of revolving elements that render the spinning unit more complicated, with consequent increase of its cost and with higher engagement for its managing and maintenance. Their rotation generally requires power which increases the cost of spinning. Furthermore the majority of known systems presents a twistless tract in the path of material, with risks of breakages.

An object of the present invention is to limit the above mentioned inconveniences.

The invention regards a drafting and contemporaneous false twisting device for a spinning unit, of the type with two couples of rollers, respectively one for feeding and one for drafting, the draft rollers couple being formed by a first roller rotating on a fixed axis in the space mostly horizontal and by a second pressure roller with mobile rotating axis, said rollers being stressed one against the other; the device foresees the generation of false twist, that is to say temporary twist, in the tract of slubbing included between the two said couples of rollers. According to the invention, the device essentially comprises: in combination with the draft roller a step with an edge and a supporting lateral surface, being realized an elastic pressure in the axial direction between aforesaid lateral surface and the corresponding side of the pressure roller, and the contact of the step with the pressure roller happening in the very closeness of the cylindrical surface of the draft roller; and a thread guide to impose to the said slubbing between the two couples of rollers an inclined trajectory of such an angle that the slubbing leans against said lateral surface and the step edge before reaching the nipping point between the draft and pressure rollers; in this way a false twist and a draft are given to the slubbing.

Practically the device can include also a flange combined with said draft roller and forming a convex surface of revolution coaxial with said roller and with said lateral surface of the step facing towards the pressure roller; the convex surface of revolution includes said step.

Said lateral surface supporting the step can be plane and orthogonal to the draft roller axis. Furtherly said surface could also be slightly inclined, i.e. with a truncated-conical development.

Said thread guide is advantageously adjustable according to a parallel direction of the axis of rotation of the feed rollers; it is therefore possible to modify the inclined trajectory and the said angle and consequently the extent of contact between the slubbing and the edge of said step and/or the convex surface of revolution; with this it is varied the extent of twisting effect on the material itself.

Said thread guide can be shaped as a fork, said fork having two branches placed about on a plane orthogonal to the axis of rotation of the feed rollers. The insertion of the slubbing into the thread guide is in this way easy, and the thread guide is able to position precisely the trajectory of the slubbing.

The path of the slubbing is imposed in such a way that, under working conditions, the slubbing reaches the draft roller presenting -in a projection on a transversal plane to the rollers axes- such an angle with the tangent plane to the draft and pressure rollers, that the slubbing itself adheres to the draft roller, upstream from the nipping point between the draft roller and the pressure roller.

This angle can be about 10°-15°.

The convex surface of revolution of the flange can be truncated-conical or at curved generatrix.

Other characteristics of the invention are defined in secondary claims here at foot of present description.

The disposition above defined allows to give contemporaneously both the false twist and the draft to the tract of slubbing included between the feed rollers couple and the draft rollers couple. Such false twist is given at tight closeness to the draft rollers nipping point on the slubbing, minimizing in such a way the distance between the parts of the flange that confer the false twist and said nipping point, in which point the false twist is annulled; disadvantageous conditions for the regularization of the slubbing are so avoided.

It is therefore obtained, as regards to the well known systems of false twist and draft, a system of great mechanical simplicity and which, not being requested a specific transmission of motion to rotate the parts that confer the false twist, has a minimum necessity of energy to confer the false twist. The system also provides a good quality performance.

It is to stabilize the path of the slubbing against the risk for the slubbing to come off the nipping point between the draft and pressure rollers, that the path between the feed rollers and the draft rollers is slightly inclined as to the plane tangent to the draft rollers in the point of reciprocal contact, as above defined; the inclination is such to make the slubbing adhere to the draft roller along a relatively small arc (10° - 15°) before reaching the contact with the pressure roller.

The draft roller and the flange that forms the convex surface of revolution can be mounted sliding in the direction of their own axis of rotation, and are elastically stressed so that the closest part to the axis of rotation of said convex surface of revolution, possibly the plane face of said step, results always leaning sideways against the pressure roller, in order to assure a stable position for the pinching or holding at the end of the tract of slubbing involved by the drafting group. Such disposition can be reversed by mounting the pressure roller elastically sliding in an axial direction and keeping axi-

ally fixed the draft roller and the flange.

In order to confer the false twist, the convex surface of revolution must exert a good friction on the textile material. To this purpose it can present concentric grooves and/or according to generatrix or spiral arcs, said grooves being uniformly distant one another. Still to this purpose, on said rotating surface can be put a layer of rubber or similar.

The device can include a cleaning element -in felt or similar- at light contact with said convex surface of revolution and with the active part of the cilindrical surface of the draft roller, said element being carried by the fixed part of the machine and being adjustable at least according to a direction parallel to the draft roller axis. Said element keeps the active surfaces of the flange and of the draft roller clean, avoiding the incipient formation of fibres accumulations and wrappings of yarn and it can serve as axial stop to the complex draft roller-flange when the pressure roller is lifted.

The device can also include a further element, called yarn-breaker, consisting of a brush or other material suitable to hold the slubbing in case of incidental disengaging from the draft rollers couple. To this purpose, during working, the path of the material between the draft rollers and the eyelet coaxial to the spinning spindle forms an angle with the tract of draft of the slubbing path; in case of incidental disengaging from the draft rollers, the material disposes itself on a rectilinear path between the feed rollers and said eyelet, and the yarn-breaker -which is placed on said path- comes in contact and holds the slubbing breaking it and so interrupting the spinning process.

This draft system and contemporaneous false twist can be repeated in succession, to obtain in a proper device two or more draft fields or zones subsequently crossed by the slubbing, each zone conferring to it a partial draft. Such zones can be varingly spaced among themselves and means of adjustement of false twist analogous to the ones of the described application can be foreseen for each zone.

The invention will be better understood following the description and the enclosed drawing, which shows a practical form of non limitative accomplishment of the invention itself. In the drawing:

Fig. 1 shows a schematic side view of a spinning unit equipped with a device according to the invention;

Fig. 2 shows a front view from line II-II of Fig. 1, of the drafting zone, partially sectioned, of two spinning units side by side;

Figs. 3, 4, 5, shows respectively front, side and plan views, partially sectioned, of a couple of draft rollers according to a modified embodiment of the invention;

Fig. 5/1 shows an enlarged detail of Fig. 5;

Figs. 6, 7 show -in two views of the draft roller respectively sectioned according to an axial plan and according to a plane orthogonal to the axis- two possible forms of accomplishing the invention, respectively a first one in the upper part and a second one in the lower part of the figure; and

Figs. 8, 9 and 10, 11 show analogous views to the ones of Figs. 6, 7 for other forms of accomplishment of the invention.

The drafting and contemporaneous false twisting device according to the invention is applied to a spinning unit that includes a roller 1 (Fig. 1) fitted to make turn a bobbin 3 (or beam or spool) for slivers or slubbings of carded fibres, to feed the slubbing according to arrow F to a couple of feed rollers 4, 5, that in turn feed it to a couple of draft rollers 7, 8. The draft rollers couple includes a draft roller 7 properly said, rotating around an axis X-X fixed in the space, and a pressure roller 8, rotating around an axis Y-Y. The pressure roller 8 is supported by a couple of arms 6B, 6C independently hinged one another around an axis W-W, each arm being stressed by its own spring 6A to push the pressure roller 8 against the draft roller 7; in such a way the two rollers 7, 8 adhere perfectly one against the other along a generatrix, independently from the possible manufacturing or assembling imprecisions.

In order to assure a regular, longitudinal contact of the pressure roller 8 against the draft roller 7, along a generatrix, a variant of realization can foresee a cot 8X (Fig. 5) made of rubber or similar, of proper elasticity, which is able to differently compensate also possible manufacturing or assembling imprecisions. In this way the support of pressure roller 8 can be simplified, depending upon only one arm.

Furthermore the pressure roller 8 can be manually lifted overcoming the force of said springs, to allow the insertion of the slubbing for beginning of the spinning operation, the cleaning of rollers or else.

The draft roller 7 and pressure roller 8 have a peripheral speed higher than the one of the feed rollers 4, 5, so that the tract of slubbing included between said couples of rollers undergoes a draft becoming longer and thinner. From the draft roller 7 and pressure roller 8 couple the slubbing is then fed towards the traditional systems of twisting and winding (take-up). For ease of description, the tracts of the material path are indicated respectively with 2A the one included between the spool 3 and the feed rollers 4, 5, where the slubbing does not get twist, with 2B the one included between said rollers and the draft rollers 7, 8, where the slubbing gets a false twist, and with 2C the one included between the draft rollers and the final package 11, where the slubbing becomes twisted yarn.

The device subject of the present invention -according to Figs. from 1 to 5- includes a thread guide 13, placed above the feed rollers couple 4, 5, to guide the slubbing 2A. The thread guide is supported, together with the analogous thread guides of all spinning units of the machine, arranged side by side, by a rectilinear sup-

porting structural shape 13A extenting parallel to the axis of the feed rollers 4, 5, said structural shape being axially adjustable to allow the contemporaneous variation of the axial position of all thread guides. Advantageously the thread guide 13 is formed by a fork having branches 13B to guide the slubbing 2A, said branches being placed on a plane orthogonal to the axis of rotation of the feed rollers 4, 5; in such a way it is possible to maintain fixed the point of exit of the slubbing from the thread guide notwithstanding the traverse of the spool 3 and also if this is placed out of the thread guide plane.

The device includes also a flange 15 coaxial to the draft roller 7 and solidal with it, said flange being placed laterally to the active surface tract of the draft roller 7. The flange 15 has a convex surface of revolution 15A (see also Figs. 3, 4, 5,) that faces towards the draft roller and that, in proximity of draft roller 7, ends with a step or stair 15B, said step having preferably a plane face 15E (Fig.5/1), turned towards the draft roller 7 and the pressure roller 8.

The draft roller 7-flange 15 complex slides according to its own axis X-X on a mandrel 16 and is stressed to slide to the left (as regards to Fig.3) by an helical spring 17 coaxial to the draft roller and contrasting with a bushing 19 solidal to the mandrel itself. A pin 19A driven in said bushing transmits the rotating motion from the mandrel 16 to the flange 15 and to the draft roller 7 even if this makes small axial movements. Under the action of spring 17, the flange 15 moves to the left until the lateral surface 15E -preferably plane- of the step 15B leans against the corresponding lateral surface 8A of pressure roller 8. Since the height of the step 15B is small compared to the diameter of pressure roller 8, the friction generated between the plane side of step 15B and the lateral side 8A of the roller is little, with minimum waste of energy.

When for servicing operations the pressure roller 8 is lifted rotating it around the axis W-W, a plug 14, generally of felt and held up by a box type support 14A fixed to a support 14B, functions as a stop for the group formed by draft roller 7 and flange 15, keeping it into position to facilitate the subsequent lowering of pressure roller 8. The felt 14 has also the function of cleaning the convex surface 15A and the portion of cylindrical surface of roller 7 next to the step 15B, to keep them free from accumulation of fibres and yarn. Alternatevely, a stop can be put separately from the felt 14 or its support.

In a front view as the one of Fig.2, the feed rollers couple 4,5 is moved to the right as regards to the draft roller 7 and pressure roller 8 and to the convex surface of revolution 15A; the thread guide 13 is adjusted in position according to a direction parallel to the feed rollers axis, in order to maintain the slubbing 2B deviated, in its path starting from the thread guide 13, of such an angle β (Fig.2) as regards to vertical plane orthogonal to the feed rollers axis, suitable to make the slubbing reach the nipping point P (Figs. from 3 to 4, 5) between the draft roller 7 and the pressure roller 8, after having at least in part leaned against the convex surafce 15A of the flange, the edge of the step 15B and the plane surface 15E. Such leaning from the beginning of contact with the flange until the nipping point P, leaning particularly continuous in the tract between the edge of the step and point P, causes in such tract the fibres to compact themselves, so that the sliding for the draft results more regular and more controlled.

The bigger such angle β is, the bigger is the arc of contact between the slubbing and the convex surface 15A; due to the rotating motion of flange 15, the contact with the lateral plane surface 15E of step 15B, the edge 15C of the step itself and the convex surface 15A of the flange generate on the slubbing such tangential forces of friction with a component normal to the slubbing axis, to impose a false twist, which propagates upstream of said zones of contact up to the feed rollers 4, 5.

Varying the inclination β, by moving the thread guide 13, the amount of contact of the slubbing with surface 15A is varied, and therefore the amount of false twist imposed to operate the draft is varied as well, according to the requirements.

In such a way the false twist is given to the slubbing in tight closeness of nipping point P of the draft rollers, point where the false twist results null. Such effect is aided by the presence of step 15B that, besides offering a precise support plane to the pressure roller 8, gives start on its edge to the false twist, completed by the further contact with the convex surface of the flange.

Advantageously, on a plane orthogonal to the axis X-X of the draft rollers (Figs.1 and 4) the path of the slubbing between the coming out from feed rollers and the nipping point P is inclined, as regards to the plane tangent to the draft roller 7 and pressure roller 8 at point P, of a relatively small angle α, for instance 10°-15°, towards the upper part of the draft roller. In such a way the out coming of the slubbing from the nipping point P is avoided, fact that would cause the winding on the cop or package of yarn which is not drafted.

The path of the slubbing that incidentally would have come out from the nipping point P tends to assume a straight configuration (D) (Fig.4) starting from the feed rollers and until the thread guide 12 (Fig.1) placed vertically above the spindle, with lateral shifting towards and beyond the flange 15 and possible taking up of non drafted yarn. To avoid such inconvenient, a plug 18 is foreseen (Figs.3 and 4) supported by a fixed part of the machine on a point of said path (D) and presenting a very rough surface, as coarse grained emery, or fitted with needles or ôvelcroö, which holds the slubbing, making it break and so interrupting the spinning.

According to variants of realization, the flange 15 can have a convex profile at curved development i.e. a lenticular (see Figs.6 and 8) or truncated-conical (see Fig.10) development. The flange can also be fixed to the mandrel or can be shaft 16 or can be obtained as one piece with it, as indicated respectively on the upper part and lower part of Figg. 6, 8, 10; in such a case, in order

to assure the lateral contact of step 15B with the side of pressure roller 8 this latter is mounted in an elastically sliding way along its own axis Y-Y, an axial spring (not shown on the drawing) keeping it laterally stressed against the step 15B.

The active surface 15A can be differently realized. To assure the friction with the slubbing 2B, said surface can be covered by grooves 18A, or steps 18B or 218 with circular development concentric to the draft roller, and/or by flutings or grooves with spiral development 120, 220 angularly regularly spaced among them, or it can partly be composed by a surface 15D of material with high coefficient of friction, such as rubber or similar. In this latter case the rubber covering does not include the zone of surface 115A immediately adjacent to the draft roller 7, particularly the step 115B, in that such zone is destined to bear the pressure of pressure roller 8.

Various possibilities of realizations of the active surface of flange 15 are schematically illustrated in the front views of Figs.7, 9, 11, in each of them the upper semi-arc being used for one representation and the lower semi-arc for another representation.

It is intended that the drawing does not show more than an exemplification given only as practical demonstration of the invention, being possible for the invention to vary in the forms and arrangements without, however, getting out of the scope of concept underlying the invention. The possible presence of reference numbers in the enclosed claims has the aim of facilitating the reading of the claims with reference to description and drawing, and does not limit the scope of protection represented by the claims.

Claims

1. Device for drafting and contemporaneous false twist for the treatment during spinning of a slubbing or roving of textile fibres, in particular carded fibres, for a spinning unit that includes a couple of slubbing feed rollers (4, 5) and, downstream from this, a draft roller (7) and a pressure roller (8) stressed by an elastic force against the draft roller, and means that generate false twist, i. e. temporary twist, in the tract of slubbing included between said pairs of rollers (4, 5; 7, 8), characterized in that it includes: in combination with the draft roller (7) a step (15B; 115B) with an edge (15C) and a supporting lateral surface (15E), an elastic pressure being generated in the axial direction between said lateral surface and the correnspondingside of the pressure roller (8), and the step contacting the pressure roller (8) in the very closeness of the cylindrical surface of the draft roller (7); and a thread guide (13) to impose to said slubbing between the two couples of rollers (4,5; 7, 8) an inclined trajectory of such an angle (β) that the slubbing leans against the edge (15C) of the step and the said lateral surface (15E) before reaching the nipping point (P) between the draft and pressure rollers (7, 8); so being given to the slubbing a false twist and a draft.

2. Device as per claim 1, characterized in that it includes a flange (15) combined to said draft roller (7) and forming a convex surface of revolution (15A) coaxial with said roller (7) and with said lateral surface (15E) facing towards the pressure roller (8); the convex surface of revolution including said step (15B, 115B).

3. Device as per claims 1 or 2, characterized in that said supporting lateral surface (15E) is plane and orthogonal to the draft roller (7) axis.

4. device as per claims 1 or 2, characterized in that the thread guide (13) is adjustable according to a direction parallel to the axis of rotation of the feed rollers, to allow the modification of said inclined trajectory and the said angle (β) and therefore the extent of contact between the slubbing (2B) and the edge (15C) of said step and/or the convex surface of revolution (15A), this causing a variation of the extent of the twisting effect on the material.

5. Device as per any of the previous claims, characterized in that said thread guide (13) is formed as a fork, said fork having two branches (13B) that lie approximately on a plane orthogonal to the axis of rotation of the feed rollers (4, 5).

6. Device as per one or more of previous claims, characterized in that the path of the slubbing (2β) is such that under working conditions the slubbing reaches the draft roller (7) presenting, on a projection on a plane transversal to the rollers axes such an angle (α) with the plane tangent to the draft and pressure rollers (7, 8) that makes it adhere to the draft roller (7) upstream from the nipping point (P) between the draft roller (7) and the pressure roller (8).

7. Device as per claim 6, characterized in that said angle (α) is about 10°-15°.

8. Device as per at least claim 2, characterized in that the convex surface of revolution of the flange can have a truncated-conical shape (215A) or at curved generatrix (15A, 115A).

9. Device as per one or more of the previous claims, characterized in that the flange (15) is mounted to be sliding along its own axis (X-X) and elastically stressed by a spring (17) as to lean laterally against the pressure roller (8); to said flange (15) being preferably solidal the draft roller (7) developed as a tubular member.

10. Device as per claims from 1 to 8, characterized in that the flange (15) is axially fixed with the draft roller (7) and that the pressure roller (8) is mounted to be sliding along its own axis (Y-Y) and is elastically stressed to lean against said step (15E).

11. Device as per at last claim 8, characterized in that, for increasing the friction between said convex surface of revolution (15A) and the slubbing, said surface (15A) presents grooves according to concentric circles (18A) and/or according to arcs of spiral (120, 220) angularly uniformly spaced among them, the concentric grooves having possibly also the form of steps (18B, 21B).

12. Device as per one of the claims from 1 to 10, characterized in that on said surface of revolution (15A) -with exclusion of the step (15B) or, in absence of this, of the correnspondingzone- is added a layer of material (15D) as rubber or similar, suitable to generate friction with the slubbing.

13. Device as per one of the previous claims, characterized in that it includes a cleaning element made of felt (14) or similar in light contact with said step and/or with said convex surface of revolution (15A) and with the cylindrical surface of the draft roller (7).

14. Device as per claims 9 and 13, characterized in that said cleaning element (14) is fixed in an adjustable way at least according to a direction parallel to the draft roller (7) axis in order to act as an axial stop to the draft roller and flange group when the pressure roller (8) is lifted.

15. Device as per any of the previous claims, characterized in that it includes a plug (18) with a rough exposed surface or a surface fitted with needles (as velcro or similar), which plug (18) is fixed on the path (D) that the slubbing tends to assume in case of its coming out from the nipping point (P), so that the slubbing is held by said exposed surface and, breaking, provokes the interruption of the spinning.

16. Device as per any of previous claims, characterized in that the pressure roller is supported by two arms (6B, 6C) articulated on a common axis (W-W), said arms being independent from one another and each one being stressed by its own spring (6A) to press the roller (8) against the draft roller (7), thus assuring the contact along all the length of the pressure roller (8).

Fig.1

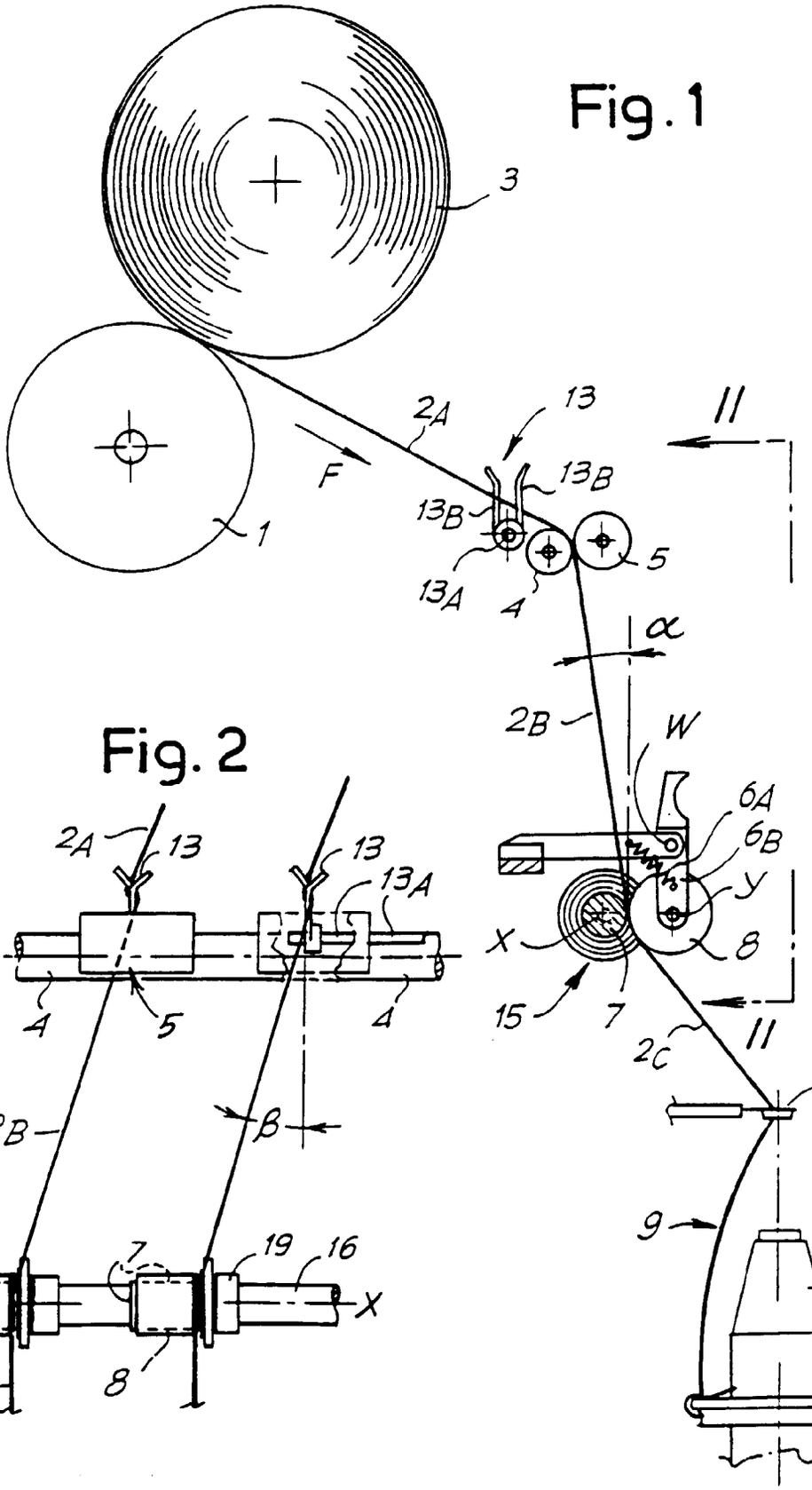

3
1
F
2A
13
13B
13B
13A
A
5
II
α
2B
W
6A
6B
y
8
X
15
7
2C
II
12
9
11

Fig.2

2A
13
13
13A
A
5
A
2B
β
8
7
19
16
X
X
2C
8

Fig. 3

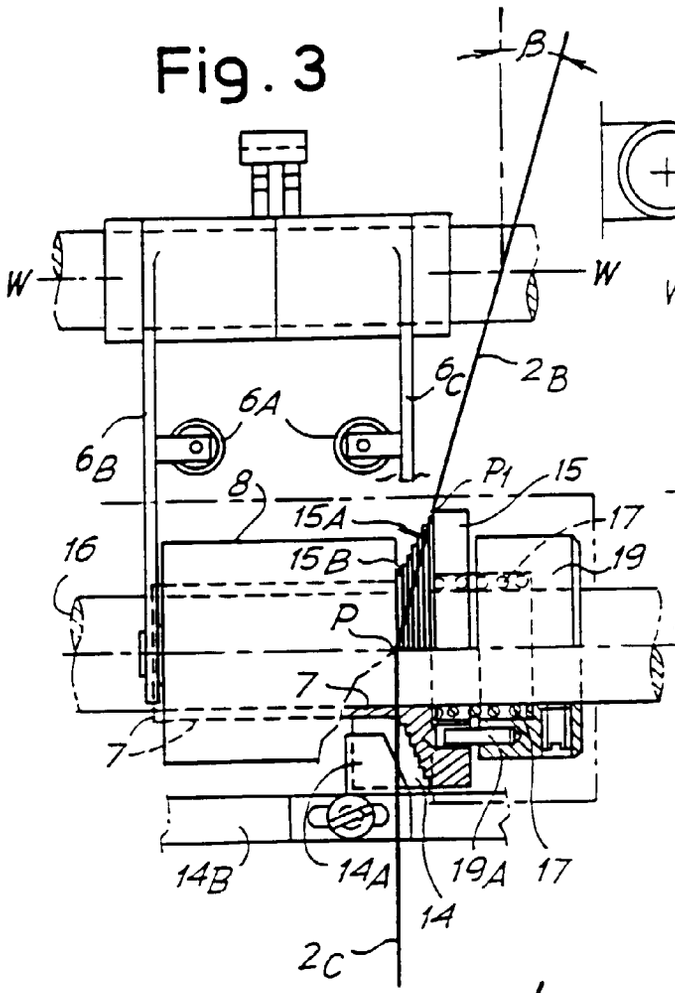


Fig. 4

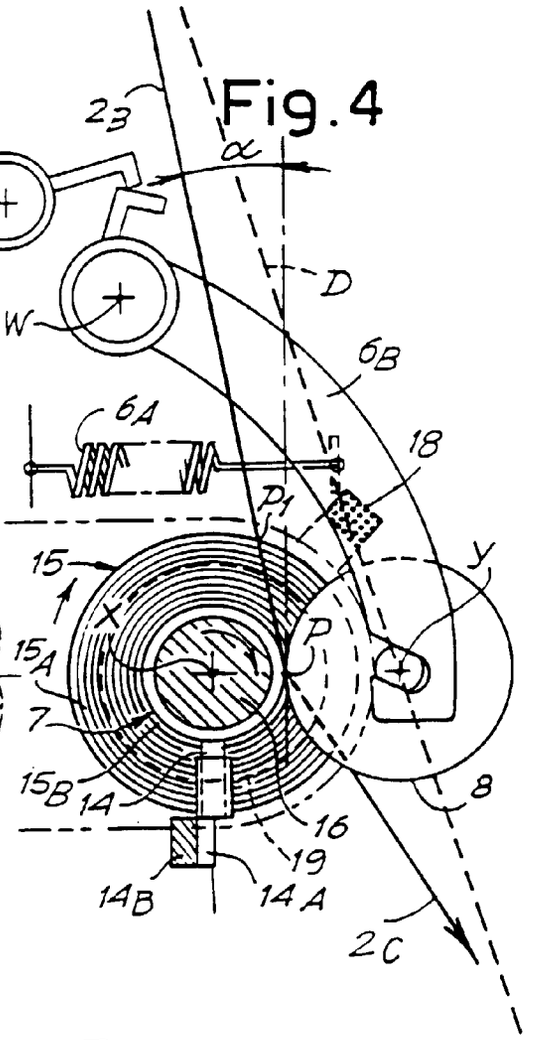


Fig. 5

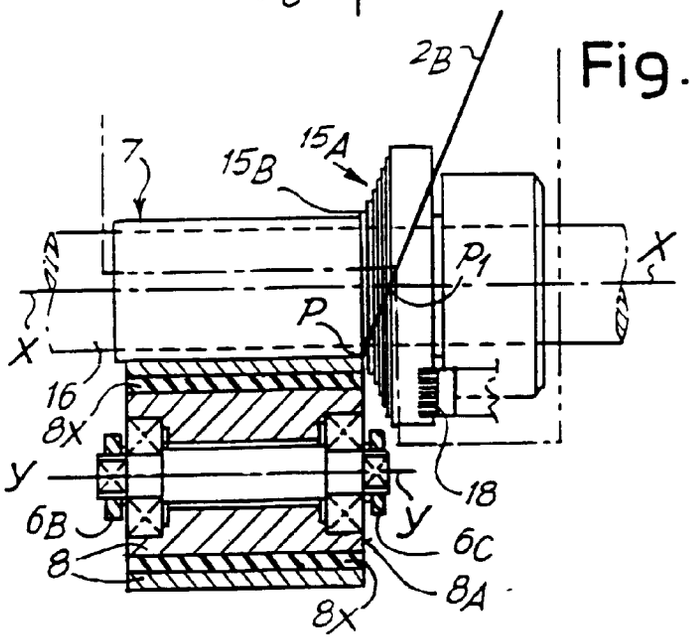


Fig. 5/1

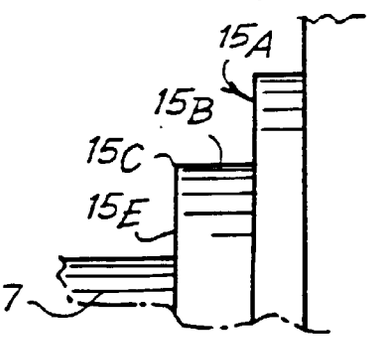


Fig. 6

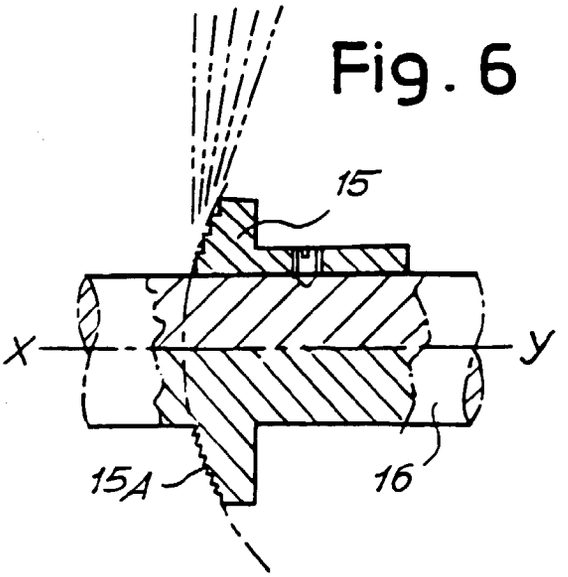


Fig. 7

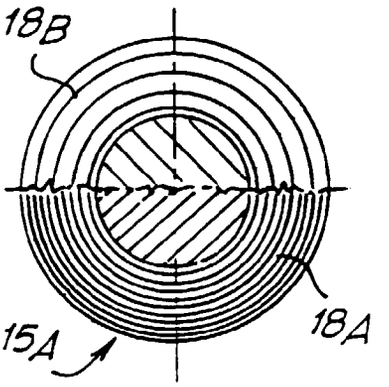


Fig. 8

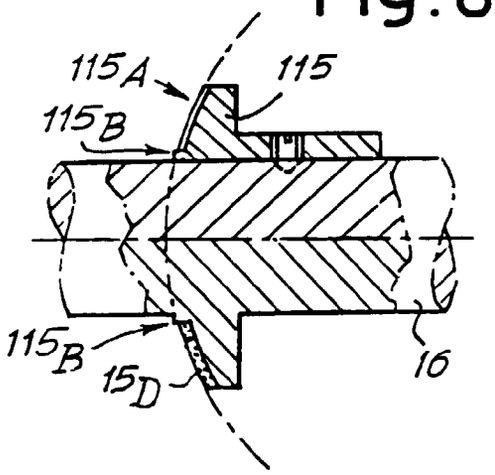


Fig. 9

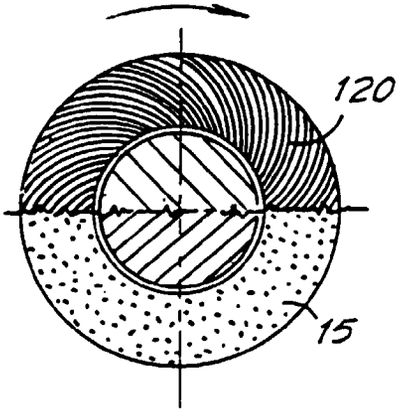


Fig. 10

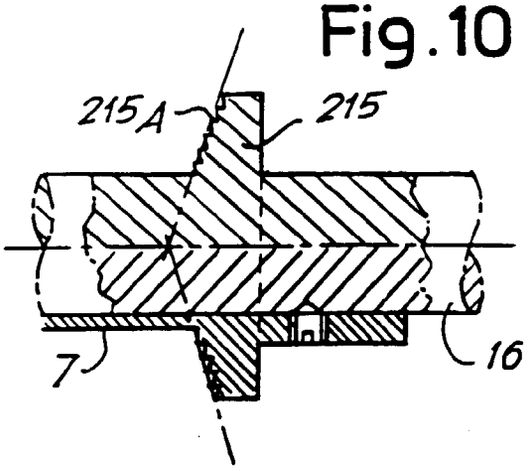
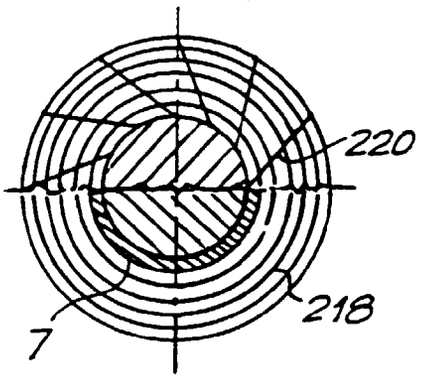


Fig. 11



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 83 0256

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	CH-A-556 406 (HEBERLEIN & CO AG) 29 November 1974 * whole document *	1-3,8-12	D02G1/00 D02G1/08
A	GB-A-991 899 (HOBURN AERO COMPONENTS LTD.) 12 May 1965 * page 1, line 53 - page 2, line 79; figure 3 *	1,4,6,12	
A	US-A-3 112 600 (STODDARD) 3 December 1963 * column 5, line 20 - line 37; figure 5 *	1,2,8,12	
A	EP-A-0 131 338 (NEDERLANDSE ORG TOEGEPAST) 16 January 1985 * page 2, line 29 - page 3, line 12 *	1,13	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

D02G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29 August 1996	V Beurden-Hopkins, S

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