

(19)



(11)

**EP 1 796 993 B1**

(12)

**EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention  
of the grant of the patent:  
**23.07.2008 Bulletin 2008/30**

(21) Application number: **05783070.5**

(22) Date of filing: **08.09.2005**

(51) Int Cl.:  
**B65H 51/22** (2006.01) **D04B 15/44** (2006.01)

(86) International application number:  
**PCT/EP2005/009674**

(87) International publication number:  
**WO 2006/032376 (30.03.2006 Gazette 2006/13)**

(54) **YARN BRAKING BODY**

**FADENBREMSKÖRPER**

**CORPS DE FREINAGE DE FIL**

(84) Designated Contracting States:  
**DE IT TR**

(30) Priority: **21.09.2004 DE 102004045725**

(43) Date of publication of application:  
**20.06.2007 Bulletin 2007/25**

(73) Proprietor: **IRO AB**  
**523 32 Ulricehamn (SE)**

(72) Inventor: **JACOBSSON, Kurt, Arne, Gunnar**  
**S-52335 (SE)**

(74) Representative: **Grünecker, Kinkeldey,**  
**Stockmair & Schwanhäusser**  
**Anwaltssozietät**  
**Leopoldstrasse 4**  
**80802 München (DE)**

(56) References cited:  
**EP-A- 1 164 103 WO-A-99/64337**  
**US-A- 6 164 580**

**EP 1 796 993 B1**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

## Description

**[0001]** The invention relates to a yarn braking body according to the preamble of claim 1.

**[0002]** In knitting yarn feeding devices which are known in practice a yarn braking body is implemented which is a precise frustocone coat made from smooth vacuum-shaped plastic material. The support part is a support ring firmly gripping the small diameter end of the frustocone coat and is installed as a separate part which comprises anchoring openings serving to hook in tension springs which extend radially outwardly from the support part and which hold the braking body in the coaxial operational position in contact with the rounded withdrawal rim of the storage body of the knitting yarn feeding device. The holding construction with the tensioning springs is structurally complicated. Manufacturing and assembling the support part at the yarn braking body needs several working steps. The knitting yarn runs off the storage body over the withdrawal rim and along the yarn braking surface at the inner side of the frustocone coat and at the same time rotates like the hand of a clock while it is pulled off axially through the small diameter end. The tension springs allow a certain movability of the yarn braking body and centre the yarn braking body on the withdrawal rim of the storage body. The yarn braking body is a wear part which in some cases has to be replaced relatively frequently. Due to the holding construction replacements are time consuming. The support part increases the mass of the braking body.

**[0003]** EP 1164103 A discloses the features of the preamble of claim 1.

**[0004]** It is an object of the invention to provide a yarn braking body of the type as mentioned at the beginning which has low mass, can be manufactured for fair costs, and which can be replaced and centred easily.

**[0005]** This object is achieved by the features of claim 1.

**[0006]** Since the support part is integrated as one piece into the frustocone coat the support part can be formed for fair costs during manufacturing the yarn braking body. The spherical support part is laid then with its spherical outer surface into a matching spherical pan for supporting the braking body. The support part is held by the contact pressure at the withdrawal rim of the storage body, and is centred by the spherical pan. The spherical support part forms so to speak a part of a spherical joint or a universal joint, respectively, which properly centres the yarn braking body on the withdrawal rim of the storage body. The yarn braking body can easily be replaced. The integrated spherical support part does not increase the mass of the braking body and also does not significantly influence the radial deformability of the frustocone coat in the region of the braking surface. The easily shapeable plastic material is used in order to form the spherical support part integrally with the frustocone coat. The rigidity of the support part which is slightly increased by the spherical form is sufficient for a stable suspension of the

yarn braking body in the spherical pan without additional reinforcement measures.

**[0007]** Expediently, the same wall thickness is present in the yarn braking body in the frustocone coat and in the spherical support part. The wall thickness e.g. amounts to between 0.2 mm and 0.5 mm. In this way the yarn braking body can be manufactured from a simple blank. Alternatively, it is possible to provide, at least regionally, a different wall thickness in the support part than in the frustocone coat.

**[0008]** The sphere radius of the spherical support part may be designed such that it reacts in an expedient relationship with the diameter at the large diameter end of the yarn braking body. The sphere radius e.g. may amount to between about 30% to 60% of the diameter. By this measure a large contact surface is achieved in the ball joint while the radial deformability of the frustocone coat is not significantly influenced in the region of the braking surface.

**[0009]** The wall thickness expediently is smaller than 1.0 mm, preferably even smaller than 0.5 mm. In case of a yarn braking body having a diameter of about 150 mm at the large diameter end the wall thickness may be about 0.3 mm.

**[0010]** The cone angle of the regular frustocone coat should amount to between about 100° and about 130°. Expediently, the cone angle amount to 120°.

**[0011]** The plastic material from which the yarn braking body is made should be a thermoplast, e.g. a polyester, PET or PVC. Such materials can be shaped easily and allow to achieve high durability and excellent surface properties.

**[0012]** The yarn braking body expediently is made by, preferably thermal, vacuum shaping from a blank. In this case the blank even could be a planar blank. At least the die surface used when shaping the inner surface of the braking body in the region of the braking surface should be polished in order to produce an inner surface in the yarn braking body which is truly smooth.

**[0013]** In order to achieve a uniform deformation property in the yarn braking body the spherical support part should continue the frustocone coat without a transition or a step. The spherical curvature, so to speak, is nestled into the frustocone.

**[0014]** The height dimension of the spherical support part measured in the direction of the axis of the frustocone coat should measure between about 15% to 35%, preferably less than 30%, of the height dimension of the yarn braking body.

**[0015]** By the integration of the spherical support part into the frustocone coat the spherical support parts constitutes the small diameter end of the frustocone coat through which small diameter end the yarn will be withdrawn. The yarn may be withdrawn directly through the support part or, alternatively, with the help of a yarn eyelet which is placed at this location with or without a connection or a bonding to the yarn braking body.

**[0016]** The outer diameter of the spherical support part

should amount to about 2.5 to 4.5 fold of the inner diameter of the smaller diameter end. Alternatively, the outer diameter of the spherical support part could amount to between about 25% and 45% of the diameter of the large diameter end. In this fashion a sufficiently large contact surface is achieved in the ball joint.

**[0017]** The inner surface of the frustocone coat, at least in the region of the braking surface, should have a smoothness which corresponds with a polished surface.

**[0018]** An embodiment of the invention is explained with the help of Fig. 1 which in the left half is a side view of a yarn braking body and in the right half is a radial section of the yarn braking body.

**[0019]** A yarn braking body B in Fig. 1, expediently for a not shown knitting yarn feeding device, is provided for a co-action with a rounded withdrawal rim of a drum-shaped storage body of a knitting yarn feeding device, in order to actuate or load the yarn with a relatively low braking force while the yarn is withdrawn inwardly over the withdrawal rim and at the same time is rotating like the hand of a clock. For this reason, the yarn braking body is laid coaxially with the storage body from the front side against the withdrawal rim and is held in a suspension such that it is centred at the withdrawal rim but nevertheless remains somewhat movable. The yarn braking body B is a one-piece plastic material shaped part, e.g. made from a thermoplastic material P like polyester, PET or PVC. The yarn braking body B e.g. is manufactured by vacuum shaping on a forming die, in some cases even by thermal vacuum shaping.

**[0020]** The yarn braking body B consists of a regular frustocone coat K and a spherical support part S which is integrated in one piece into the frustocone part K. The yarn braking body B has a large diameter circular end 1 having an opening 5 of a diameter D and a small diameter circular end 2 with an opening 4 of an inner diameter d. The frustocone coat K has a linear generatrice 3 and an axis Y. The spherical support part S is a stepless continuation of the generatrice 3 and has a sphere radius R e.g. between 30% to 60% of the diameter D. The centre Z of the sphere is situated on the axis Y of the frustocone coat K which axis Y is prolonged beyond the large diameter end 1.

**[0021]** In a concise embodiment of a yarn braking body B with a diameter D of about 110 mm and a cone angle  $\alpha$  of 120° the sphere radius R is about 590 mm.

**[0022]** The wall thickness x of the yarn braking body B is the same in the frustocone coat K and in the spherical support part S and amounts to between 0.2 mm and maximally 1.0 mm, preferably amounts to about 0.3 mm (in the case of a yarn braking body having a diameter D of 150 mm). Alternatively, the wall thickness in the spherical support part at least in part could be different from the wall thickness in the frustocone coat K.

**[0023]** The respective edges in the openings 5, 6 in the large diameter end 1 and in the small diameter end 2 could be rounded. The inner surface of the frustocone coat constitutes at least in a region a ring-shaped, cir-

cumferentially continuous braking surface F. At least in the region of the braking surface F the inner surface should be very smooth, e.g. with a smoothness corresponding to a polished surface.

**[0024]** The height h of the yarn braking body B in direction of the axis Y e.g. amounts in case of a diameter D of 110 mm to about 46 mm. The height h<sub>2</sub> of the spherical support part S amounts to somewhat less than 30% of the height h and may amount to between about 15% to about 35% of the height h. The outer diameter d<sub>S</sub> of the spherical support part S amounts to about 2.5 to 4.5 fold of the inner diameter d of the small diameter end 2, or may be about 25% to 45% of the diameter D, respectively. The cone angle  $\alpha$  in general may amount to between about 100° and 135°. A tangent drawn at the edge 6 of the opening 4 along the outer side of the spherical support part S either may be perpendicular to the axis Y or may include an angle with the axis Y which angle is smaller than 90°. The height h<sub>1</sub> of the frustocone coat K in each case is larger than the height h<sub>2</sub> of the spherical support part S. In no case should the yarn braking surface F reach towards the spherical support part S. Expediently, the outer surface of the spherical support part S also has a smoothness which corresponds to a polished surface.

## Claims

1. Yarn braking body (B) for a yarn feeding device, in particular for a knitting yarn feeding device, the yarn braking body being a flexible frustocone coat (K) made from plastic material (P) and having a large diameter end (1) of substantially circular form, a small diameter end (2) of substantially circular form and a circumferentially continuous braking surface (F) defined by a part of the inner surface of the frustocone coat, and having a circumferentially continuous support part (S) at the small diameter end (2), **characterised in that** the support part (S) is integrally made spherical and in one piece with the frustocone coat (K) from the plastic material of the yarn braking body (B) such that the centre (Z) of the sphere lies in the axis (Y) of the frustocone coat which axis (Y) is prolonged beyond the large diameter end (1).
2. Yarn braking body as in claim 1, **characterised in that** the wall thickness (X) of the yarn braking body (B) is continuously the same in the frustocone coat (K) and in the spherical support part (S).
3. Yarn braking body as in claim 1, **characterised in that** the sphere radius (R) of the spherical support part (S) is between 30% and 60%, preferably about 43%, of the diameter (D) of the large diameter end (1) of the frustocone coat (K).

4. Yarn braking body as in claim 2, **characterised in that** the wall thickness (X) is smaller than 1.0 mm, preferably is between 0.2 mm and 0.5 mm.
5. Yarn braking body as in claim 1, **characterised in that** the cone angle ( $\alpha$ ) of the frustocone coat (K) amounts to between about 100° and 135°.
6. Yarn braking body as in claim 1, **characterised in that** the plastic material (P) is a thermal plastic material, e.g. polyester, PET or PVC.
7. Yarn braking body as in claim 1, **characterised in that** the yarn braking body (B) is shaped by, preferably thermal, vacuum shaping of a blank, preferably of a planar blank.
8. Yarn braking body as in claim 1, **characterised in that** the spherical support part (S) is a stepless continuation of the frustocone coat (K).
9. Yarn braking body as in claim 1, **characterised in that** the height (h2) of the spherical support part (S) measured in the direction of the axis (Y) of the frustocone coat (K) measures between about 15% to 35%, preferably less than 30%, of the height (h) of the yarn braking body (B).
10. Yarn braking body as in claim 1, **characterised in that** the spherical support part (S) forms the small diameter end (2) of the frustocone coat (K).
11. Yarn braking body as in claim 1, **characterised in that** the outer diameter (dS) of the spherical support part (S) amounts to about 2.5 to 4.5 fold of the inner diameter (d) of the small diameter end (2).
12. Yarn braking body as in claim 1, **characterised in that that** the outer diameter (dS) of the spherical support part (S) amounts to about 25% to 45% of the diameter (D) of the large diameter end (1).
13. Yarn braking body as in claim 1, **characterised in that** the inner surface of the frustocone coat (K) has a smoothness at least in the region of the braking surface (F) corresponding to a polished surface.

#### Patentansprüche

1. Fadenbremskörper (B) für eine Fadenliefervorrichtung, insbesondere für eine Strickfaden-Liefervorrichtung, wobei der Fadenbremskörper ein flexibler Kegelstumpfmantel (K) aus Kunststoffmaterial ist, der ein großdurchmessriges Ende (1) substanziell kreisförmiger Form, ein kleindurchmessriges Ende (2) substanziell kreisförmiger Form, und eine in Umfangsrichtung kontinuierliche Bremsfläche (F) auf-

weist, die durch einen Teil der inneren Oberfläche des Kegelstumpfmantels definiert ist, wobei der Fadenbremskörper am kleindurchmessrigen Ende (2) einen in Umfangsrichtung kontinuierlichen Stützteil (S) aufweist, **dadurch gekennzeichnet, dass** der Stützteil (S) aus dem Kunststoffmaterial des Fadenbremskörpers (B) integral sphärisch und einstückig mit dem Kegelstumpfmantel (K) derart ausgebildet ist, dass der Mittelpunkt (Z) der Kugel in der über das großdurchmessrige Ende (1) hinaus verlängerten Achse (Y) des Kegelstumpfmantels (K) liegt.

2. Fadenbremskörper nach Anspruch 1, **dadurch gekennzeichnet, dass** die Wandstärke (X) des Fadenbremskörpers (B) in dem Kegelstumpfmantel (K) und in dem sphärischen Stützteil (S) kontinuierlich dieselbe ist.
3. Fadenbremskörper nach Anspruch 1, **dadurch gekennzeichnet, dass** der Kugelradius (R) des sphärischen Stützteils (S) zwischen 30% und 60%, vorzugsweise etwa 43%, des Durchmessers (D) des großdurchmessrigen Endes (1) des Kegelstumpfmantels (K) beträgt.
4. Fadenbremskörper nach Anspruch 2, **dadurch gekennzeichnet, dass** die Wandstärke (X) kleiner ist als 1,0 mm, vorzugsweise zwischen 0,2 mm und 0,5 mm beträgt.
5. Fadenbremskörper nach Anspruch 1, **dadurch gekennzeichnet, dass** der Konuswinkel ( $\alpha$ ) des Kegelstumpfmantels (K) zwischen etwa 100° und 135° beträgt.
6. Fadenbremskörper nach Anspruch 1, **dadurch gekennzeichnet, dass** das Kunststoffmaterial (P) ein thermoplastisches Material ist, z.B. Polyester, PET oder PVC.
7. Fadenbremskörper nach Anspruch 1, **dadurch gekennzeichnet, dass** der Fadenbremskörper (B) durch, vorzugsweise thermisches, Vakuumverformen eines Zuschnitts, vorzugsweise eines ebenen Zuschnitts, gebildet ist.
8. Fadenbremskörper nach Anspruch 1, **dadurch gekennzeichnet, dass** der sphärische Stützteil (S) eine stufenlose Verlängerung des Kegelstumpfmantels (K) ist.
9. Fadenbremskörper nach Anspruch 1, **dadurch gekennzeichnet, dass** die Höhe (h2) des sphärischen Stützteils (S), gemessen in der Richtung der Achse (Y) des Kegelstumpfmantels (K) zwischen ca. 15% bis 35%, vorzugsweise weniger als 30%, der Höhe (h) des Fadenbremskörpers (B) beträgt.

10. Fadenbremskörper nach Anspruch 1, **dadurch gekennzeichnet, dass** der sphärische Stützteil (S) das kleindurchmessrige Ende (2) des Kegelstumpfmantels (K) bildet.
11. Fadenbremskörper nach Anspruch 1, **dadurch gekennzeichnet, dass** der Außendurchmesser (dS) des sphärischen Stützteils (S) bis zum ca. 2,5- bis 4,5-fachen des Innendurchmessers (d) des kleindurchmessrigen Endes (2) beträgt.
12. Fadenbremskörper nach Anspruch 1, **dadurch gekennzeichnet, dass** der Außendurchmesser (dS) des sphärischen Stützteils (S) bis zu ca. 25% bis 45% des Durchmessers (D) des großdurchmessrigen Endes (1) beträgt.
13. Fadenbremskörper nach Anspruch 1, **dadurch gekennzeichnet, dass** die innere Oberfläche des Kegelstumpfmantels (K) zumindest in der Region der Bremsfläche (F) eine mit einer polierten Oberfläche korrespondierende Glätte aufweist.

#### Revendications

1. Corps de freinage de fil (B) dans un dispositif d'alimentation en fil, en particulier pour un dispositif d'alimentation en fil à tricoter, ce corps de freinage de fil consistant en une enveloppe tronconique flexible (K) composée d'une matière plastique (P) et présentant une extrémité à grand diamètre (1) de forme globalement circulaire, une extrémité à petit diamètre (2) de forme globalement circulaire et une surface de freinage (F) continue sur la circonférence, qui est définie par une partie de la surface intérieure de l'enveloppe tronconique et qui présente à l'extrémité à petit diamètre (2) une partie de support (S) continue sur la circonférence, **caractérisé en ce que** la partie de support (S) est sphérique et réalisée d'une seule pièce avec l'enveloppe tronconique (K), à partir de la matière plastique du corps de freinage de fil (B), de telle sorte que le centre (Z) de la sphère se trouve dans l'axe (Y) de ladite enveloppe tronconique, l'axe (Y) se prolongeant au-delà de l'extrémité à grand diamètre (1).
2. Corps de freinage de fil selon la revendication 1, **caractérisé en ce que** l'épaisseur de paroi (X) du corps de freinage de fil (B) est la même, de manière continue, dans l'enveloppe tronconique (K) et dans la partie de support sphérique (S).
3. Corps de freinage de fil selon la revendication 1, **caractérisé en ce que** le rayon (R) de la partie de support sphérique (S) représente entre 30 % et 60 %, de préférence 43 %, du diamètre (d) de l'extrémité à grand diamètre (1) de l'enveloppe tronconique (K).

4. Corps de freinage de fil selon la revendication 1, **caractérisé en ce que** l'épaisseur de paroi (X) est inférieure à 1,0 mm et est située de préférence entre 0,2 mm et 0,5 mm.

5. Corps de freinage de fil selon la revendication 1, **caractérisé en ce que** l'angle de cône ( $\alpha$ ) de l'enveloppe tronconique (K) est situé entre environ 100° et 135°.

6. Corps de freinage de fil selon la revendication 1, **caractérisé en ce que** la matière plastique (P) est une matière thermoplastique, par exemple du polyester, du PET ou du PVC.

7. Corps de freinage de fil selon la revendication 1, **caractérisé en ce qu'il** est obtenu par formage, de préférence thermoformage, sous vide d'un flan, de préférence un flan plat.

8. Corps de freinage de fil selon la revendication 1, **caractérisé en ce que** la partie de support sphérique (S) est constituée par un prolongement continu de l'enveloppe tronconique (K).

9. Corps de freinage de fil selon la revendication 1, **caractérisé en ce que** la hauteur (h2) de la partie de support sphérique (S), mesurée dans le sens de l'axe (Y) de l'enveloppe tronconique (K), représente environ 15 % à 35 %, de préférence moins de 30 %, de la hauteur (h) du corps de freinage de fil (B).

10. Corps de freinage de fil selon la revendication 1, **caractérisé en ce que** la partie de support sphérique (S) forme l'extrémité à petit diamètre (2) de l'enveloppe tronconique (K).

11. Corps de freinage de fil selon la revendication 1, **caractérisé en ce que** le diamètre extérieur (dS) de la partie de support sphérique (S) représente environ 2,5 à 4,5 fois le diamètre intérieur (d) de l'extrémité à petit diamètre (2).

12. Corps de freinage de fil selon la revendication 1, **caractérisé en ce que** le diamètre extérieur (dS) de la partie de support sphérique (S) représente environ 25 % à 45 % du diamètre (D) de l'extrémité à grand diamètre (1).

13. Corps de freinage de fil selon la revendication 1, **caractérisé en ce que** la surface intérieure de l'enveloppe tronconique (K) présente, au moins dans la zone de la surface de freinage (F), une texture lisse qui correspond à une surface polie.

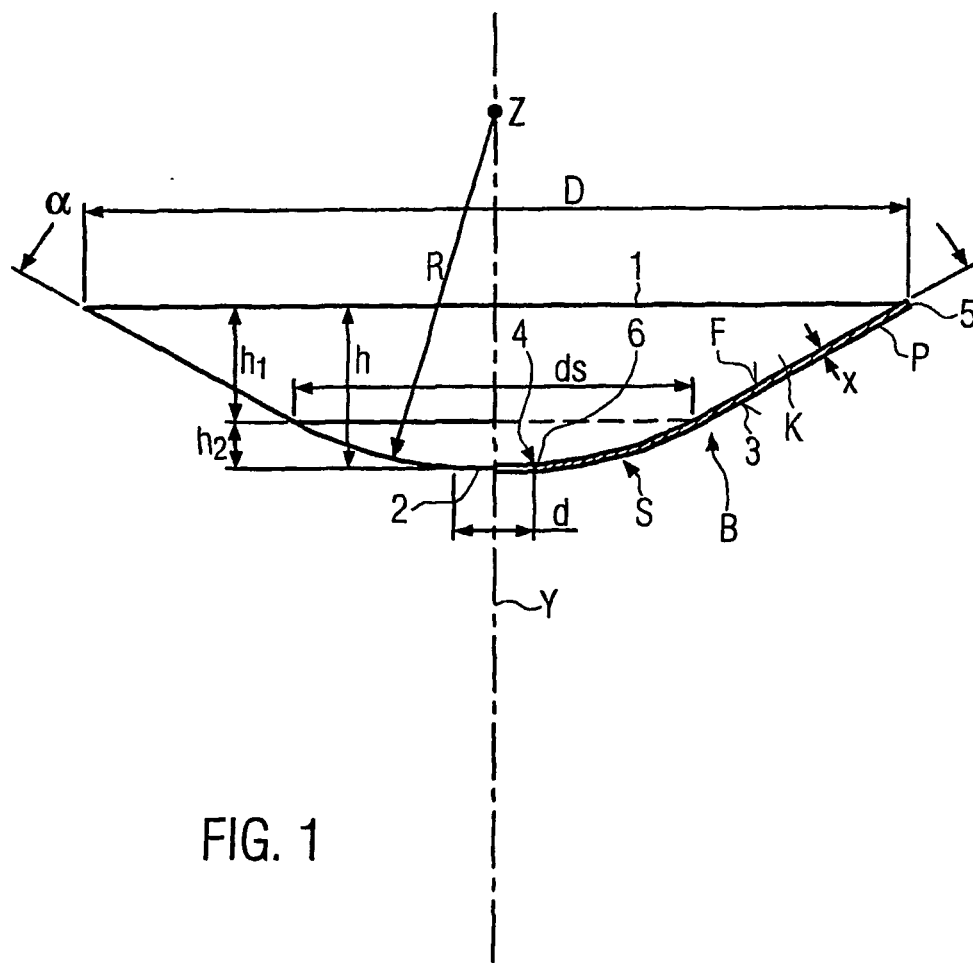


FIG. 1

**REFERENCES CITED IN THE DESCRIPTION**

*This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.*

**Patent documents cited in the description**

- EP 1164103 A [0003]