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(19) **United States**(12) **Patent Application Publication** (10) **Pub. No.: US 2004/0123581 A1****Wuest**(43) **Pub. Date:****Jul. 1, 2004**(54) **ADJUSTABLE SPINNING DISTANCE****Publication Classification**(75) **Inventor:** **Olivier Wuest**, Seuzach (CH)(51) **Int. Cl.⁷** **D02G 3/02**; D01H 5/28(52) **U.S. Cl.** **57/350**; 57/315

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DORITY & MANNING, P.A.**POST OFFICE BOX 1449****GREENVILLE, SC 29602-1449 (US)**(57) **ABSTRACT**(73) **Assignee:** **MASCHINENFABRIK RIETER AG**

The invention relates to air spinning frames for the production of spun thread (2) from a staple fibre strand (3), comprising a drafting unit (4) followed by a spinning box (5) with a twisting chamber (9) and a spindle (8). The invention was based on the task to provide a design by means of which the distance between the drafting unit (4) and the spindle (8) can be newly adjusted in a fast and simple manner. This task has been solved according to the invention by attaching an adjusting device (10) to adjust the distance (I) between the drafting unit and the spindle (8).

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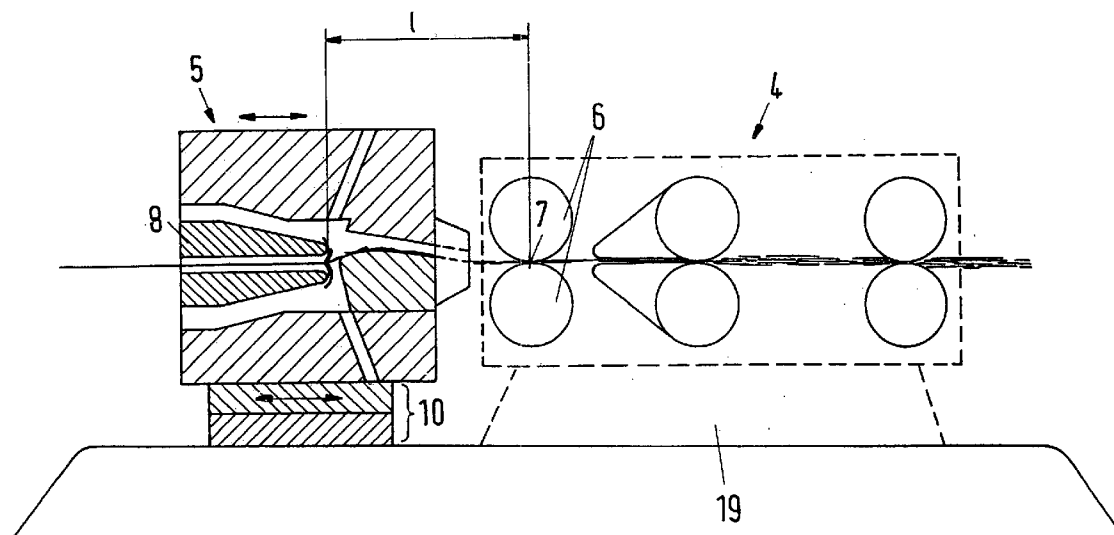
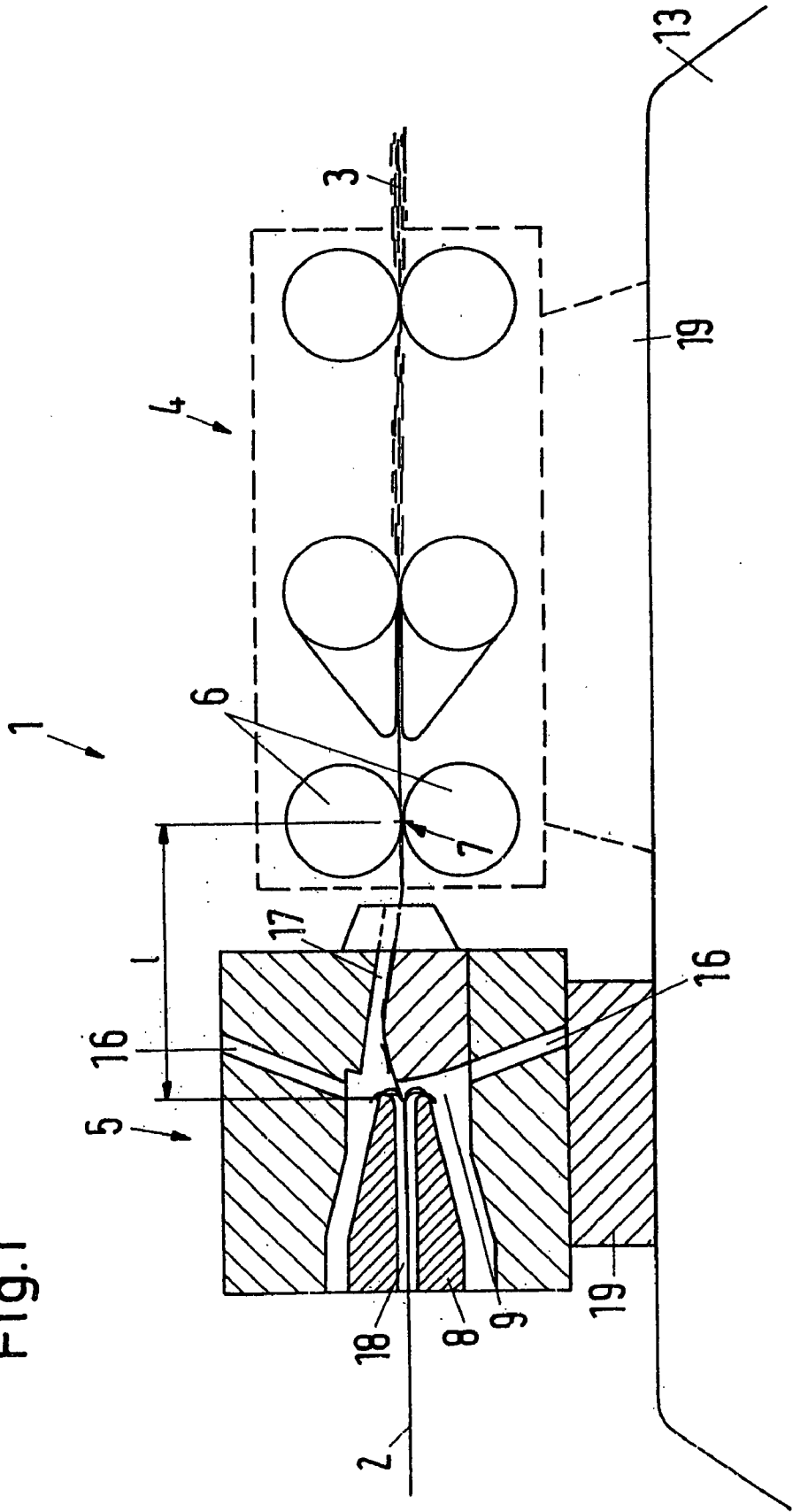


Fig.1



PRIOR ART

Fig.2

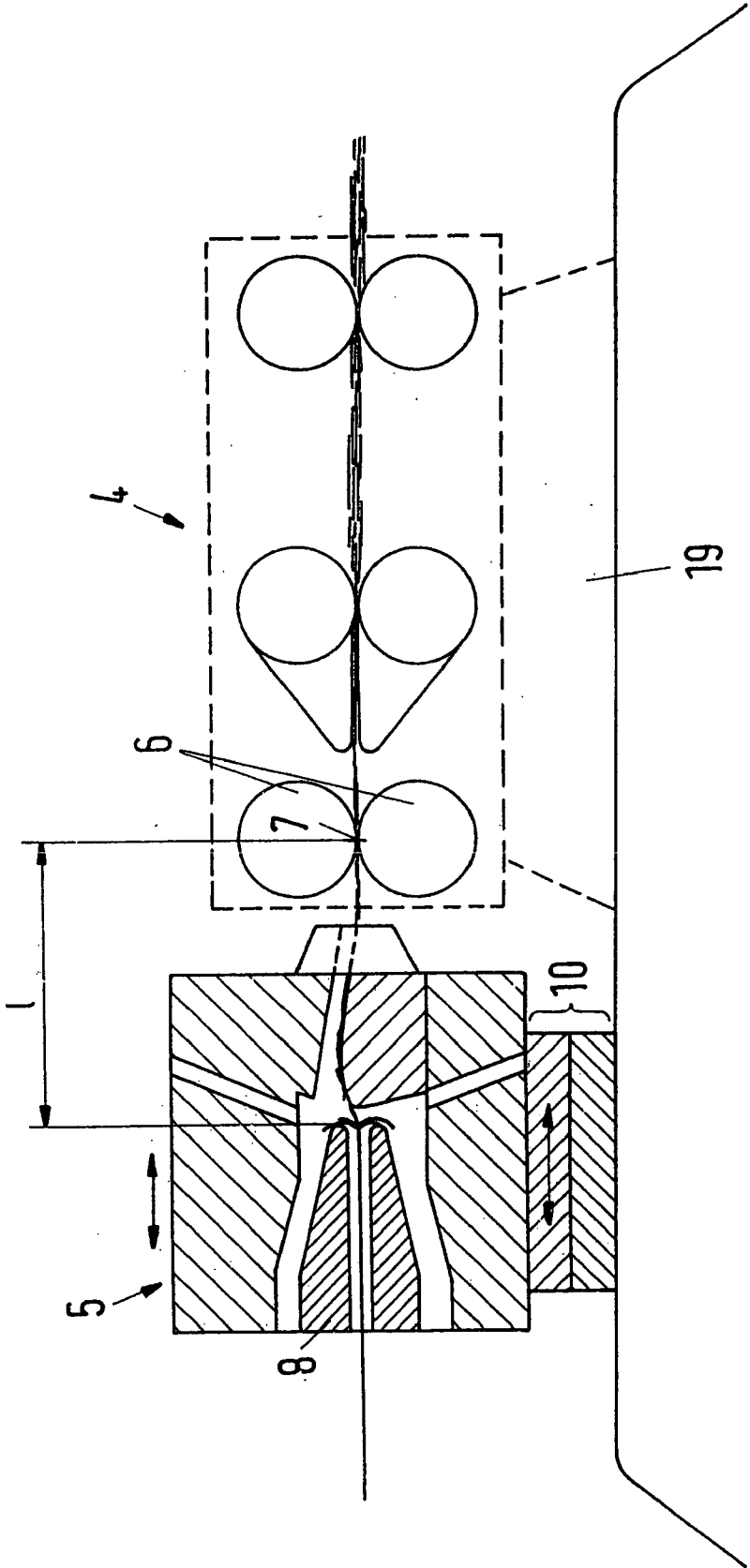
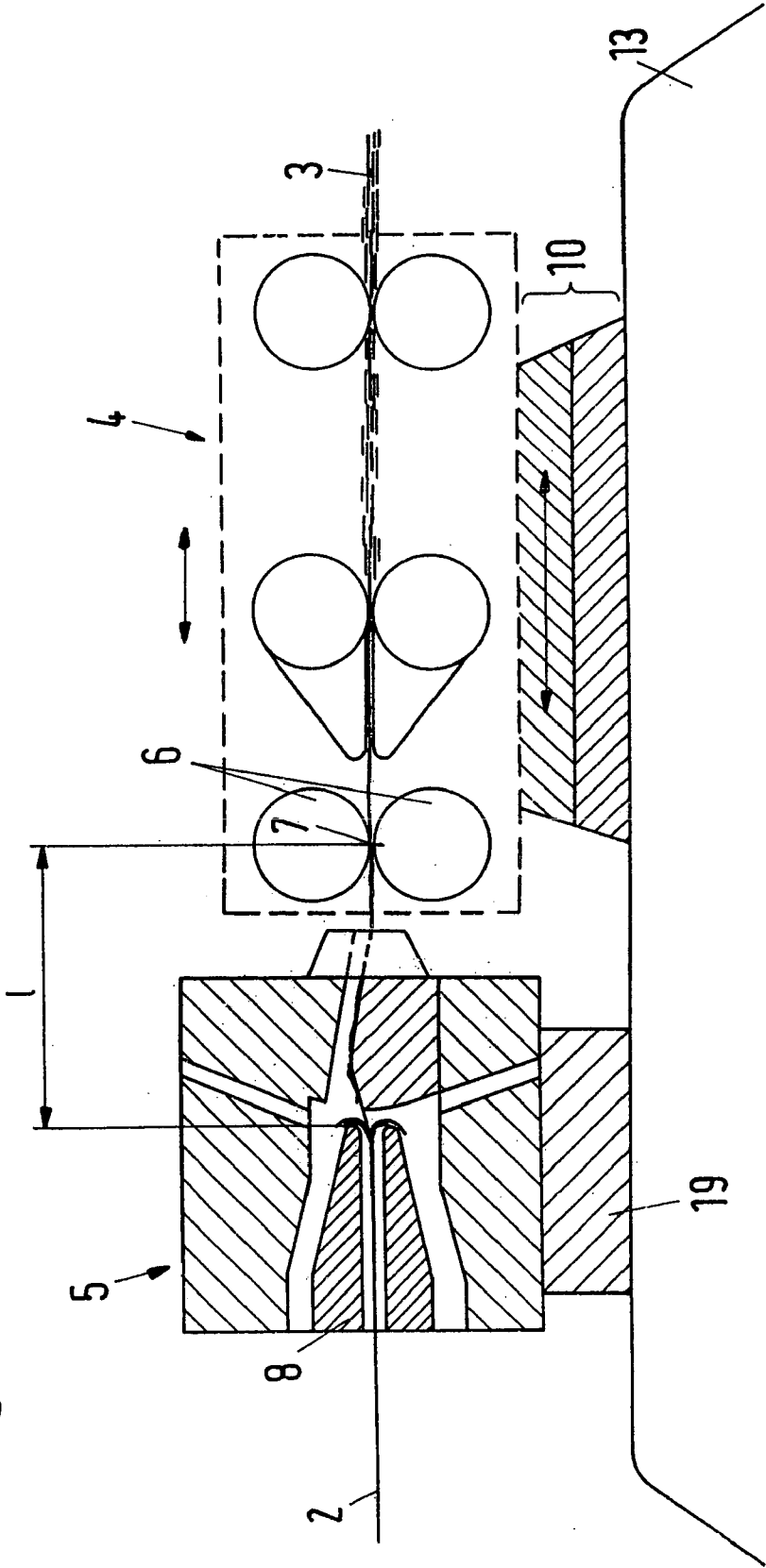


Fig.3



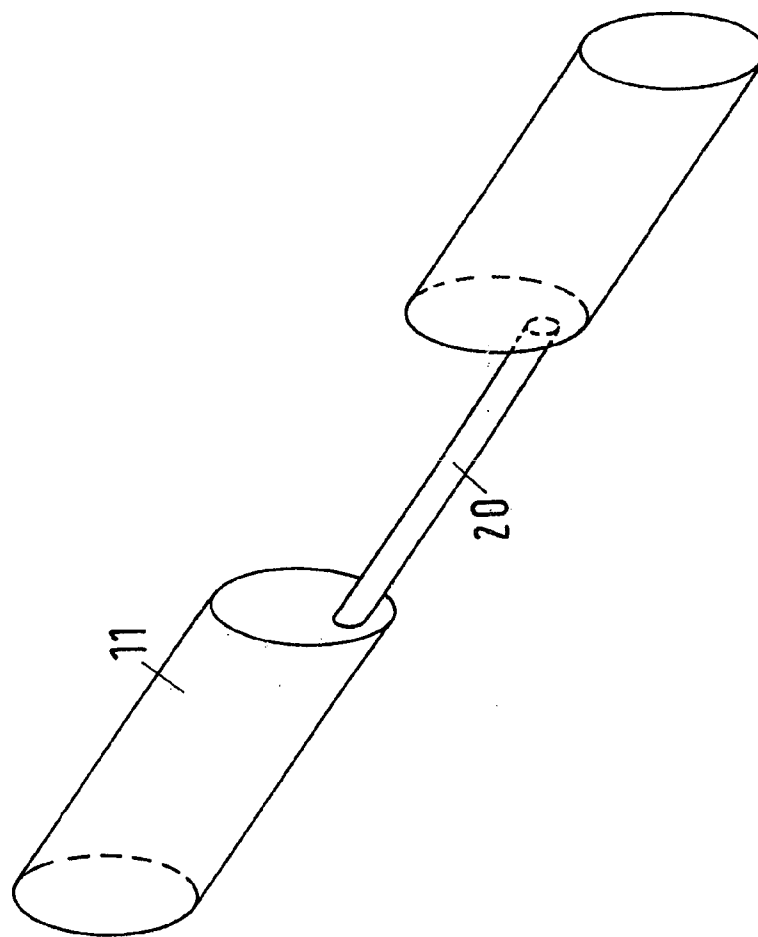


Fig. 4

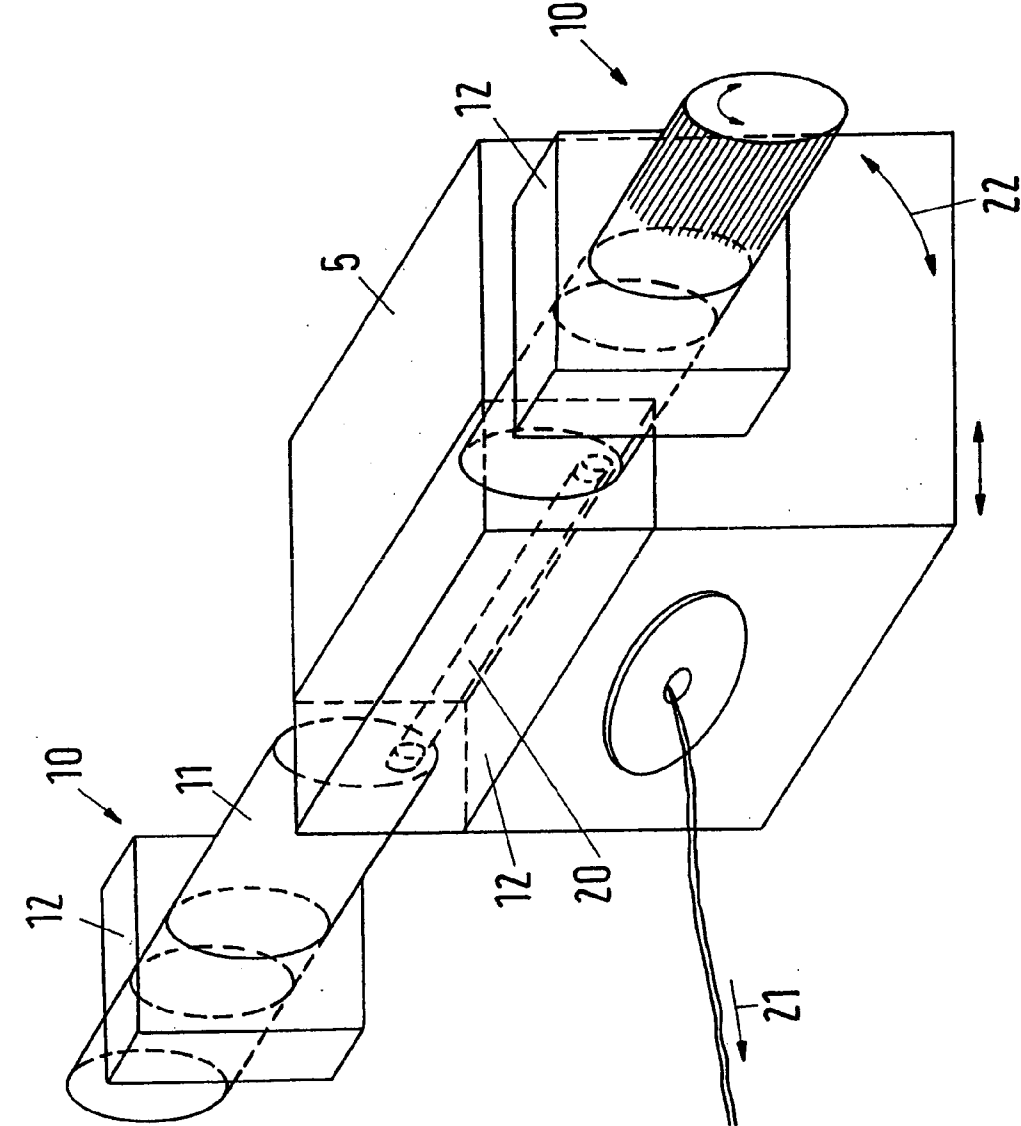
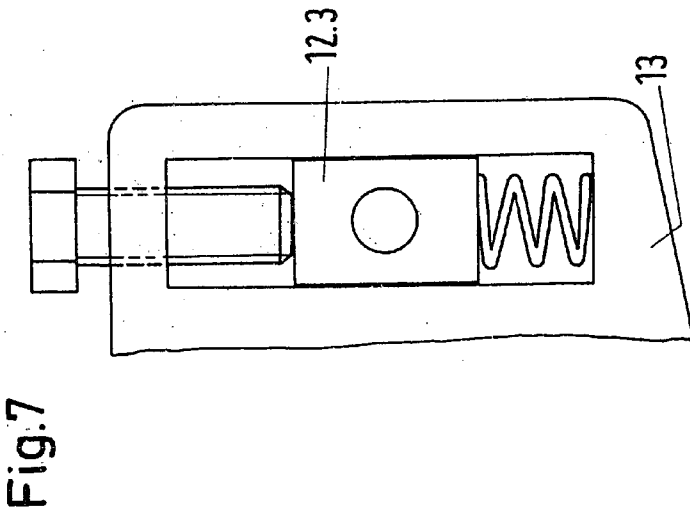
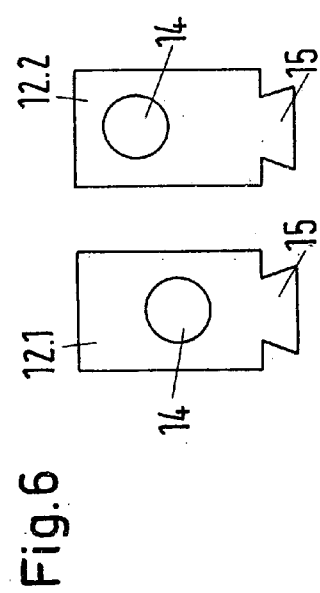
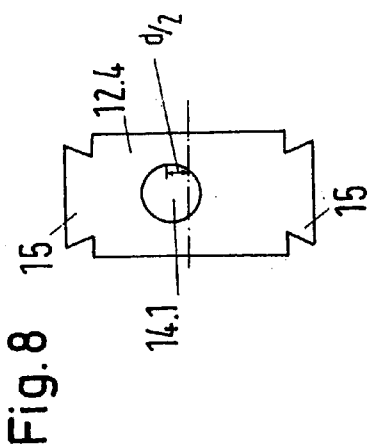


Fig.5



ADJUSTABLE SPINNING DISTANCE

[0001] The present invention relates to different devices for air spinning frames for the production of spun thread from a staple fibre strand according to the preamble of the independent claims 1, 2 and 3.

[0002] By air spinning frames such devices are to be understood which comprise at least one, usually, however, a multiplicity of spinning places, each of which produces a thread from a supplied longitudinal fibre formation and/or staple fibre strand, whereby the process of thread formation takes place by means of an air (vortex) spinning method, i.e., the thread formation is carried out by means of air twisting within a so-called spinning box. For this, each spinning box comprises a fibre conveying channel with a fibre-guiding surface for guiding the staple fibre strand, at whose outlet a twisting chamber is provided, which, for its part, comprises a spindle with a thread guiding channel. The twisting chamber contains a fluid device, which generates turbulence around the inlet opening of the thread guiding channel of the spindle. The staple fibre strand and/or the thread are drawn off through the thread-guiding channel. The turbulence around the inlet opening of the thread guiding channel causes a twisting of the outside fibres of the staple fibre strand around its inner core during drawing-off of the longitudinal fibre formation. This way, a thread is being produced from a staple fibre strand.

[0003] To supply the spinning box with the longitudinal fibre formation and/or staple fibre strand, a drafting unit is provided. The drafting unit is required, in order to first draw the longitudinal fibre formation, which is usually a roving, to the degree of fineness that is suitable for the spinning process.

[0004] Such devices are known in textile technology and are already applied for air spinning processes. Such a device is for example disclosed in the document EP 854 214 (equivalent to U.S. Pat. No. 5,927,062). It is further known that the distance between the clamping point or the clamping line of the pair of drafting unit discharge rollers and the inlet port of the spindle have a substantial effect on the quality of the produced thread. From the DE 41 05 108 C 2 (equivalent to U.S. Pat. No. 5,146,740 and U.S. Pat. No. 5,263,310) and in particular from the DE 41 31 059 A 1 (equivalent to U.S. Pat. No. 5,211,001) it is known that the distance between the clamping line of the pair of drafting unit discharge rollers and the port of the spindle has to have a certain dimensional relation to the average fibre length of the staple fibre strand, in order to obtain a good thread quality. It was realized that the distance mentioned should be within the range of between half and one and a half of the average fibre length of the staple, so that spun thread can be given a real twist.

[0005] The FIG. 1 shows a spinning place 1 of an air spinning frame, as it is known from the state of the art. An air spinning frame comprises a multiplicity of such spinning places 1. The individual components of the spinning place 1 are schematically illustrated in FIG. 1. One can see how the staple fibre strand 3 is led through the drafting unit 4 and how it is refined there. The drafting unit 4 supplies the refined staple fibre strand 3, by way of the discharge rollers 6 which are part of the drafting unit, to the spinning box 5. The staple fibre strand 3 supplied from the drafting unit 4 enters the spinning box 5 through the fibre-conveying channel 17. From the fibre-conveying channel 17 the fibres enter

the twisting chamber 9 of the spinning box 5, wherein a (not illustrated air-) turbulence is generated by the fluid device 16. The thread 2, and/or the not yet spun staple fibre strand 3, is drawn through the guiding channel 18 of a spindle 8 contained in the twisting chamber 9. The formation of the thread 2 from the staple fibre strand 3 takes place at the port of the spindle 8, in that the outside fibres of the staple fibre strand 3 receive a twist from the turbulence in the twisting chamber 9, and/or a real turning motion. The drafting unit 4 and the spinning box 5 are fixedly mounted on the frame 13 of the air spinning frame. During the configuration and the assembly of the machine it is made certain that the distance I between the clamping line 7 of the pair of drafting unit discharge rollers 6 and the spindle 8, and/or the port of the spindle 8, is of a suitable length. The disadvantage in the spinning places, according to the state of the known art, is, that the distance I is given fixedly by the design of the machine and cannot be changed or can only be changed by way of a time-consuming and laborious dismounting of the spinning box 5 or of the drafting unit 4 from the frame 13 and by means of adapting the holders 19. It is therefore the task of the present invention to provide a configuration of a design with which the distance between the drafting unit and the spindle, and/or the port of the spindle, can be adjusted again in a fast and simple manner.

The Invention

[0006] This task is solved with the characteristic features given in the independent patent claims 1, 2 and 3.

[0007] By using an adjustment device, with which the distance I between the clamping line 7 of the pair of drafting unit discharge rollers 6 and the spindle 8, and/or the port of the spindle 8 can be adjusted, it is possible to newly adjust the distance I in a simple and fast way. A further advantage of the invention is that the distance I can be adjusted to the optimal amount for the type of staple fibre strand being treated at the moment. The device also permits, during the spinning of different staple fibre strands (assortments), to faster change the distance I over to the optimal value. A further advantage of the invention is that the determination of the optimal amount for the distance I can be evaluated by means of a testing series. Between the test runs the distance I can be changed fast and simply.

[0008] Advantageous arrangements and embodiments of the invention are given in further claims.

[0009] In the following the invention and the idea of the invention are described by way of the exemplified embodiments illustrated in the figures. It is, however, to be pointed out expressly, that the invention and/or the idea of the invention is not limited to the examples of the embodiments shown. Thereby shows:

[0010] FIG. 1 a spinning place of an air spinning frame according to the state of the art with fixedly attached holders 19;

[0011] FIG. 2 a first embodiment of the invention with an adjusting device 10 according to the invention;

[0012] FIG. 3 a further embodiment of the invention;

[0013] FIG. 4 a possible embodiment of the adjusting device 10 according to the invention in the form of an eccentric;

[0014] **FIG. 5** a mounted adjusting device comprising an eccentric with the pertaining bearing for the eccentric;

[0015] **FIGS. 6, 7 and 8** different embodiments of bearings for the eccentric.

[0016] **FIG. 1** shows a conventional spinning place of an air spinning frame, as it is known from the state of the art. The individual components of the spinning place **1** were already described further above, thus a further description can be omitted at this stage. Contrary to the devices according to the invention, in **FIG. 1**, both the spinning box **5** as well as the drafting unit **4** are, by means of pertaining holders **19**, fixedly mounted on the frame **13** within the air spinning frame and are not adjustable. By this type of design it is not possible, as already described further above, to adjust the distance **I** between the clamping line **7** of the pair of drafting unit discharge rollers **6** and the port of the spindle **8**. This means that such a machine must comprise a distance **I** which is designed for a wide range of types of staple fibres. This means, however, at the same time, that the distance **I** cannot be optimised to a specific type of staple fibre (that is, to a certain average staple fibre length). A new adaptation of the distance **I** to the assortment to be treated can thus not be provided and is also not possible with the devices according to the state of the art: The dismounting of the spinning box **5** or of the drafting unit **4** at each spinning place of an air spinning frame (which comprises a multiplicity of such spinning places) and their renewed installation after adaptation or substitution of the holders **19** would mean an unreasonably high effort for the user of the machine.

[0017] **FIG. 2** shows a first embodiment of the invention, at which (schematically illustrated) an adjusting device **10** according to the invention is provided at the spinning box **5** (in place of the holders **19** of the **FIG. 1**). By looking at the arrows in the figure it can be recognized how the spinning box **5** can be adjusted in fibre conveying direction, whereby the distance **I** changes. The adjusting device **10** is only schematically illustrated in **FIG. 2**, because there are many possibilities for the actual embodiment of the adjusting device, which are all to be covered by this application. The remaining components correspond with the components of **FIG. 1**; for this reason they are not described furthermore. One can see in **FIG. 2** how the distance **I** can be adjusted between the clamping line **7** of the pair of drafting unit discharge rollers **6** and the spindle **8**, and/or and its port, in particular how it can be steplessly adjusted. The drafting unit **4** is thereby still mounted on a conventional holder **19**.

[0018] For the realisation of the idea of the invention it is insignificant whether the adjusting device **10**, as shown in **FIG. 2**, is provided at the spinning box **5** or whether the adjusting device **10** is applied at the drafting unit **4** in place of a conventional holder **19**. The essential fact is that the adjusting device permits a relative motion between the clamping line **7** and the yarn package **8**. In **FIG. 3** therefore, the adjusting device **10** is provided at the drafting unit **4**, while the spinning box **5** comprises a conventional holder **19**. The remaining components correspond with the description of **FIGS. 1 and 2**. The adjusting device **10** is also only schematically illustrated here. The possible adjustment, and/or movement of the drafting unit **4**, is indicated with the arrows. The adjusting device **10** is, on the one hand, attached on the drafting unit **4** and, on the other hand, on the frame **13** of the spinning place, and/or the air spinning frame.

[0019] In **FIG. 4** one of the many conceivable and possible concrete embodiments of the adjusting device **10** is illustrated. It is again to be pointed out that the invention is not only limited to the following description of the embodiment of the adjusting device.

[0020] The adjusting device according to the invention can for example, as is shown in this **FIG. 4**, consist of an eccentric **11**. The eccentric **11** comprises an eccentrically arranged shaft **20**. The working principle of an eccentric, as it is illustrated in **FIG. 4**, is generally known to the specialist. Therefore no further explanations are given here.

[0021] In **FIG. 5** an eccentric **11**, as is shown in **FIG. 4**, is applied as an adjusting device. The figure shows the eccentric **11** in the mounted condition (schematically illustrated). One can see, how the eccentric **11** is held by means of one central and two outer bearings **12** of the eccentric. The centre bearing **12** of the eccentric serves as the support of the eccentric bearing shaft **20**. The centre eccentric bearing **12** in this exemplified embodiment is fastened on the spinning box **5**. The two outer bearings **12** of the eccentric are for example fastened on the frame of the spinning place, and/or on the air spinning frame, (the attachment and the frame are not illustrated). By turning the eccentric **11** (see arrow on the eccentric **11**) the eccentric shaft **20** moves, whereby the spinning box **5** experiences a movement. If the shaft **20** of the eccentric **11** is arranged in the eccentric bearing **12** as in **FIG. 5**, then the spinning box **5** is subjected to a movement, which is mainly directed in spinning direction **21**. The movement component (vector) of the spinning box **5** normal (perpendicular) to the spinning direction **21** can be neglected if the eccentric **11** is turned only within a certain range, and/or if the relation of the dimension between eccentrics **11** inclusively the eccentrically arranged shaft **20**, and the spinning box **5** are chosen correspondingly large. Since, according to **FIG. 5**, the outer eccentric bearings **12** are mounted fixedly, i.e. are mounted immovably, on the frame (frame not shown), the spinning box **5** makes a relative motion in relation to the frame and to the outer eccentric bearings **12** as well as to the drafting unit being likewise fixedly mounted on the frame (frame and drafting unit not shown). This corresponds to a relative motion of the spinning box **5** according to **FIG. 2**. The relative motion takes mainly place in spinning direction **21**.

[0022] A further, but not shown embodiment of the **FIG. 5** would be, that the outer eccentric bearings **12** are not connected at the frame (not shown), but directly with the drafting unit **4**. By turning the eccentric **11** the spinning box **5** would likewise be positioned closer or further away from the drafting unit.

[0023] A further feature of this device is, that the spinning box **5** can also be swivelled around the eccentric shaft **20** (see swivelling direction **22**). The possibility to swivel the spinning box **5** around the shaft **20** has the advantage that it can be better accessed for maintenance.

[0024] The **FIGS. 6, 7 and 8** show different embodiments for the eccentric bearings. **FIG. 6** shows interchangeable eccentric bearings **12.1** and **12.2**. These two eccentric bearings are characterised in that their holes **14** for the mounting of the eccentric shaft **11** are at different locations. The eccentric bearings **12.1** and **12.2** comprise dovetails **15** for their mounting, by which they are attached on the frame or on the component that is to be adjusted. By using different

eccentric bearings **12.1** and **12.2**, the adaptation of the distance **L** can take place in two steps: On the one hand, by using different eccentric bearings **12.1** and **12.2** the distance **I** can be adjusted stepwise (first step coarse adjustment). On the other hand the distance **I** can be accurately adjusted additionally by means of the eccentric (second step fine adjustment). It is possible in this way, to affect a coarse and a fine adjustment of the distance **I**. This has the advantage that the distance for each average staple length, and/or for each type of staple fibre, can be optimally adjusted with an adjusting device throughout a very large range. The interchangeable eccentric bearings, like the components **12.1** and **12.2** can be used both on the frame and as well as on the component which is to be adjusted (see example in **FIG. 5**).

[0025] **FIG. 7** shows a further exemplified embodiment of the invention. In this example the eccentric bearing **12.3** is not interchangeable, but adjustably attached on the frame **13** (machine frame, and/or frame of the spinning place). The adjustable eccentric bearing **12.3** can, as is shown in this exemplified embodiment, be shiftable mounted with a spring and a screw within a guide. This embodiment of the adjusting device has the advantage that the adjustability of the distance **I** can take place over a very wide range.

[0026] **FIG. 8** illustrates a further embodiment of an eccentric bearing **12.4** with off centre-arranged hole **14.1**. In this embodiment the eccentric bearing **12.4** can be mounted in two positions: Thanks to the hole **14.1** arranged off-centre, the bearing **12.4** can also be mounted in a 180° turned position. Thereby the distance **I** between the clamping line **7** and the port of the spindle **8** changes (see preceding figures) by the amount **d**. The rotatable eccentric bearing **12.4** with off-centre arranged hole **14.1** is preferentially selected as bearing on the component which is to be adjusted, but it can also be used as eccentric bearing on the frame.

[0027] The invention and the idea of the invention are not only limited to the use with the devices of an air spinning frame with a drafting unit. In particular, another refinement device can also be used in place of a drafting unit, as for example a dissolving roller with succeeding clamping unit, which causes the clamping (similar to the clamping line of the drafting unit).

[0028] Furthermore it is not essential for the invention, which component is adjusted finally, whether this is the spinning box or the refinement device, and/or the drafting unit. It would be also conceivable that the adjusting devices of several or each spinning place are joined mechanically (e.g. by a shaft) or coupled control-technologically. Thereby it would be possible that, by means of a central control unit of the air spinning frame, the spinning distance (distance **I**) of all adjusting devices could simultaneously be adjusted.

[0029] The invention is not explicitly limited to the possibilities and embodiments specified. These embodiments are rather meant as a suggestion for the specialist, in order to realize the idea of the invention in the most possible advantageous way. From the described embodiments further advantageous applications and combinations are therefore easily derivable, which likewise reflect the idea of the

invention and which are to be protected by this application. Some of the disclosed features were described combined in this description and are claimed combined in the following claims. It is, however, also conceivable to claim individual features of this description for themselves on their own or in another combination within the application scope of the idea of the invention. The applicant, therefore, expressly reserves the right to provide, if necessary, other combinations when applying the idea of the invention.

1. Spinning place (1) of an air spinning frame for the production of spun thread (2) from a staple fibre strand (3), comprising a drafting unit (4) followed by a spinning box (5), whereby the drafting unit (4) comprises a pair of drafting unit discharge rollers (6) with a clamping line (7) and whereby the spinning box (5) comprises a twisting chamber (9) with a spindle (8), characterized in that an adjusting device (10) is provided to adjust the distance (I) between the clamping line (7) of the pair of drafting unit discharge rollers (6) and the spindle (8).

2. Spinning box (5) for air spinning frames for the production of spun thread (2) from a staple fibre strand (3), with a twisting chamber (9), which preferably comprises a spindle (8), characterized in that an adjusting device (10) is assigned to the spinning box (5), which device serves to adjust the position of the spinning box (5).

3. Drafting unit (4) for air spinning frames for the production of spun thread (2) from a staple fibre strand (3), with a pair of drafting unit discharge rollers (6) with a clamping line (7), characterized in that an adjusting device (10) is assigned to the drafting unit (4), which serves to adjust the position of the drafting unit (4).

4. Adjusting device (10) according to the claims 1 to 3, characterized in that the adjusting device (10) consists of an eccentric (11).

5. Adjusting device (10) according to claim 4, characterized in that the eccentric (11) comprises bearings (12, 12.1, 12.2, 12.3) for the eccentric, which are interchangeably or adjustably fastened on the frame (13) or on the adjustable component (4, 5).

6. Bearing (12.3) for the eccentric according to claim 5, characterized in that the bearing (12.3) for the eccentric is mounted in a guide on the frame (13) where it is adjustable by means of a screw and a spring.

7. Bearing (12.4) for the eccentric according to claim 5, characterized in that the bearing (12.4) for the eccentric comprises a hole 14.1 arranged off-centre for the mounting of the eccentric shaft (11), whereby the bearing (12.4) for the eccentric can be mounted in different locations.

8. Adjusting device according to claim 4, characterized in that the eccentric (11) comprises a bearing (12) for the eccentric, which allows the swivelling of the adjustable component (4, 5).

9. Air spinning frame with several spinning places (1), which are furnished with adjusting devices (10) according to one of the preceding claims, characterized in that the adjusting devices (10) are joined with one another in such a manner that they are simultaneously adjustable by means of a central control unit.

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