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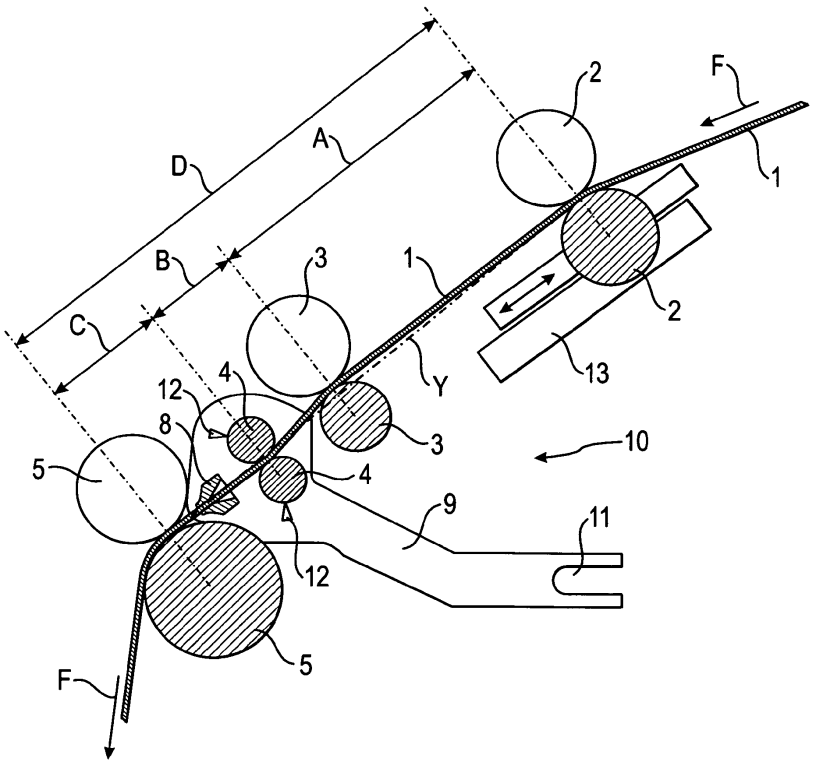
(54) **Drafting device for spinning machinery**

(57) Drafting device (10) for use in spinning machinery and for drafting discontinuous fibers, such as cotton, linen, wool, jute, ramie, hemp or man-made fibers, with a pair of feed rollers (2), a pair of draft rollers (3), a pair of control rollers (4) and a pair of delivery rollers (5), being arranged in this order in a rove feed direction (F) defining a drafting zone (D) composed of three sub-drafting zones (A, B, C), whereby the rollers (2, 3, 4) are driven at a respective predetermined speed in such a manner that a drafting action is exerted on the rove (1), wherein said control rollers (4) are both provided with an active drive mechanism and said control rollers (4) are mounted in a fixed but contact-free manner with a defmed control gap (6) between them of a predetermined dimension.

Fig. 1



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Description

[0001] The present invention relates to a drafting device for use in spinning machinery according to the preamble of claim 1. Such drafting devices, also referred to as drafting units, are an essential part of spinning frames or spinning machinery, in which the rove, i.e. the twisted roll or bundle of textile fibers coming from the preparation and fed through the spinning machine, is drafted to the final dimension of the yarn with the best possible regularity and is then twisted and finally wound onto bobbins.

[0002] One problem with respect to such drafting devices is that for different types of raw material respectively adapted drafting devices are normally required. Different types of raw material, such as linen, cotton or wool, have staple fibers of very different lengths and characteristics. To date, for each type of fiber - short fiber, medium fiber and long fiber - the spinning frame was provided with a specially adapted drafting unit being capable of drafting only one type of fiber, e.g. short or long. Another problem with known drafting units for spinning frames is that the control of the rove is technically relatively complex due to the differences in the preparation steps, in the quality of the raw material and in fiber lengths in one and the same raw material. Some of the raw materials are even treated in immersion tanks before the drafting step, whereas other materials are drafted and spun in dry condition. In the known drafting devices, such differences in the quality and the treatment of discontinuous textile fibers have resulted in problems regarding the quality of the output of spinning processes and often also in yarn breaks during the drafting of the fibers.

[0003] The optimal control and support of very different types and qualities of textile fibers during the drafting process is therefore a complex task.

[0004] Some prior art drafting devices have been developed: for example, in US 2,624,074, a drafting apparatus is disclosed, in which, between a pair of front rollers and a pair of intermediate rollers, a pair of control rollers is inserted. One of the control rollers is actively driven, whereas the second one is passively driven as a result of a friction contact with the first roller. For this purpose, the control rollers are spring loaded. This results in varying tensions during the drafting process.

[0005] Also in the further prior art drafting unit according to WO 2009/060298 A2, a pair of control rollers is provided in addition to the feed rollers and delivery rollers of the drafting unit, which are held in direct contact by the pressure provided by a spring. Although this drafting apparatus has shown good results in the case of high-quality raw materials, the device is not capable of providing a high-quality yarn in some situations and in particular in the case of different types of textile fiber qualities and of different preparation treatments, such as wet treatment or chemical treatment, before the drafting procedure.

[0006] It is therefore a problem to be solved by the present invention to provide a drafting device capable of high-quality drafting even in the case of different lengths of staple fibers and strongly diverging quality of raw materials or different preparation treatments. The drafting device should also be more flexible, require less intervention by technical staff and minimize production downtime compared to known devices; the mounting, maintenance and replacement in different types of spinning technologies and spinning frames should be simpler and quicker.

[0007] According to the present invention, this problem is solved by a drafting device according to the features of claim 1. Preferable embodiments and further developments of the invention are defined in the dependent claims.

[0008] According to the present invention, a drafting device for spinning machinery is provided, having a pair of feed rollers, a pair of draft rollers, a pair of twin control rollers and a pair of delivery rollers being all arranged in this order in a rove feed direction F defining a drafting zone D composed of three sub-drafting zones A, B, C; the feed rollers, draft rollers and control rollers are driven at a respective predetermined speed such that a drafting action is exerted on the rove, whereas the invention is characterized in that said control rollers are both provided with an active drive mechanism, and that said control rollers are mounted in a fixed, but contact-free manner with one another with a defined control gap of a set dimension between them. The control rollers, located between the draft rollers and the delivery rollers, are therefore not in contact with one another but in a spaced-apart relationship and have a certain defined and fixed distance from each other, which is in the following referred to as a control gap. The control rollers are, according to the invention, both actively driven, which means that both have some type of active drive mechanism, contrary to prior art devices, in which one of the rollers is usually driven and the other one is driven only in a passive manner due to friction contact between these two rollers. The rove, which is defined as a twisted roll or bundle of textile fibers, comes from the preparation stages and is fed through the spinning machine. Textile fibers are any discontinuous or staple fibers of a natural or non-natural material which are used in textile materials.

[0009] Through this special control gap of a predetermined dimension depending on the type of fiber and/or quality of the rove, the fibers of the textile material passing through these control rollers are assisted by this innovative guidance arrangement, where a constant homogeneous speed is maintained on the rove during the drafting process from both sides of the control gap. Furthermore, the fixed and separate mounting of both control rollers avoids an undesired increase or decrease in the pressure exerted on the rove and the textile material fibers in case of variations in rove mass. By means of this, the control of the rove is guaranteed to a high extent, even when the rove is varying in its mass. In prior art drafting devices, the spring loaded control rollers or the like lead to an important variation in tension, which becomes even

worse in the event of a disturbance due to the fluctuating number of fibers, the mass of the rove, the varying quality of the raw material and also in case of high speed. The present invention with the characterizing feature of claim 1 avoids all this: the occurrence of friction between textile fibers and varying speeds exerted on the fibers by the control rollers is effectively avoided by remarkably simple measures, i.e. a certain predetermined control gap between the control rollers in combination with an active drive mechanism for each of the pair of control rollers. By means of this, the drafting operations result in much higher quality and regularity of the final yarn, even in the case of a varying mass of the raw material or varying qualities of the textile fibers, which depend in particular on the preparation stages, or whether they are dry or wet.

[0010] According to an embodiment of the present invention, the control rollers are mounted in a fixed, relative position with regard to a compactor on a common support element, and the compactor has an inner shape adapted to compact and/or compress said rove. By combining a compactor and a pair of control rollers with a defined control gap and being mounted in a fixed, relative position to the compactor, higher quality and better drafting results can be achieved, even in the case of a strong variation in the type of textile material - short or long - or the quality and characteristics of the natural raw material and rove. The compactor is adapted, according to the invention, to compact and/or compress the textile fibers coming from the control rollers, which are both actively driven at the same speed. Due to these measures, this innovative drafting device ensures a controlled movement of almost all of the drafted fibers with a minimum of disturbance, such as friction, differences in speed, tangling, etc. to the other fibers surrounding them. This fixed, relative position between the control rollers and the compactor is set in relation to the types of textile fibers, which are to be drafted: the distance between the compactor and the twin control rollers is set such that the majority of fibers arriving at the nip of the delivery rollers is processed at approximately the same speed in the critical final drafting zone, and due to the compactor, the flaring-out of fibers just before the delivery rollers is effectively avoided. Due to the common support element, the relative position between the control rollers and the compactor is guaranteed in each situation. The common support element allows also a simple mounting and replacement in case of damage to either the compactor or other parts of the drafting device.

[0011] According to a further embodiment of the invention, a compactor is provided in the drafting device, which is positioned in alignment with the center of said pair of control rollers. The rove made up of a compact and rather uniform bundle of textile fibers arrives therefore in the required exact nip position of the draft rollers, resulting in a yarn of a more regular and better quality, independently of the different characteristics and qualities of the fibers in the raw material. By means of the innovative drafting device, it is therefore possible to produce a very compact and uniform yarn with high quality. Due to the better drafting performance and the higher quality output from this drafting system, the device according to the present invention is even able to considerably reduce production costs, in particular in the preparation of the rove. A wider range of raw material and of characteristics of the rove in the preparation processes may be drafted, than is possible with previous known devices of the prior art, in which only a certain defined, limited number of textile fibers could be drafted in a certain range of quality. The productivity of said preparation processes and machinery can also be appreciably increased due to the distinctive capabilities of this innovative drafting unit.

[0012] According to a further embodiment of the invention, the drafting device is provided with a compactor between said pair of actively driven control rollers and said delivery rollers in the closest possible position directly in front of said delivery rollers in the feed direction F. The compactor is therefore positioned immediately before the nip of the delivery rollers. The compressed and compacted rove is therefore maintained in correct alignment until the final drafting step performed by the delivery rollers in combination with the twin control rollers and the compactor is finished. These measures drastically reduce an undesired flaring-out of the textile fibers and/or the breaking of the rove as a result of the strongly varying mass of the said rove.

[0013] According to a further advantageous embodiment of the invention, the compactor of the drafting device is provided in the feed direction F, with first an inner conical guiding part and second an inner parallel compacting part. Therefore, the fibers in the rove coming at a relatively uniform high speed from the two actively driven control rollers will be kept in the parallel compacting part under tension due to the holding action between the delivery rollers and the two control rollers. By means of this, it is guaranteed that most of the fibers are accelerated in a more selective manner as nipped by the delivery rollers. The conical guiding part of the compactor functions as a guide element in order that all fibers are continuously and uniformly guided to the parallel compacting part. This avoids to a high degree disadvantageous flaring-out of outer fibers. In combination with the increase in speed in the drafting unit, this results in a considerable reduction of the flaring-out effect as it is given in known prior art drafting devices. Also through these measures, the irregularity in the final yarn is limited and reduced due to these technical features.

[0014] According to a further advantageous embodiment of the invention, the drafting device is provided with a compactor between said pair of control rollers and said delivery rollers in a position close to the delivery rollers, which has a central, longitudinal axis X, which is slightly inclined with respect to a drafting line Y defined by the feed rollers and the delivery rollers. The slight inclination of the central, longitudinal axis of the compactor is, according to the invention, preferably in a range of up to 15 degrees. The inventor of the present invention discov-

ered that such a slight inclination of some degrees with respect to the drafting line Y provides better control and higher drafting quality than an exact alignment of the compactor with the drafting line, as is the case in prior art apparatuses. The rove arriving at largely uniform speed and without disturbance, e.g. friction forces or the like, from the twin control rollers is guided in the compactor on the edge between the conical guiding part and the inner parallel compacting part. This has advantages in view of the degree of control of different types of textile fibers and in particular different lengths and qualities of textile fiber materials.

[0015] According to a further advantageous embodiment of the invention, the compactor is mounted together with said pair of control rollers on a common control bar by screwless fitting features or means, preferably by means of clip mounting features. Other screwless fitting means such as pressure mounting with a pin/hole-combination may also be used according to the invention. With screwless fitting, the different components, e.g. the control rollers and the compactor, may be easily replaced in the case of damage. The mounting of different types of compactors, e.g. different sizes adapted to different types of raw material, is simplified. The maintenance and the mounting of the device are easy to carry out and do not require specialized personnel, tools or the like.

[0016] According to a further embodiment of the invention, the control rollers are gear-driven via said draft rollers (directly or indirectly) at a predetermined driving speed in relation to the speed of the draft rollers. With this simple construction design a uniform drafting action is guaranteed. In a preferred embodiment, the intermediate gears, which may be mounted between the control rollers and the draft rollers, are installed by means of a press-fit mounting.

[0017] According to a further embodiment of the invention, the control rollers are provided with scrapers, which are in contact with the outer circumference of each control roller. The scrapers remove all filaments or dirt particles on the control surfaces of the control rollers. With a highly clean surface of the control rollers, any unintended variation in the speeds or pressures of the drafted textile fibers is avoided.

[0018] According to a further embodiment of the invention, a first sub-drafting zone A in the drafting zone D is provided between said feed rollers and said draft rollers, which has features enabling a variable adjustment of its length. The drafting device may therefore be easily adapted to different lengths of textile fibers, depending on the type of raw material, e.g. linen and cotton. It is not necessary to specifically adapt the drafting device to another complex form as was the case with prior art drafting devices for different types of staple fiber material.

[0019] The above-mentioned objects, features and advantages of the present invention will become more apparent from the following more detailed description of some preferred embodiments of the invention made with reference to the accompanying drawings. In the drawings:

Fig. 1 is a schematic view of a first embodiment of a drafting device according to the present invention;

Fig. 2 is a detailed side view of the control rollers, the compactor and the control bar according to the embodiment shown in Fig. 1;

Fig. 3 is a detailed side view of a further embodiment of a drafting device according to the present invention showing the combination of the control rollers, the compactor and a control bar in relation to the delivery rollers;

Fig. 4 is a schematic view of a further embodiment of a drafting device according to the present invention showing two drafting units A and B; and

Figs. 4a, 4b are detailed views A and B of Fig. 4.

[0020] A first embodiment of the invention is shown in the schematic drawing in Fig. 1 in form of a drafting unit or drafting device 10. The drafting device 10 comprises basically four pairs of rollers 2, 3, 4, 5, one pair of control rollers 4 being mounted together with a compactor 8 on a control bar 9. The drafting device 10 is intended for use in different types and designs of spinning machinery for wet as well as dry spinning applications. The purpose of such a drafting device 10 is the exertion of a drafting action on the rove before the spinning operation. The rove to be processed by the drafting device 10 according to the present invention may consist of discontinuous or staple fibers of different lengths, such as cotton, linen, wool, jute, ramie, hemp, as well as man made fibers. These fibers have very wide variations in many parameters and in particular in the length. The raw material may come from a preparation step, e.g. a wet treatment prior to the feed rollers on the right-hand top side in Fig. 1, as a so called rove 1. The rove 1 is fed in the feeding direction F to a first pair of rollers 2, the so-called feed rollers 2. The draft rollers 3 draw the rove 1 from the feed rollers 2. The delivery roller pair 5 draws the rove through the pair of control rollers 4 and the compactor 8. From the control rollers 4, the rove advances at a predetermined speed - usually with a predetermined acceleration - and, according to the present invention, proceeds through a compactor 8 and afterwards to the delivery rollers 5, from which the drafted fibers advance to the twisting part of the spinning machine and finally the bobbin.

[0021] Between the rollers 2, 5, a drafting zone D is defined, which is comprised of three sub-drafting zones A, B, C. The feed rollers 2 are mounted on an adjustable bracket 13 so that the length of the first sub-drafting zone

A is variable. The two other sub-drafting zones B and C are not variable in their length, but may be adjusted by the changing of parts configured specifically for different drafting requirements of spinning machinery. The length of the first sub-drafting zone A is set according to the variable parameters of the discontinuous fibers in the rove, such as the characteristics, special finish, conditions, i.e. wet or dry, length and diameter of the fibers, as well as the rove mass or twist. In the case of the feed rollers 2, the draft rollers 3 and the delivery rollers 5, only one of the rollers is actively driven, whereas the other roller is, due to the direct contact with the driven roller, propelled by means of friction contact. According to the present invention, a special type and arrangement of two control rollers 4 is provided: the control rollers 4 both have an active gear drive mechanism. Furthermore the control rollers 4, according to the present invention, are not in contact with each other, but have a special set distance between them to provide a defined control gap 6 with a predetermined dimension (cf. also Fig. 2). The control gap 6 is set according to the variable parameters of the fibers as mentioned above. The control rollers 4 provide through these measures a remarkably large improvement in the control and draft efficiency of very different types of fibers in different qualities, due to the uniform speed of the control rollers 4 and due to the innovative fixed control gap 6 between these rollers 4. The control rollers 4 have in this embodiment on their outer circumference two scrapers 12 for cleaning the control surface 7, which is made of a hard material, such as a metal or metal alloy. According to a preferred embodiment of the invention, the control rollers 4 have a hard surface. The control rollers 4 are mounted in a specified fixed position in the drafting zone and with the predetermined control gap 6 between them on a control bar 9.

[0022] According to an embodiment of the invention, the drafting device 10 comprises a compactor 8 between the control rollers 4 and the delivery rollers 5 in the closest position possible to the delivery rollers 5. The compactor 8 is mounted in a fixed relation to the control rollers 4 and a predetermined alignment with regard to the drafting line Y. In the embodiment shown in Fig. 1, the compactor 8, the scrapers 12 and the control rollers 4 are mounted on one and the same control bar 9 so that an easy fitting, maintenance and exchange of damaged parts is possible. The compactor 8 has first a conical guiding part 81 and second a parallel compacting part 82, as can be seen in more detail in Fig. 2. In the embodiment of Fig. 1 the draft rollers 3 and the control rollers 4 generate a slight and opposite deviation of the rove from the drafting line Y.

[0023] The parts of the drafting device 10 are all made of plastic material except for the driving rollers 2, 3, 4 and 5, whose surfaces are made of a rust-free metal, such as stainless steel, and the driven rollers 2, 3 and 5 which are rubber clad. The control rollers 4 have a hard control surface 7, which is according to one embodiment of the invention realized with a chrome material on the outer surface 7 of the rollers 4. The active drive mechanisms for both of the pair of control rollers 4 are gears (not shown in the figures), which are also mounted on the control bar and which are directly, or via intermediate gears, in contact with the draft rollers 3. The rollers 2, 3, 4 and 5 are driven at a predetermined speed, respectively, such that the drafting of the discontinuous fibers in form of the rove 1 is realized in the drafting zone D.

[0024] The purpose and function of the three different sub-drafting zones A, B and C according to the drafting device 10 of the present invention is as follows: in the first sub-drafting zone A, the rove 1 is fed to the draft rollers 3. In this area, the tension is in particular applied to long fibers. In this area A, the rove is drawn to the ideal tension by means of the adjustment of the respective speeds of the rollers 2, 3 via gears installed at the head of the spinning frame, hence achieving a predetermined acceleration of the fibers.

[0025] The second sub-drafting zone B from the draft rollers 3 to the two actively driven control rollers 4 is the principal drafting area for the majority of fibers, i.e. long and medium fibers. The two control rollers 4 are also driven via a gear mechanism (not shown in the figures), which is in contact with the draft rollers 3, and at a predetermined speed such that a uniform and continuous drafting action is guaranteed. Since both control rollers 4 are actively driven and have a set control gap 6 between them and arranged at a predetermined distance from the compactor 8 and the delivery rollers 5, the control rollers provide in combination with the other rollers and the compactor 8 a much better control of the drafting process than in the case of prior art drafting devices, in which the control rollers are in direct contact and can therefore run in some circumstances at different speeds or in which rubber belts, so called aprons, are used, which may apply a varying tension to the fibers in this critical part of the drafting zones B and C. The control rollers 4 have a fixed distance from one another and from the nip of the delivery rollers 5 but may be exchanged as needed together with the control bar 9 and the compactor 8, depending on the aforementioned variable parameters of the raw material.

[0026] In the third and final sub-drafting zone C, almost all fibers (inner and outer fibers) in the rove 1 are forwarded at a uniform speed to the compactor 8 which is in a very close position in front of the delivery rollers 5. The purpose and functioning of the compactor 8 is described below in more detail.

[0027] In Fig. 2, the two control rollers 4 mounted together with the compactor 8 on a control bar 9 are shown in more detail in a schematic side view. The two control rollers 4 are both driven by an active drive mechanism, as indicated by the arrows in Fig. 2. Between the control rollers 4, there is a control gap 6 of a predetermined dimension. The dimension of the control gap 6 is set on the basis of the variable parameters concerning the type, quality, form and length of the raw material which is to be drafted by the drafting device 10. On the same control bar 9, at a predetermined distance d, a compactor 8 is also mounted according to the present invention. The

compactor 8 is in alignment with the center of the control rollers 4 and in a position as close as possible to the delivery rollers 5 (cf. also Fig. 3). Two scrapers 12 are also mounted on the control bar 9 in order to clean the hard surface 7 of the control rollers 4, which is preferably made of chrome or similar hard material. The compactor 8 is made of plastic material and comprises essentially two parts, first a conical guiding part 81 for approximately two thirds of its length and second a parallel compacting part 82 of a predetermined smaller diameter (approximately one third of the total length). The conical part 81 of the compactor 8 has a conicity of in the range of 25 to 50 degrees. The compactor 8 has an outer shape such that it can be mounted as close as possible to the nipping point in front of the two delivery rollers 5 (cf. also Figs. 1 and 3). The scrapers 12 are mounted with pin/hole-combinations 14; the compactor 8 is fitted by means of a special clip 15.

[0028] Figure 3 is a detailed side view of another embodiment of the main parts of this drafting device 10 according to the present invention showing the combination of a control bar 9, two driven control rollers 4 and a compactor 8. The control bar 9 is preferably made of a plastic material. At its free end, the control bar 9 has in this embodiment a mounting fork for fitting to existing spinning sections of spinning machinery so that the drafting device 10 may, according to the invention, also be easily fitted to different types of existing spinning frames. The compactor 8 as well as the control rollers 4 and their gear mechanism (not shown in Fig. 3) and the scrapers 12 are all mounted on the control bar 9 by way of screwless fitting means, such as clip mounting or pressure fitting features. This enables a user to easily exchange damaged parts. The fitting, maintenance and changing of the compactor 8, the control rollers 4 and the control bar 9 according to the needs and specific purposes of a spinning process may be executed by machine operators without any tools or technical know-how. Further screwless fitting or mounting means, like press-fitting or other similar assembly features, may be employed in the drafting device 10 according to the invention. In particular for the mounting of the gears of the active driven control rollers 4 press-fitting reduces manufacturing costs and avoids any unnecessary complexity in the construction of the device.

[0029] In Figs. 4, 4a and 4b, a further embodiment of a drafting unit 10 according to the present invention is shown. In Fig. 4, two drafting units 10 are shown in the mounted situation side by side and behind the delivery rollers 5, only one of which is shown in Figs. 4, 4a and 4b for simplicity reasons. Two control rollers 4 are respectively mounted together with a compactor 8 on a common control bar 9 as a support element. The compactor 8 is here mounted through a screwless feature, which is in this case a clip-fitting feature 15, which can be seen in more detail in Figs. 4a and 4b. The compactor 8 is provided with a lateral slot 16 in order to be able to introduce and to remove the rove 1 from the drafting unit 10 (cf. Fig. 4a). The clip mounting means 15 of the compactor 8 is arranged at a lateral position of the rove 1 so that the compactor 8 protrudes into the drafting zone, as it is visualized by the rove feed direction F in Fig. 4a. Also in this embodiment according to Figs. 4, 4a and 4b, the control rollers 4 are mounted in a predetermined and fixed relative position with a control gap 6 of a predetermined dimension. Together with the compactor 8, which is also mounted in a predetermined and fixed position in relation to the control rollers 4, a high drafting quality is achieved by the drafting unit 10 according to the present invention, independently of the speed or other variable characteristics depending on the preparation of the raw material or the type of raw material, which is to be drafted.

[0030] All in all, the drafting device 10 is, according to the invention, capable to greatly increase quality in the drafting output and is less sensitive to variations in the quality and the length of fibers. The different sub-drafting zones A to C of the drafting zone D are specifically adapted to different lengths of fibers and provide a much better control of the fibers in the drafting process than prior art drafting devices have done.

Claims

1. Drafting device (10) for use in spinning machinery and for drafting discontinuous fibers, such as cotton, linen, wool, jute, ramie, hemp or man-made fibers, with a pair of feed rollers (2), a pair of draft rollers (3), a pair of control rollers (4) and a pair of delivery rollers (5), being arranged in this order in a rove feed direction (F) defining a drafting zone (D) composed of three sub-drafting zones (A, B, C), whereby the rollers (2, 3, 4) are driven at a respective predetermined speed in such a manner that a drafting action is exerted on the rove (1), **characterized in that** said control rollers (4) are both provided with an active drive mechanism and that said control rollers (4) are mounted in a fixed but contact-free manner with a defined control gap (6) between them of a predetermined dimension.

2. Drafting device (10) according to claim 1, **characterized in that** said control rollers (4) are mounted in a fixed relative position with regard to a compactor (8) on a common support element (9), and that said compactor (8) has an inner shape adapted to compact and to compress said rove (1).

3. Drafting device (10) according to claim 1 or 2, **characterized in that** a compactor (8) is provided which is positioned in alignment with the center of said pair of control rollers (4).

4. Drafting device (10) according to any one of the preceding claims, **characterized in that** a compactor (8) is provided between said pair of actively driven

control rollers (4) and said delivery rollers (5) in the closest possible position immediately in front of said delivery rollers (5) in the feed direction (F).

5. Drafting device (10) according to any one of claims 2 to 4, **characterized in that** said compactor (8) is provided in feed direction (F) first with an inner conical guiding part (81) and second with an inner parallel compacting part (82).

6. Drafting device (10) according to any one of the preceding claims, **characterized in that** a compactor (8) is provided between said pair of actively driven control rollers (4) and said delivery rollers (5) in the closest possible position immediately in front of the delivery rollers (5) having a central longitudinal axis (X) which is slightly inclined, preferably in the range of up to 15 degrees, with respect a drafting line (Y) defined by said feed rollers (2) and said delivery rollers (5).

7. Drafting device (10) according to any one of the preceding claims, **characterized in that** a compactor (8) is provided, which is mounted together with said pair of control rollers (4) on a common control bar (9) by means of screwless fitting features, preferably by means of clip-mounting features.

8. Drafting device (10) according to any one of the preceding claims, **characterized in that** said control rollers (4) are gear-driven via said draft rollers (3) with a predetermined driving speed in relation to the speed of the draft rollers (3).

9. Drafting device (10) according to any one of the preceding claims, **characterized in that** scrapers (12) are provided in contact with the outer circumferences of said control rollers (4).

10. Drafting device (10) according to any one of the preceding claims, **characterized in that** a first subdrafting zone (A) between said feed rollers (2) and said draft rollers (3) is provided with means for variable adjustment of its length.

11. Drafting device (10) according to any one of the preceding claims, **characterized in that** a second subdrafting zone (B) between said draft rollers (3) and said control rollers (4) has a length in the range of 14 mm to 24 mm depending on the type of fibers.

12. Drafting device (10) according to any one of the preceding claims, **characterized in that** a third subdrafting zone (C) between said control rollers (4) and said delivery rollers (5) has a length in the range of 10 mm to 40 mm depending on the type of fibers.

13. Drafting device (10) according to any one of the preceding claims, **characterized in that** said control gap (6) between the control rollers (4) is set in the range of 0.1 mm to 1 mm, preferably 0.1 mm to 0.3 mm.

14. Drafting device (10) according to any one of the preceding claims, **characterized in that** said control rollers (4) have a hard control outer surface (7) made of a metal or a metal alloy material, preferably chrome.

Fig. 1

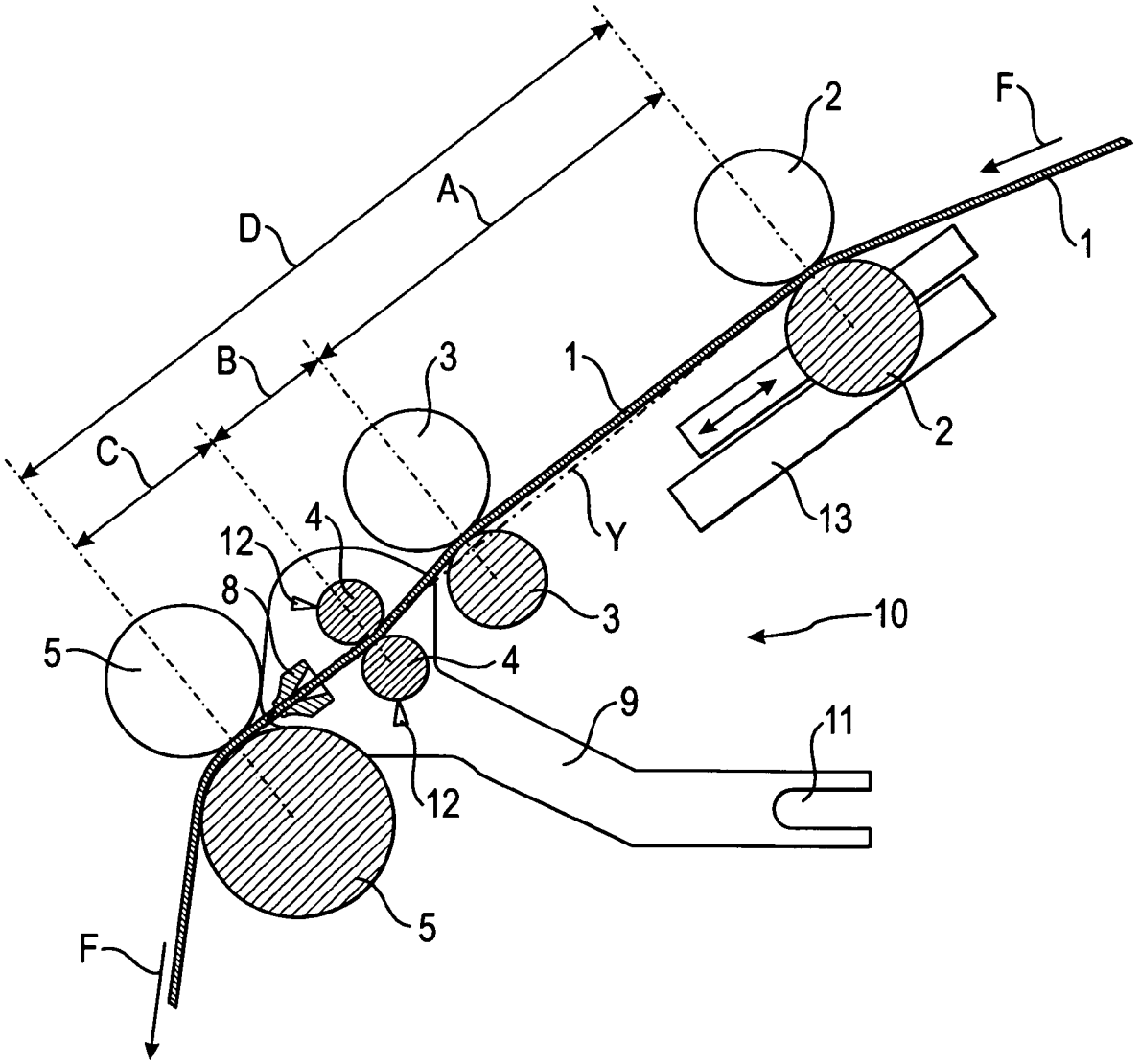


Fig. 2

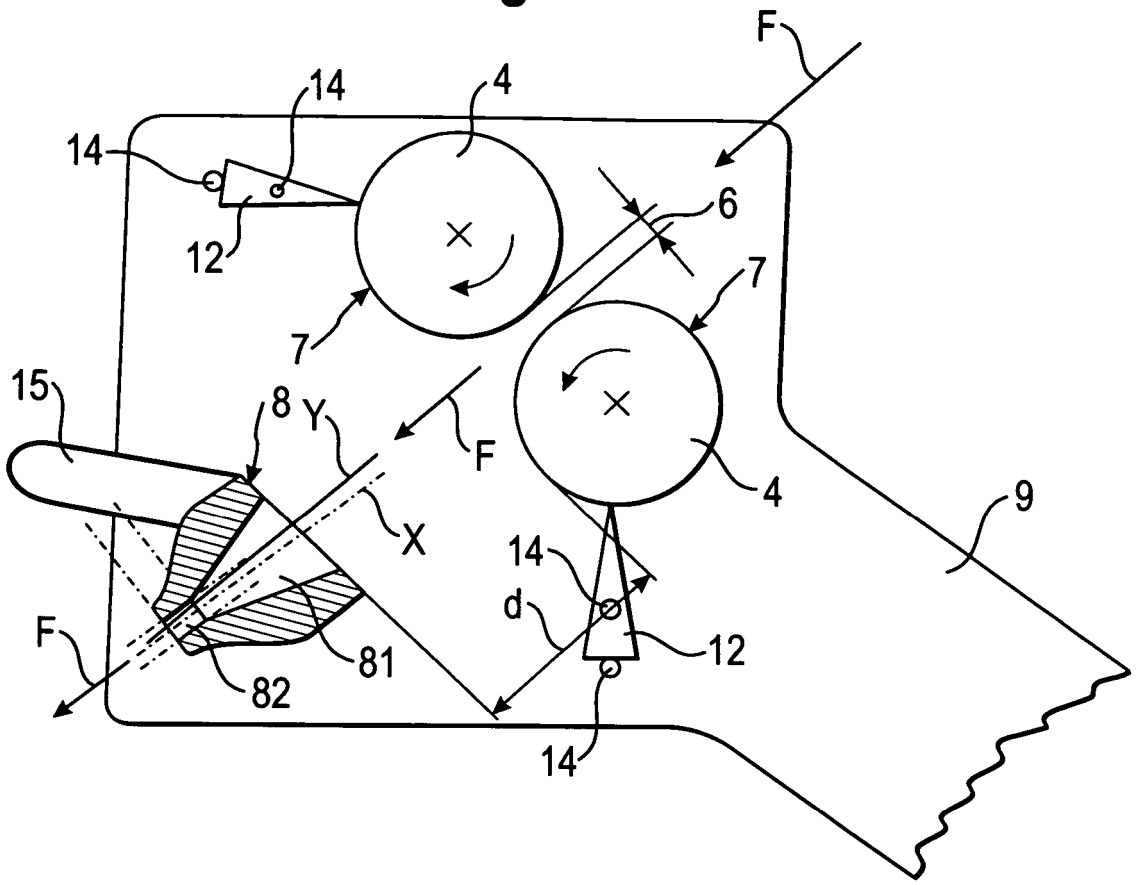
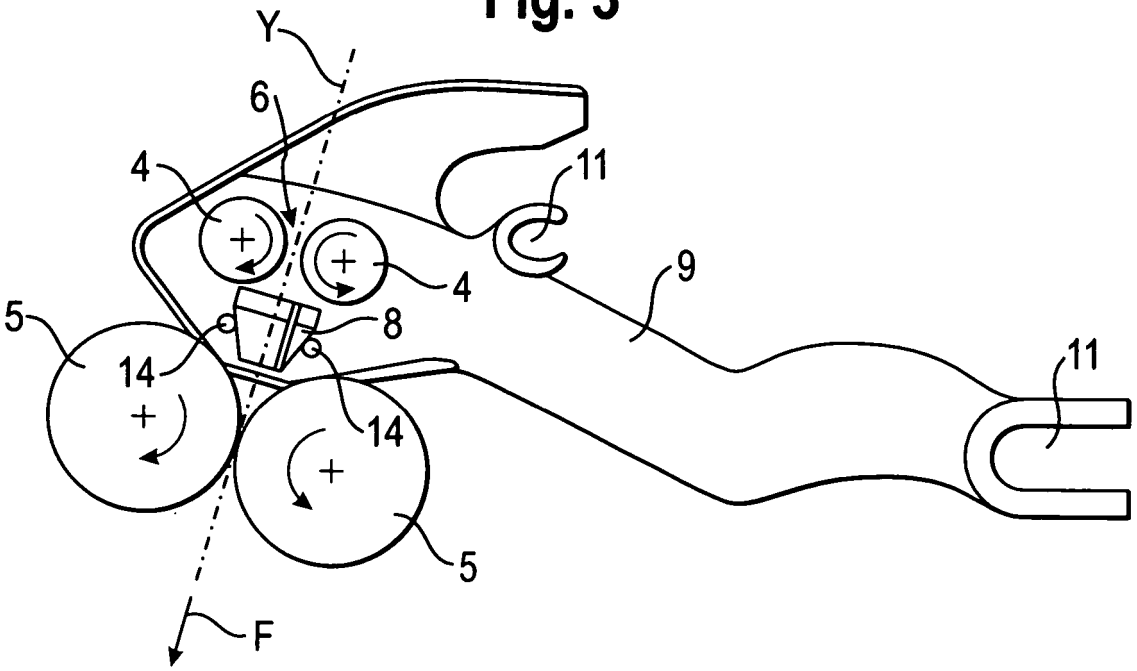


Fig. 3



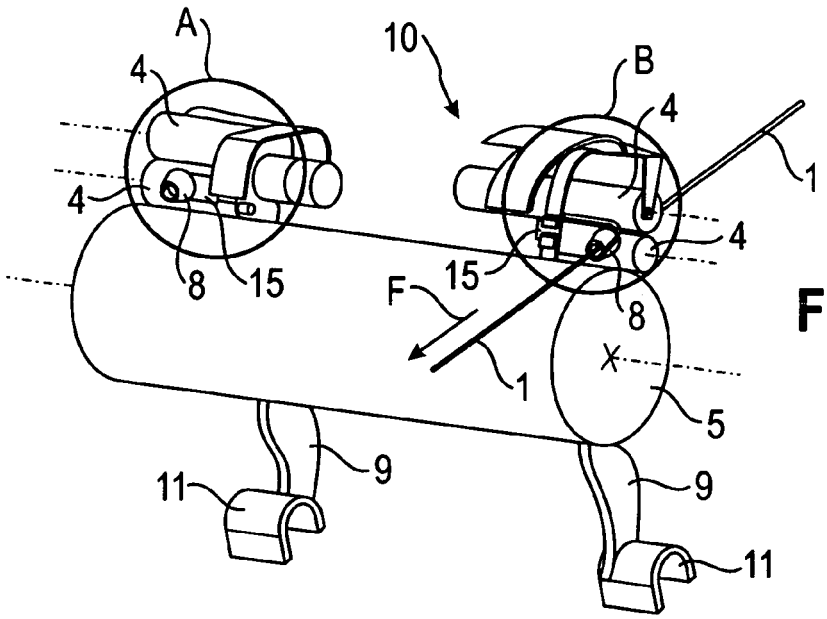


Fig. 4

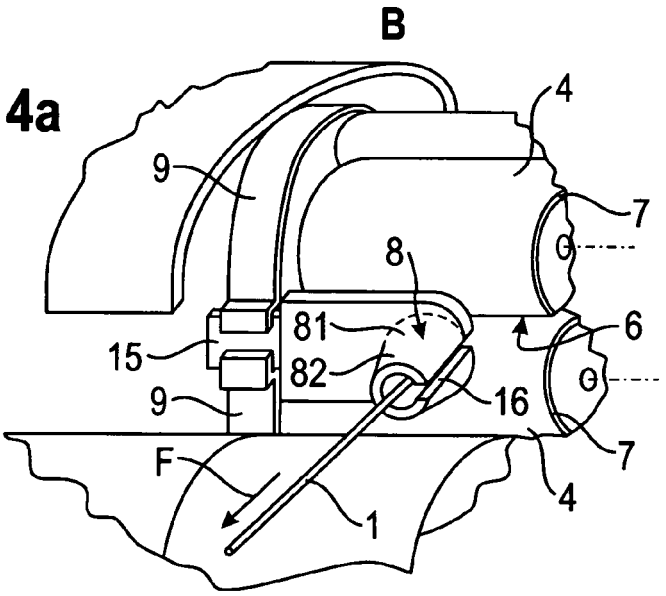


Fig. 4a

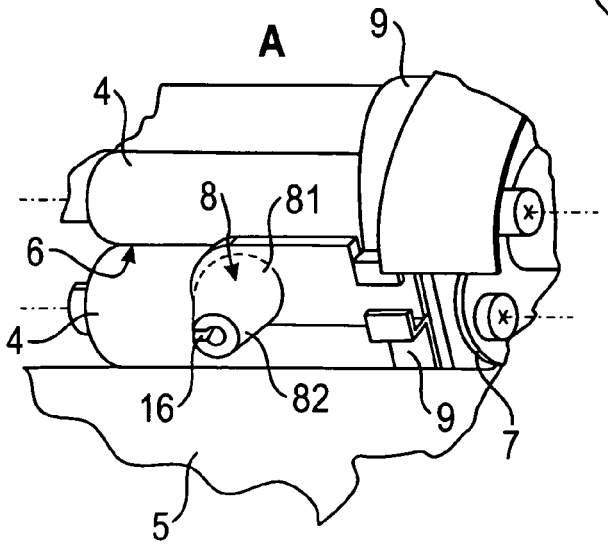


Fig. 4b

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EUROPEAN SEARCH REPORT

Application Number
EP 10 00 7018

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 February 2011	Dreyer, Claude

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