(19) Europäisches Patentamt
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(11) **EP 2 868 608 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
06.05.2015 Bulletin 2015/19

(51) Int Cl.:
B65H 59/18 *(2006.01)* ***B65H 59/38*** *(2006.01)*
D04B 15/50 *(2006.01)*

(21) Application number: **14002706.1**

(22) Date of filing: **02.08.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **29.10.2013 IT TO20130875**

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(54) Positive yarn feeder with control of the feeding tension

(57) A yarn feeder comprises a housing (12) and a yarn-winding wheel (16), which is driven to rotate by motor means for feeding a yarn (Y) wound on it to a textile machine (M). A brake (18) applies a slight, static braking action upon the yarn (Y) upstream of the yarn-winding wheel (16). A control unit (CU) modulates the speed of rotation of the yarn-winding wheel (16) on the basis of a tension signal received from a tension sensor (26) engaged by the yarn (Y) downstream of the yarn-winding wheel (16), in order to maintain the yarn tension substantially constant on a desired level. The yarn (Y) is wound, in the form of a single loop, in a circumferential groove (32) of the yarn-winding wheel (16) which has a substantially V-shaped profile defined between two counterposed annular toothings (38, 40) in an alternated configuration. A deviating arm (42) has yarn-guiding means (44) which are slidably engaged by the yarn (Y) between the brake (18) and the tension sensor (26) in a position such that the yarn input to the yarn-winding wheel (16) is prevented from contacting the yarn delivered from the same.

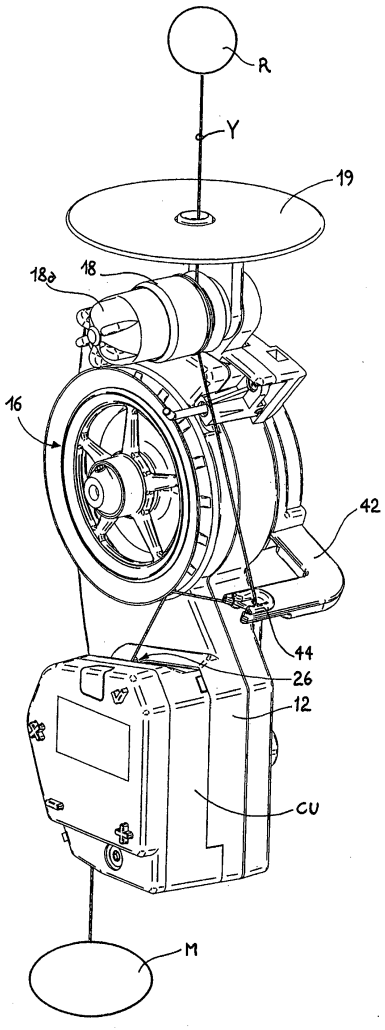

Fig. 2

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Description

[0001] The present invention relates to a positive yarn feeder provided with a system for controlling the feeding tension.

[0002] As known, with a so-called "positive" yarn feeder such as the one described in EP 2218670A, the yarn is wound on a drum which is driven to rotate by a motor for drawing the yarn from a reel and delivering it to a downstream textile machine, e.g., a knitting machine. A control unit modulates the speed of the motor based on a tension signal received from a tension sensor, in order to maintain the tension of the yarn (which depends on the difference between the speed at which the yarn is delivered by the feeder and the speed at which it is drawn by the textile machine) substantially constant on a desired level, with advantages in terms of quality of the output mesh.

[0003] As well known to the person skilled in the art, this type of yarn feeder is not suitable for feeding yarns having a high elasticity and/or a relatively high count, e.g., in the range 400 and 1000 decitex, because these yarns al liable to slip on the drum, thereby affecting the accuracy of the feeding process particularly in relation to the control of the tension.

[0004] Hence, other types of feeders are used in these case, e.g., feeders in which the yarn passes between two motorized, counter-rotating wheels in tangential contact with each other.

[0005] However, with the known solutions such as the above-cited one, the motor is always controlled in axis with the textile machine, so that it always delivers the amount of yarn requested by the machine without any control on the feeding tension, with consequent limitations in terms of quality of the output mesh.

[0006] Therefore, it is a main object of the present invention to provide a positive yarn feeder for textile machines which is also capable of accurately feeding yarns having a high elasticity and/or a high count, under a controlled tension.

[0007] The above object and other advantages, which will become apparent from the following description, are achieved by a positive yarn feeder having the features recited in claim 1, while the dependent claims state other advantageous, though secondary, features of the invention.

[0008] The invention will be now described in more detail, with reference to a preferred, non-exclusive embodiment, shown by way of non-limiting example in the attached drawings, wherein:

Fig. 1 is a partially exploded, perspective view of a positive yarn feeder according to the invention;

Fig. 2 is a perspective view of the yarn feeder of Fig. 1 in an assembled configuration;

Fig. 3 is a perspective view showing a detail of Fig. 2 to an enlarged scale and from a different viewpoint;

Fig. 4 is an exploded perspective view of a component of the positive yarn feeder according to the invention;

Fig. 5 is a view in side elevation of an isolated part of the component of Fig. 4;

Fig. 6 is a diagrammatical, front view showing an alternative embodiment of the positive yarn feeder according to the invention.

[0009] With initial reference to Figs. 1 to 5, a yarn feeder 10 comprises a motor 11 received in a housing 12 and provided with a driving shaft 15. A yarn-winding wheel 16 keyed to driving shaft 15 has a yarn Y wound thereon. Yarn-winding wheel 16 is driven to rotate by motor 11 for drawing yarn from a reel R (which is only diagrammatically shown in Fig. 2) and feeding it to a textile machine M (which is also diagrammatically shown in Fig. 2).

[0010] Yarn feeder 10 is provided with a brake 18 (known per se) which is adapted to apply a slight, static braking action upon yarn Y upstream of yarn-winding wheel 16, in order to maintain yarn Y under a slight tension. The braking action exerted by brake 18 is manually adjustable by a knob 18a.

[0011] An anti-baloon disc 19, which is also known per se, is arranged immediately upstream of brake 18.

[0012] Yarn Y unwinding from yarn-winding wheel 16 operatively engages a tension sensor 26 incorporated in the feeder. In a way known per se, motor 11 is driven by a control unit CU, which is also incorporated in the feeder and is programmable by a display 28 and push buttons 30. Control unit CU modulates the speed of yarn-winding wheel 16 by feedback on the basis of the tension signal generated by tension sensor 26, in such a way as to maintain the tension of yarn Y (which depends on the difference between the speed at which the yarn is delivered by the feeder and the speed at which it is drawn by the textile machine) substantially constant on a desired level.

[0013] According to the invention, yarn Y is wound in a single loop in a circumferential groove 32 of yarn-winding wheel 16, which groove has a substantially V-shaped profile which is defined between two counterposed annular surfaces 34, 36 having respective toothings in an alternated configuration (i.e., the teeth 38 of one toothing face the intervals between the teeth 40 of the opposite toothing); in addition, yarn feeder 10 is provided with a deviating arm 42 having a yarn-guiding eyelet 44 which is slidably engaged by yarn Y between brake 18 and yarn-winding wheel 16, in a position such that the yarn entering yarn-winding wheel 16 does not contact the yarn delivered from the same.

[0014] As shown in detail in Fig. 5, deviating arm 42 is arranged in such a way as to deviate yarn Y both laterally and longitudinally with respect to the axis of yarn-winding

wheel 16. Accordingly, the yarn entering the wheel initially engages only one of the two toothings (the right-hand toothing in Fig. 5) while the yarn delivered from the wheel only engages the opposite toothing (the left-hand toothing in Fig. 5), so that any risk of contact is prevented.

[0015] Having now particular reference to Fig. 3, yarn-winding wheel 16 is advantageously comprised of a disc-shaped support 50 and of a ring 52 removably fitted to disc-shaped support 50; circumferential groove 32 being formed on the ring. Disc-shaped support 50 is provided with a hub 54 by which it is keyed to driving shaft 15, and with a support ring 56 which is connected to the hub by spokes 58. Support ring 56 has a peripheral seat 59 in which ring 52 is received.

[0016] Yarn feeder 10 is also provided with a loop-separing device 60 known per se. In the context of the present invention, loop-separing device 60 is not used because yarn Y is wound on yarn-winding wheel 16 in the form of a single loop. However, if wheel 16 is replaced by a conventional yarn-winding drum and deviating arm 42 is removed - or bypassed - yarn feeder 10 may be used in a conventional way, i.e., with the yarn wound between the yarn-winding drum and loop-separing device 60 in a plurality of loops. To this purpose, deviating arm 42 is provided with a foot 62, which is shaped in such a way as to removably engage a corresponding seat 64 of housing 12, so that it can be removed if necessary.

[0017] In operation, toothings 38, 40 of groove 32 increase the friction between yarn Y and yarn-winding wheel 16, thereby preventing slippage even in case of yarns having high elasticity and a relatively high count. Moreover, deviating arm 42 allows yarn Y to unwind smoothly and regularly from wheel 16 so that it prevents yarn Y from overlapping or creeping against itself while unwinding from the yarn-winding wheel towards tension sensor 26, as shown in detali in Fig. 5.

[0018] Using a yarn-winding wheel 16 with a deviating arm 42 as above, in association with the system known per se for controlling the yarn-feeding tension, also allows yarns having a high elasticity and/or a relatively high count to be fed at a constant tension.

[0019] With the preferred embodiment shown in Figs. 1 to 5, deviating arm 42 is arranged in such a way as to deviate the yarn upstream of yarn-winding wheel 16. However, as shown in the alternative embodiment of Fig. 6, wherein the parts similar to the previus embodiment are referred to by the same reference numbers increased by 100, a similar result may be achieved by positioning deviating arm 142 in such a way as to deviate the yarn downstream of yarn-winding wheel 16.

[0020] A preferred embodiment of the invention has been described herein, but of course many changes may be made by a person skilled in the art within the scope of the claims. For instance, in the above preferred embodiments the annular surfaces 34, 36 have counterposed frustoconical profiles. However, since the yarn, in groove 32, comes into contact with the teeth only, what matters is that the above substantially V-shaped profile is defined between the profiles of the counterposed annular toothings, regardless of the profile of the annular surfaces.

Claims

1. A yarn feeder comprising:

a housing (12),
a yarn-winding wheel (16), which is driven to rotate by motor means for feeding a yarn (Y) wound on it to a textile machine (M),
a brake (18), which is arranged to apply a slight, static braking action upon the yarn (Y) upstream of said yarn-winding wheel (16),
a control unit (CU) which is programmed to modulate the speed of rotation of said yarn-winding wheel (16) on the basis of a tension signal received from a tension sensor (26) engaged by the yarn (Y) downstream of said yarn-winding wheel (16),
in such a way as to maintain the yarn tension substantially constant on a desired level,
characterized in that the yarn (Y) is wound, in the form of a single loop, in a circumferential groove (32) of said yarn-winding wheel (16), said circumferential groove (32) having a substantially V-shaped profile defined between two counterposed annular toothings (38, 40) in an alternated configuration, and **in that** it comprises a deviating arm (42) provided with yarn-guiding means (44) which are slidably engaged by the yarn (Y) between said brake (18) and said tension sensor (26) in a position such that the yarn input to said yarn-winding wheel (16) is prevented from contacting the yarn delivered from the same.

2. The yarn feeder of claim 1, **characterized in that** said deviating arm (42) is positioned in such a way as to deviate the yarn (Y) upstream of said yarn-winding wheel (16).

3. The yarn feeder of claim 1 or 2, **characterized in that** said deviating arm (42) is positioned such that it deviates the yarn (Y) both laterally and longitudinally with respect to the axis of said yarn-winding wheel (16).

4. The yarn feeder of any of claims 1 to 3, **characterized in that** said yarn-winding wheel (16) is comprised of a disc-shaped support (50) and of a ring (52) which is removably fitted to said disc-shaped support (50), said circumferential groove (32) being formed on said ring (52).

5. The yarn feeder of any of claims 1 to 4, **character-**

ized in that said deviating arm (42) is provided with a foot (62) which removably engages a corresponding seat (64) of said housing (12), so that it can be removed if necessary.

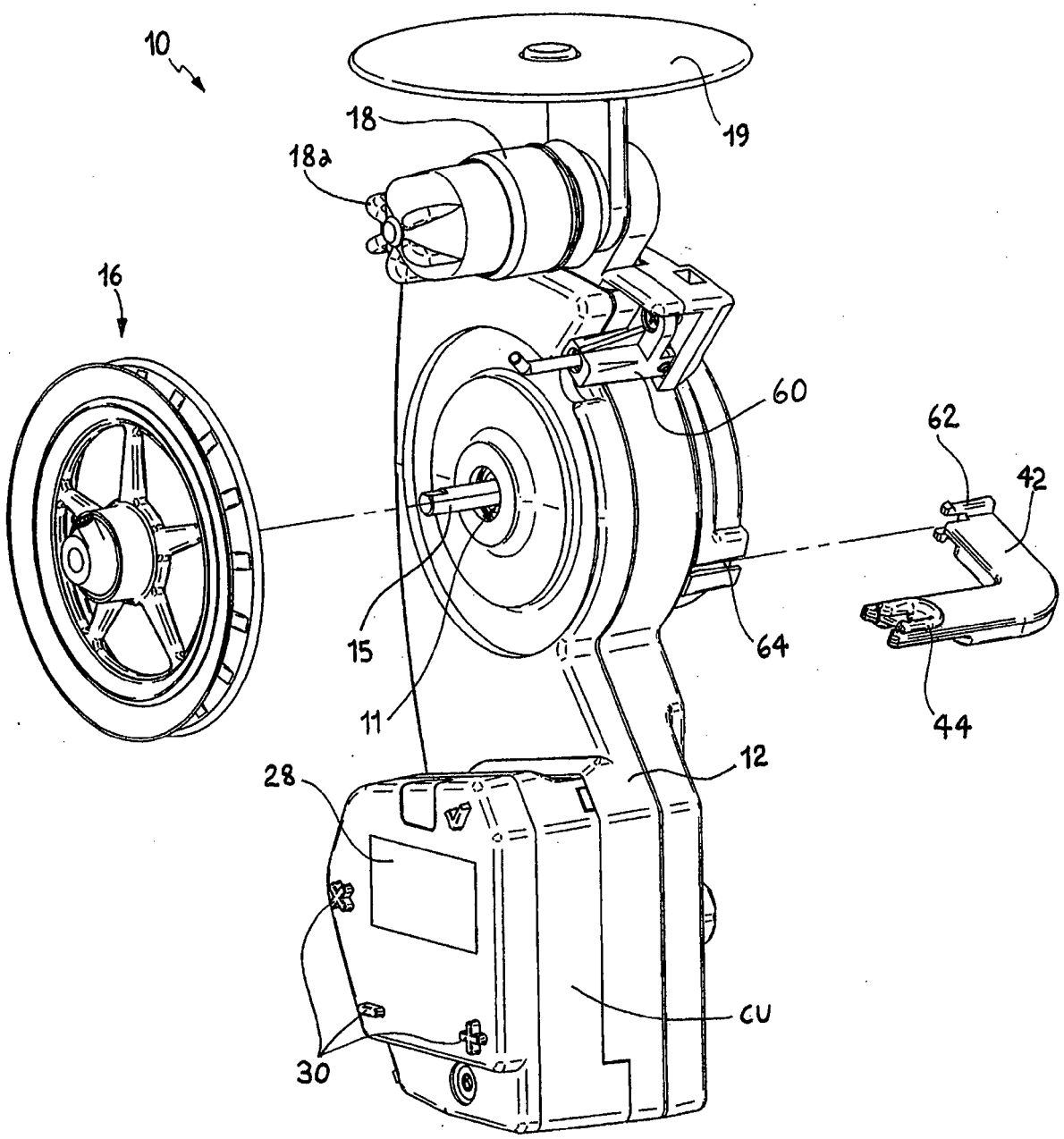
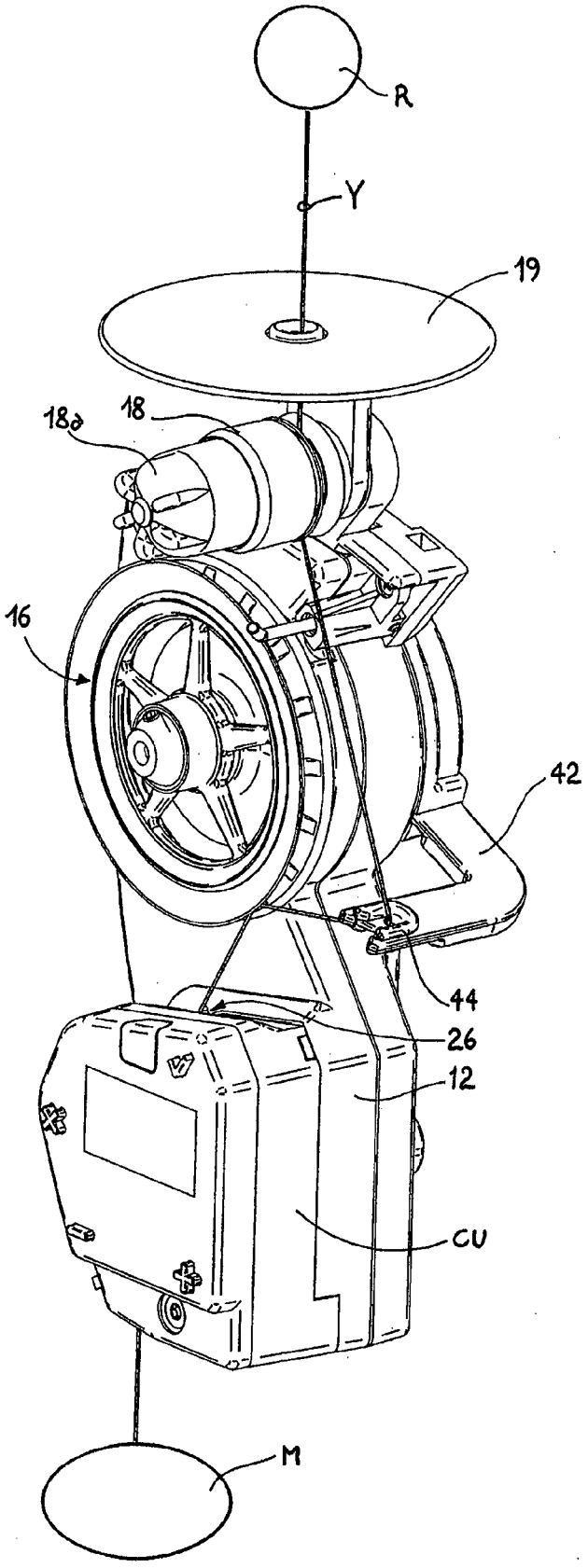


Fig. 1

Fig. 2



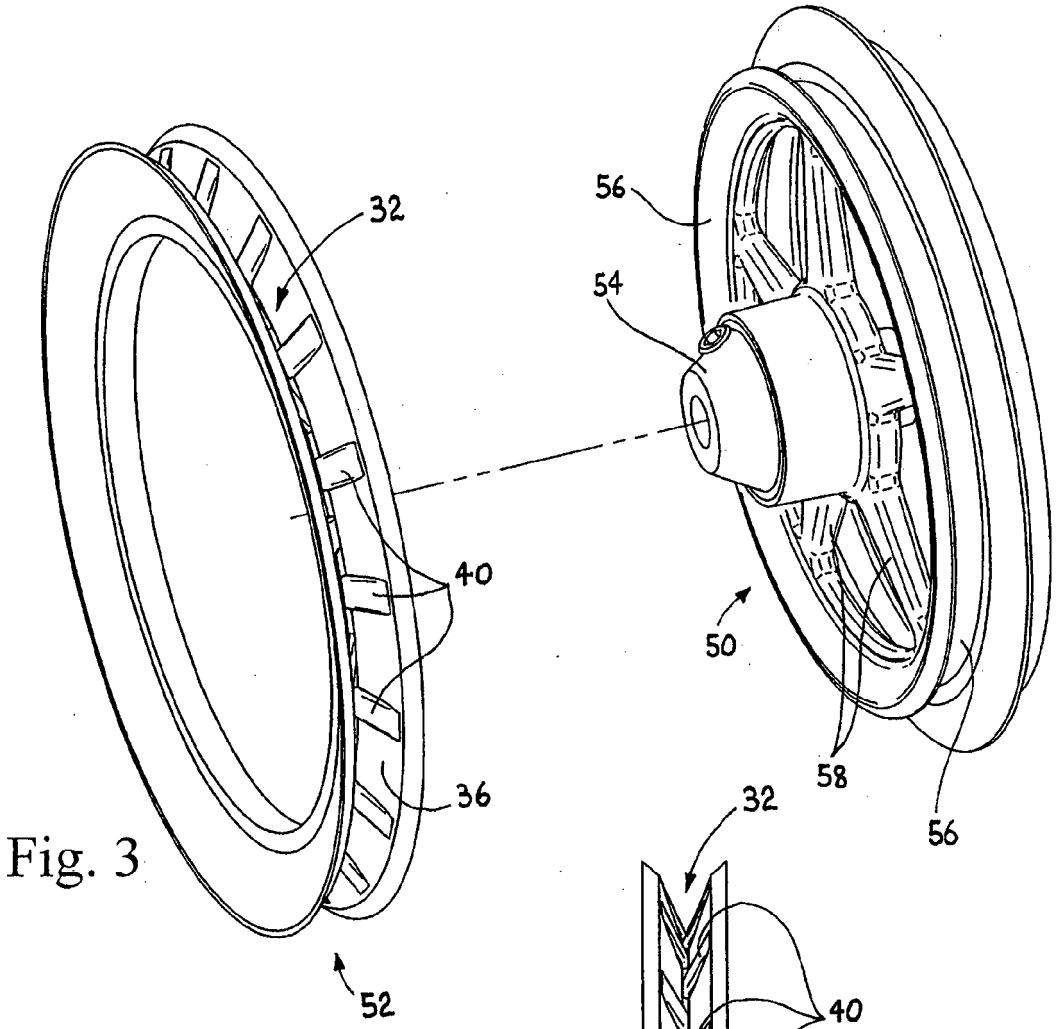


Fig. 3

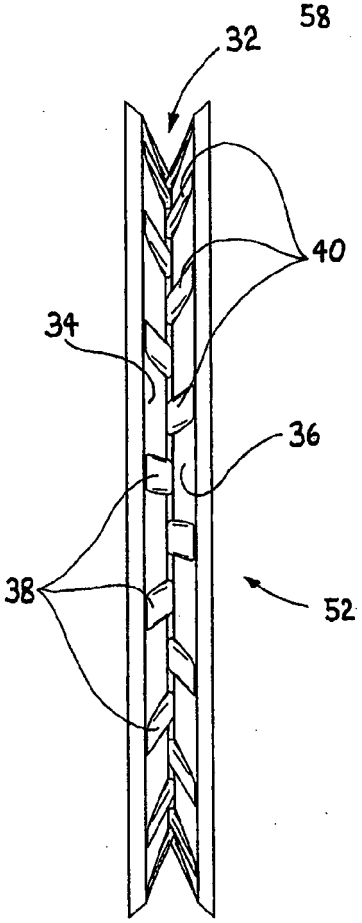


Fig. 4

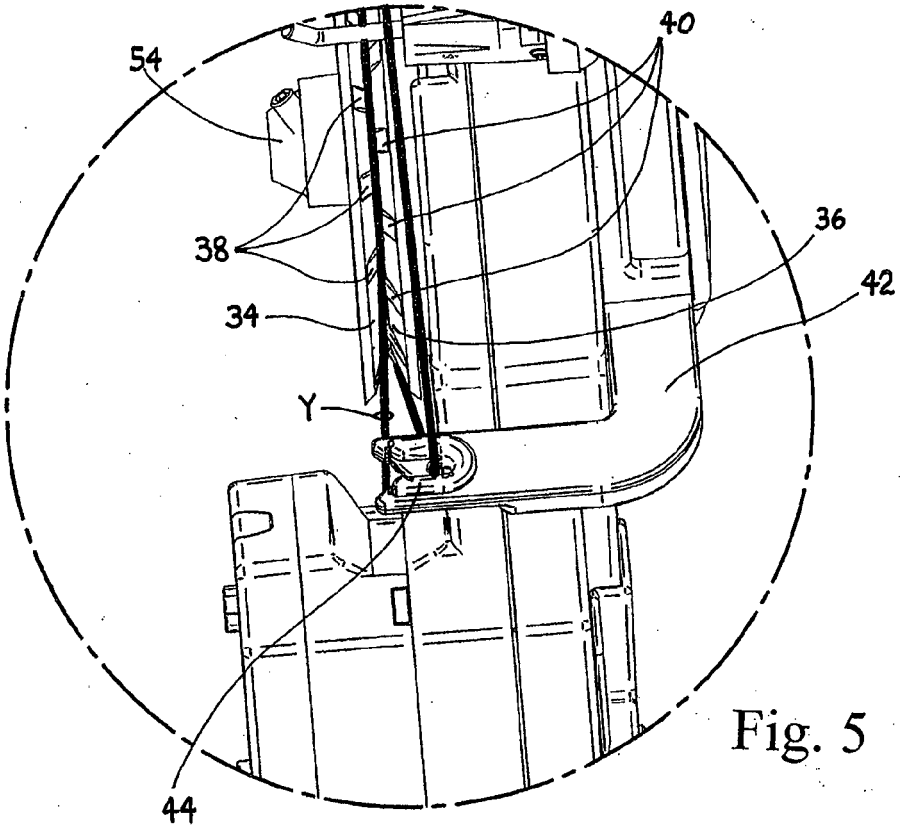


Fig. 5

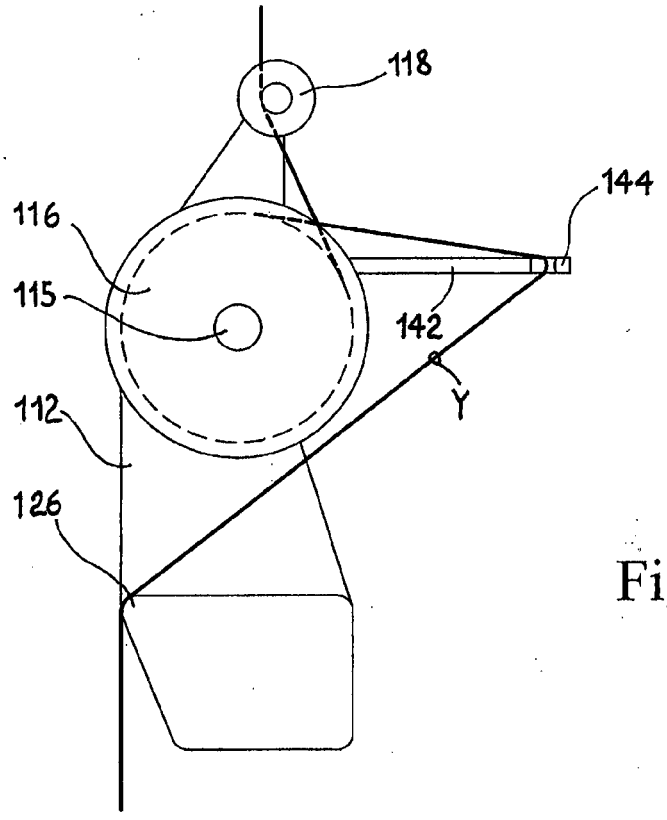


Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 14 00 2706

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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
The Hague	3 March 2015	Pussemier, Bart

CATEGORY OF CITED DOCUMENTS

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