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

Positive Fadenzufuhrvorrichtung mit Steuerung der Zufuhrspannung

Dispositif d'alimentation positive de fil avec commande de la tension d'alimentation

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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 are 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 cases, e.g., feeders in which the yarn passes between two motorized, counter-rotating wheels in tangential contact with each other.

[0005] US 2007/210198 A1 discloses a yarn feeder according to the preamble of claim 1.

[0006] 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.

[0007] 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.

[0008] 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.

[0009] 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.

[0010] 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).

[0011] 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.

[0012] An anti-balloon disc 19, which is also known per se, is arranged immediately upstream of brake 18.

[0013] 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.

[0014] 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.

[0015] 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 tooting in Fig. 5) while the yarn delivered from the wheel only engages the opposite tooting (the left-hand tooting in Fig. 5), so that any risk of contact is prevented.

[0016] 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.

[0017] Yarn feeder 10 is also provided with a loop-separating device 60 known per se. In the context of the present invention, loop-separating 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-separating 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.

[0018] 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 detail in Fig. 5.

[0019] 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.

[0020] 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 previous 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.

[0021] 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 embodiment 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.

Patentansprüche

1. Garnzuführer, mit:

einem Gehäuse (12),
einem Garnaufwickelrad (16), das von einer Motoreinrichtung drehend angetrieben ist zum Zuführen eines auf ihm aufgewickelten Garns (Y) zu einer Textilmaschine (M),
einer Bremse (18), welche dazu angeordnet ist, eine geringfügige, statische Bremswirkung auf das Garn (Y) stromaufwärts des Garnaufwickelrades (16) aufzubringen,
einer Steuereinheit (CU), die dazu programmiert ist, die Drehgeschwindigkeit des Garnaufwickelrades (16) basierend auf einem Zugspannungssignal, das von einem durch das Garn (Y) stromabwärts des Garnaufwickelrades (16) berührten Spannungssensor (26) empfangen wird, solchermassen zu modulieren, dass die Garnspannung im Wesentlichen konstant auf einem gewünschten Wert gehalten wird,
dadurch gekennzeichnet, dass das Garn (Y) in Form einer einzigen Schlaufe in eine Umfangsnut (32) des Garnaufwickelrades (16) gewickelt ist, wobei die Umfangsnut (32) ein im Wesentlichen V-förmiges Profil hat, welches zwischen zwei gegenüberliegend angeordneten ringförmigen Verzahnungen (38, 40) in einer alternierenden Anordnung festgelegt ist, und dass er einen Ablenkarm (42) aufweist, der mit Garnführungsmitteln (44) versehen ist, die von dem Garn (Y) an einer Stelle zwischen der Bremse (18) und dem Spannungssensor (26) gleitend berührt werden, so dass der Garneinfluss in das Garnaufwickelrad (16) daran gehindert ist, das von demselben abgegebene Garn zu berühren.

2. Garnzuführer nach Anspruch 1, **dadurch gekennzeichnet, dass** der Ablenkarm (42) solchermassen angeordnet ist, dass er das Garn (Y) stromaufwärts des Garnaufwickelrades (16) ablenkt.

3. Garnzuführer nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der Ablenkarm (42) solchermassen angeordnet ist, dass er das Garn (Y) sowohl seitlich als auch in Längsrichtung bezüglich der Achse des Garnaufwickelrades (16) ablenkt.

4. Garnzuführer nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** das Garnaufwi-

ckelrad (16) aus einem scheibenförmigen Träger (50) und einem Ring (52) besteht, der lösbar an dem scheibenförmigen Träger (50) befestigt ist, wobei die Umfangsnut (32) an dem Ring (52) ausgebildet ist.

5. Garnzuführer nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** der Ablenkarm (42) mit einem Fuß (62) versehen ist, der lösbar mit einem entsprechenden Sitz (64) des Gehäuses (12) in Eingriff ist, so dass er falls erforderlich entfernt werden kann.

Revendications

1. Dispositif d'alimentation de fil, comprenant:

un boîtier (12);
une roue d'enroulement de fil (16), qui est entraînée à tourner par des moyens de moteur pour amener un fil (Y) à s'enrouler sur celle-ci dans une machine textile (M),
un frein (18), qui est agencé de manière à appliquer une légère action de freinage statique sur le fil (Y) en amont de ladite roue d'enroulement de fil (16),
une unité de commande (UC) qui est programmée de manière à moduler la vitesse de rotation de ladite roue d'enroulement de fil (16) sur la base d'un signal de tension reçu en provenance d'un capteur de tension (26) engagé par le fil (Y) en aval de ladite roue d'enroulement de fil (16), de manière à maintenir la tension du fil sensiblement constante à un niveau souhaité,
caractérisé en ce que le fil (Y) est enroulé, sous la forme d'une boucle simple, dans une rainure circonférentielle (32) de ladite roue d'enroulement de fil (16), ladite rainure circonférentielle (32) présentant un profil sensiblement en forme de V défini entre deux dentelures annulaires opposées (38, 40) en une configuration alternée, et **en ce qu'il** comprend un bras de déviation (42) pourvu de moyens de guidage de fil (44) qui sont engagés de façon coulissante par le fil (Y) entre ledit frein (18) et ledit capteur de tension (26) dans une position telle que le fil entrant sur ladite roue d'enroulement de fil (16) soit empêché d'entrer en contact avec le fil délivré à partir de celle-ci.

2. Dispositif d'alimentation de fil selon la revendication 1, **caractérisé en ce que** ledit bras de déviation (42) est positionné de manière à dévier le fil (Y) en amont de ladite roue d'enroulement de fil (16).

3. Dispositif d'alimentation de fil selon la revendication 1 ou 2, **caractérisé en ce que** ledit bras de déviation (42) est positionné de telle sorte qu'il dévie le fil (Y)

à la fois latéralement et de façon longitudinale par rapport à l'axe de ladite roue d'enroulement de fil (16).

4. Dispositif d'alimentation de fil selon l'une quelconque des revendications 1 à 3, **caractérisé en ce que** ladite roue d'enroulement de fil (16) est constituée d'un support en forme de disque (50) et d'un anneau (52) qui est agencé de façon amovible sur ledit support en forme de disque (50), ladite rainure circumférentielle (32) étant formée sur ledit anneau (52). 5 10
5. Dispositif d'alimentation de fil selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** ledit bras de déviation (42) est pourvu d'un pied (62) qui engage de façon détachable un siège correspondant (64) dudit boîtier (12), de telle sorte qu'il puisse être enlevé si nécessaire. 15

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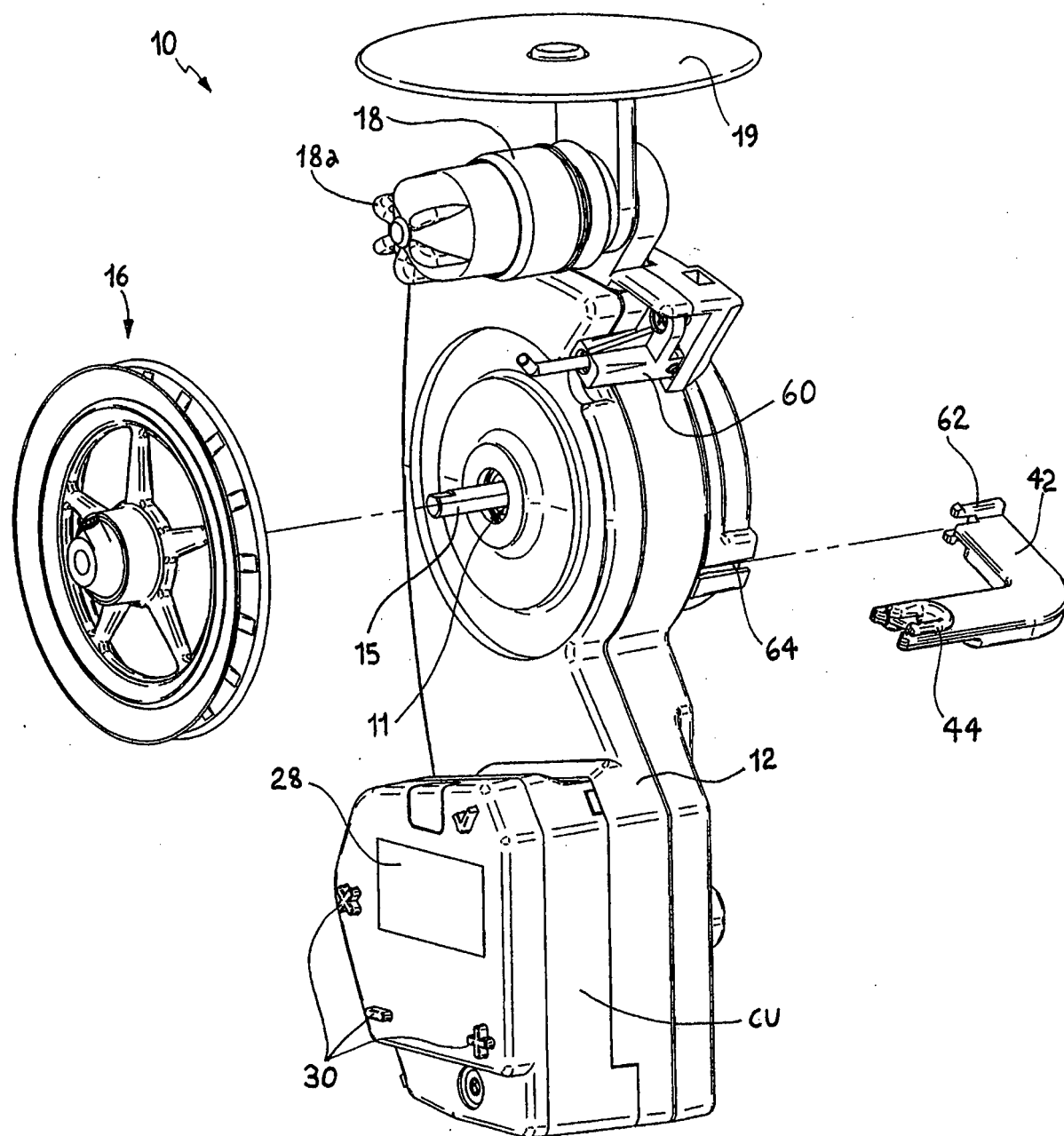
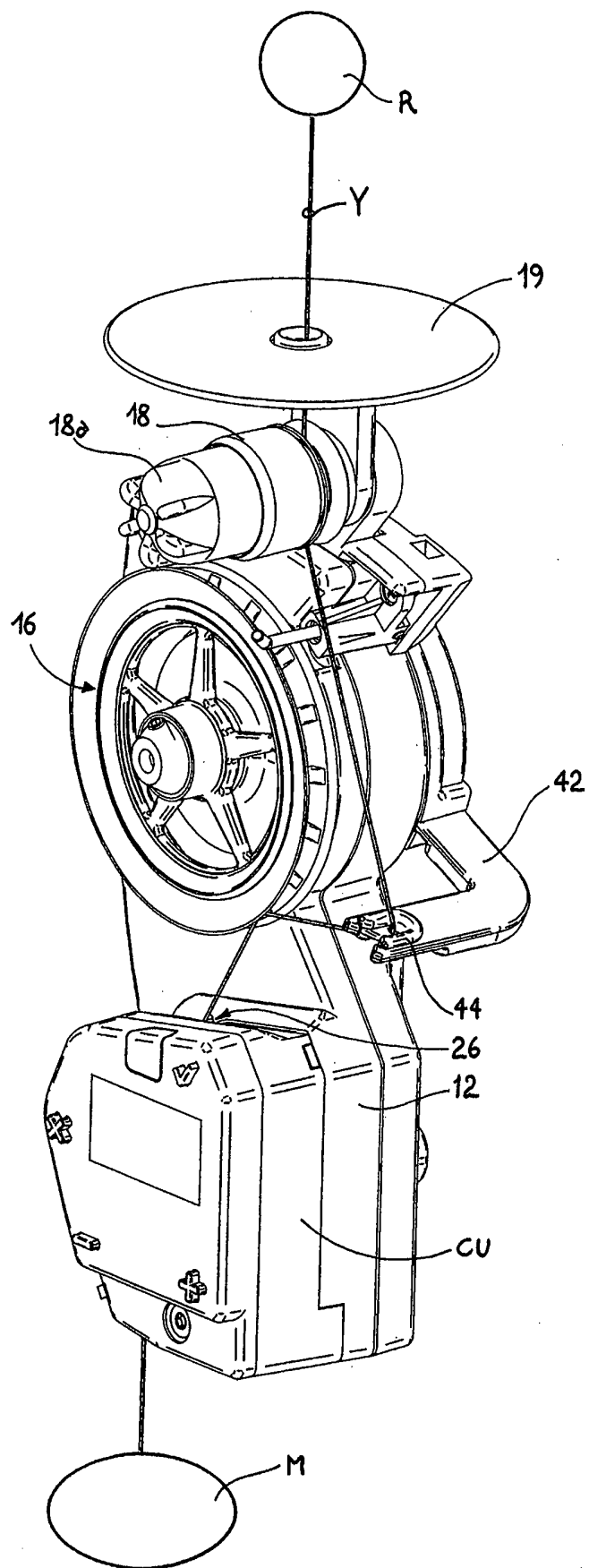


Fig. 1

Fig. 2



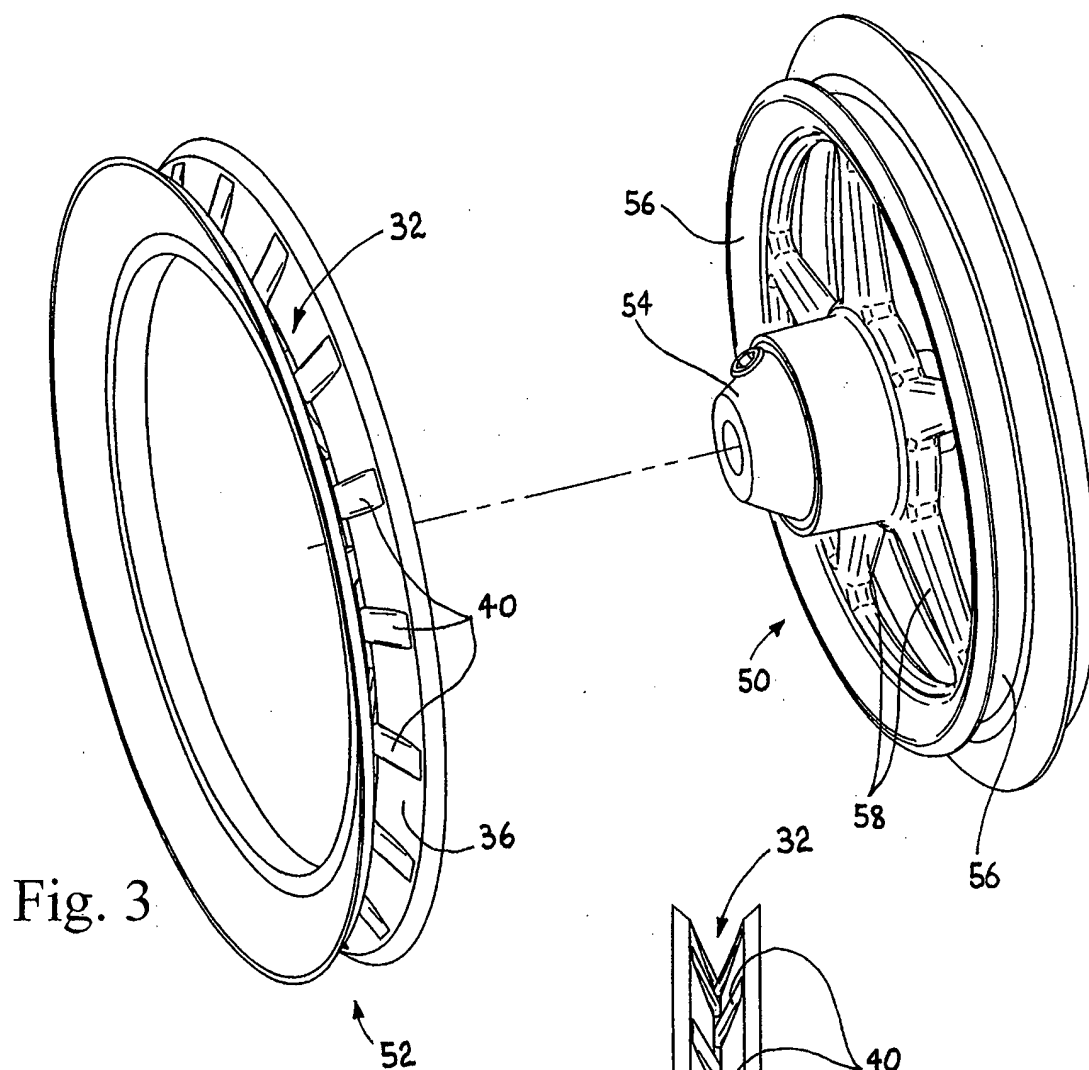
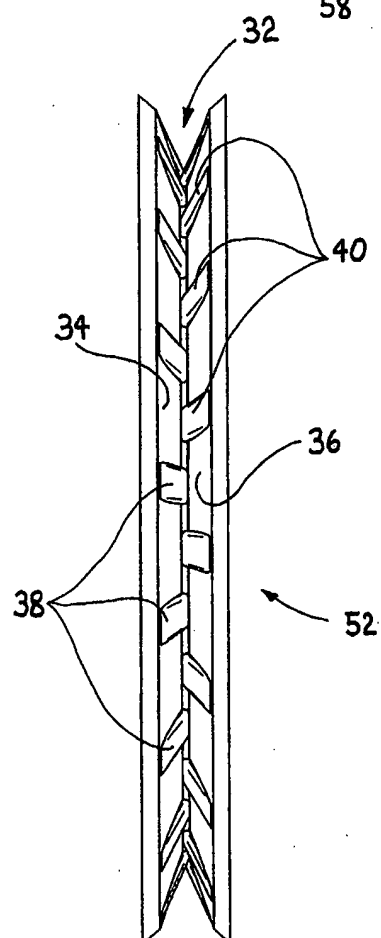
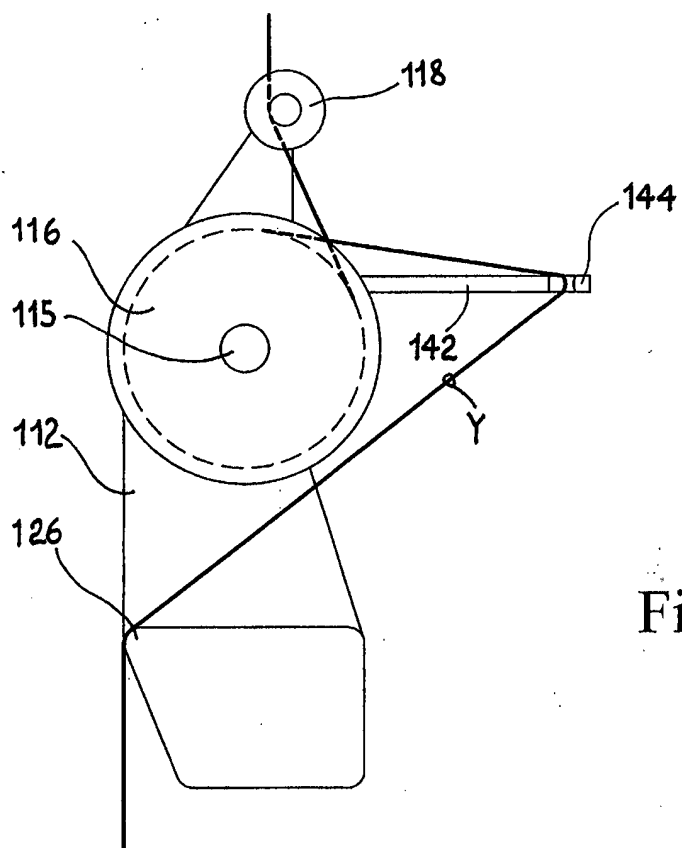
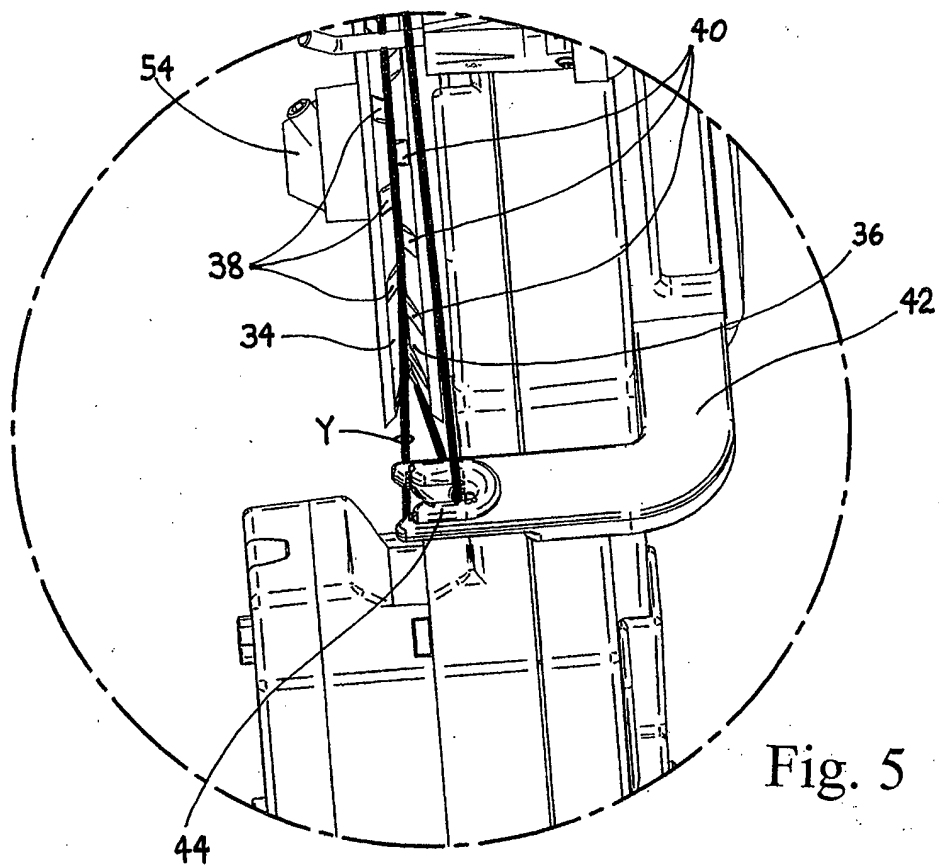


Fig. 4





REFERENCES CITED IN THE DESCRIPTION

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