

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 935 579 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

21.05.2003 Bulletin 2003/21

(21) Application number: **97912604.2**

(22) Date of filing: **04.11.1997**

(51) Int Cl.7: **B65H 75/22**

(86) International application number:
PCT/SE97/01834

(87) International publication number:
WO 98/019953 (14.05.1998 Gazette 1998/19)

(54) **SPOOL MADE OF PLASTICS**

AUS KUNSTSTOFF HERGESTELLTE SPULE

BOBINE EN PLASTIQUE

(84) Designated Contracting States:
CH DE DK FI GB LI SE

(30) Priority: **04.11.1996 SE 9604038**

(43) Date of publication of application:
18.08.1999 Bulletin 1999/33

(73) Proprietors:
• **Höglind, Inga-Lill**
330 15 Bor (SE)
• **Svensson, Ingvar**
331 32 Värnamo (SE)

(72) Inventors:
• **Höglind, Inga-Lill**
330 15 Bor (SE)

• **Svensson, Ingvar**
331 32 Värnamo (SE)

(74) Representative: **Lindberg, Klas Valter Bo et al**
AWAPATENT AB,
Södra Hamngatan 37-41,
P.O. Box 11394
404 28 Göteborg (SE)

(56) References cited:
EP-A- 0 214 562 **DE-A- 2 259 364**
DE-A- 4 414 577 **SE-B- 469 982**
US-A- 2 990 133

EP 0 935 579 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention relates to a spool of a plastics material for reception thereon of a strand-like material, such as e.g. tape, cable, wire and the like, comprising two preferably disc-like end members held together in spaced-apart relationship by a tubular core extending between said end discs. The end discs and the core are formed with portions of complementary configuration, which are fitted into one another upon assembly of the spool. The end discs are provided with protruding supports having radial, grip lugs thereon. The protruding supports project axially from the facing sides of the discs, and in the area of its ends the core is provided with grip portions comprising grip edges.

[0002] Spools of this kind usually are manufactured by moulding the end discs separately and then gluing them to the core. In order to satisfy various requirements concerning the volume and the diameter and length dimensions, it is necessary to manufacture spools of a large number of different dimensions. It should be appreciated that numerous different end-disc diameter sizes could be used together with a core of a specific length just like numerous different core lengths could be used together with an end disc of a specific diameter size. When glue is used as the bonding agent to fasten the end discs to the core it is very difficult to find a glue that is suitable from an environmental point of view. In addition, factory-finished spools are very bulky to store as well as to transport and handle.

[0003] Another way of manufacturing a spool is to assemble the spool from two parts of end-disc members and one middle tubular part. Such a spool is disclosed in DE 22 59 364, upon which the preamble of the first claim of the present application is based. A spool of that kind is having cantilever-like grip lugs at the end-discs, intended to engage in recesses in the middle tubular part for assemblage.

[0004] The main object of the invention is to provide a spool obviating the necessity of using environmentally harmful bonding agents while at the same time the number of pieces necessary to supply the desired spool volumes and spool dimensions is considerably reduced. A further object of the invention is to provide a reliably operating spool structure that requires but a minimum storage and transportation space.

[0005] This object is achieved by means of a spool according to claim 1 wherein said end discs are provided with protruding supports having radial, grip lugs thereon, said protruding supports projecting axially from the facing sides of said discs, and in the area of its ends said core is provided with grip portions comprising grip edges said grip lugs being non-resilient by having stiffening webs extending radially from said grip lugs towards said end disc centre, i.e. rigid grip lugs, and in that said grip edges are arranged, in the interfitted position of the core and the end discs, to be engaged by the end-disc grip lugs after the latter, upon interfitting of the end discs and

the core, having been forced past the core grip portions while making use of the resilience of the plastic material by extending the core in the circumferential direction. Owing to this arrangement a strong spool is obtained, wherein the user need only purchase and keep in stock a minimum number of parts that he may adapt to his spool-volume needs. For instance, the buyer could purchase end discs of only one or in any case a very reduced number of diameter sizes, and with the aid of cores of different lengths he is able to make the adaptations necessary for the desired volume in view of the material to be wound onto the spool. It is, of course, likewise possible to purchase cores of one or at least only a few different dimensions and adapt the volume with the aid of end discs of different diameter sizes. Because the end discs are press fit onto, and not integrated with the core, the assembly of the parts may be effected by the user, which offers considerable advantages from a transportation point of view. It should be appreciated that just like before there is nothing to prevent assembly of the spool at the place of moulding of the plastic components. This arrangement also gives a very strong construction with minimum risks for the components separating when handled roughly.

[0006] Preferably, the grip lugs of the end discs are configured as hook-like tongues comprising a wedge-shaped face turned away from the associated end disc and a grip edge facing the associated end disc for snap engagement with the grip portion in the core. Accordingly, the assembly may be performed conveniently by merely pressing the end discs and the core together axially.

[0007] Preferably also, the grip tongues are directed radially outwards, and the grip edges formed in the core are recesses made in the core wall, preferably in the shape of apertures extending through the core wall. In addition, the grip lugs on the end discs preferably are spaced apart along a circular arc, second protruding supports preferably being arranged between the first protruding supports, said second supports having wedge-shaped sloping ramps to be ridden on by the core. Furthermore, since the grip lugs on the end discs are non-resilient, i.e. stiff, whereby passage of said lugs by means of the grip portions of the core is allowable by extension of the core in the circumferential direction thereof, a very reliable, durable joint is achieved once the components have been pressed together, a joint which an unauthorised person may disconnect only with considerable difficulty. The arrangement prevents the joint from being disconnected and the components again be fitted together in a manner jeopardising the strength of the spool.

[0008] One embodiment of the invention will be described in closer detail in the following with reference to the accompanying drawings, wherein

Fig. 1 is a perspective view of a spool designed in accordance with the invention,

Fig. 2 is an exploded view of one end portion of the core and the inner face of an end disc of the spool in accordance with the invention, shown in an exploded view in a non-mounted condition,

Fig. 3 is an axial cross-sectional view through the central part of the end disc and the end portion of the core intended for the same spool as in the preceding drawing figures, and

Figs 4-6 are fragmentary axial views as seen from the inner face of one end disc and showing the sequential deformation of the core as it is being fitted onto the end disc.

[0009] The spool illustrated in the drawing figures consists of two end discs 1 which are held together in spaced apart relationship by a tubular core 2. The end discs 1 preferably are identical but could equally well differ in shape as well as in configuration, should this be desired. In accordance with the shown embodiment the outwardly directed face of the end discs are formed with a number of stiffening ribs 3, 4 and 5. It is of course equally possible to provide the end discs with stiffening ribs on their inner face or to design them with a smooth outer face or both faces smooth, or to form them with stiffening ribs having a different appearance and extension. The spool may be used to receive any windable material, such as tape, cable, wire and the like. Numeral reference 6 designates protruding supports generally, said supports projecting from the inner face of the end disc and in accordance with the shown embodiment they consist of an annular, axially protruding flange 7 and of grip lugs 8 distributed along the flange periphery and projecting radially beyond the outer face of the flange. The grip lugs 8 form hook-shaped grip tongues comprising a wedge-shaped face 8a turned away from the inner face 9 of the end disc, and a grip edge 8b turned towards the inner face of the end disc. The grip tongues are stiffened by a stiffening web 10 extending radially towards the disc centre, the grip portions consequently being non-resilient (non-flexible). The upper half of Fig. 3 is a sectional view on the line indicated in Fig. 2 by arrow IIIa and the lower half is a sectional view indicated in Fig. 2 by arrow 111b. Numeral reference 11 designates a stiffening web which like stiffening web 10 extends radially and is formed with a wedge-like sloping edge face 12. As most clearly apparent from Fig. 3 the parts of the annular flange 7 extending between the grip tongues 8 have an obliquely bevelled face 13 on its edge turned away from the end disc. The oblique bevel 13 forms a continuation of the wedge-shaped edge face 12 of the stiffening web 11. Also the stiffening web 10 has a wedge-shaped face 14 which forms a continuation of the wedge-shaped face 8a of the engagement tongue 8. Numeral reference 15 designates a centre hole formed in the end disc by means of which the spool may be rotatably mounted on e.g. a shaft. Numeral reference 16 designates apertures formed adjacent the ends of the core 2, the aperture edges 18 closest to the core

end 17 forming grip edges which cooperate with the grip edges 8b on the grip tongues. The spool is assembled by the core being pressed against the end disc 9. When the end edge 17 of the core comes into contact with and runs along the oblique faces 14 and 8a on the stiffening webs 10 and the grip tongues 8, respectively, the parts of the core that are positioned between the grip tongues will be distended as appears from Fig. 5. Upon continued pressing-together of the two components this movement of the tubular wall of the core is, however, opposed in a direction towards the centre by the between wedge faces 12 as well as by the wedge face 13 on the annular support means 6, whereby the core is forced to re-assume a circular configuration, as shown in Fig. 6. When the end portion of the core moves past the grip tongues and thus is forced outwards, onto the outer periphery of the annular flange 7, the material of the core is extended in the circumferential direction against the action of its resilience. When the grip tongues snap into the engagement apertures 16, the core again assumes its circular shape. Extension of the portion of the core closest to the end edge thereof, in which core portion the material possesses remaining resilience, will result in the core fitting narrowly around the external face of the annular support 7. By adequately adapting the distance A from the grip edge 8b on the grip tongue to the inner face of the end disc relative to the distance B from the grip edge 18 of the grip apertures to the end edge 17 of the central component a very stable and durable joint is obtained. Unauthorised breaking up of this joint is very difficult, since the grip tongues, owing to the stiffening means 10 at their rear, cannot be forced back through the grip apertures, and any attempts to prise loose the end portion of the core from the grip tongues with the aid of a tool of some kind will only result in damaging of the engagement parts. Should it have become possible to thus separate the components, unauthorised re-assembly thereof, which could endanger the function of the spool as it is used again, is at least prevented.

[0010] The invention is not limited to the embodiment described herein and illustrated in the accompanying drawings by way of example but could be varied as to its details within the scope of the appended claims without departure from the basic idea of the invention. For example, in accordance with the shown embodiment the grip tongues 8 are provided in a number of four as are also the projecting supports formed by the stiffening webs and positioned between the tongues. Within the scope of the invention, this number could, of course, be higher or lower. It is not either necessary that the number of projecting supports having grip tongues formed thereon is identical with the number of projecting supports positioned therebetween. As an alternative, the annular flange 6 need not be continuous along the entire periphery. Instead, it could be divided into a number of sections spaced somewhat apart. With a sufficiently large number of wedge-shaped edges 12 to be ridden by the

core the flange-shaped annular member 7 could, however, be omitted altogether.

Claims

1. A spool made of plastics material for reception thereon of a windable material, such as e.g. tape, cable, wire and the like, comprising two preferably disc-like end members (1) held together in spaced-apart relationship by a tubular core (2) extending between said end discs, said end discs (1) and said core (2) are formed with portions of complementary configuration, said complementary portions being fitted into one another upon assembly of said spool, said end discs (1) being provided with protruding supports (6, 8) having radial, grip lugs (8) thereon, said protruding supports projecting axially from the facing sides of said discs, and in the area of its ends said core is provided with grip portions comprising grip edges (18), **characterised in that** said grip lugs (8) being non-resilient by having stiffening webs (10) extending radially from said grip lugs (8) towards said end disc (1) centre, i.e. rigid grip lugs, and **in that** said grip edges (18) are arranged, in the interfitted position of the core and the end discs, to be engaged by the end-disc grip lugs (8) after the latter, upon interfitting of the end discs and the core, having been forced past the core grip portions while making use of the resilience of the plastic material of the core (2) by extending the core in the circumferential direction.
2. A spool as claimed in claim 1, **characterised in that** the grip lugs (6, 8) of the end discs (1) are configured as hook-like tongues (8) comprising a wedge-shaped face (8a) turned away from the associated end disc and a grip edge (8b) turned towards the associated end disc for snap engagement with the grip portions in the core.
3. A spool as claimed in claim 2, **characterised in that** the grip tongues (8) are directed radially outwards.
4. A spool as claimed in any one of claims 1-3, **characterised in that** the grip edges (18) formed in the core (2) are formed by grip recesses (16) formed in the core wall.
5. A spool as claimed in claim 4, **characterised in that** the grip recesses (16) are apertures extending through the core wall.
6. A spool as claimed in any one of claims 1-5, **characterised in that** the grip lugs (8) on the end discs are spaced apart along a circular arc.
7. A spool as claimed in claim 6, **characterised in that**

between the protruding supports (8) formed on the end discs second protruding supports (7, 11) are provided having wedge-shaped sloping ramps (13, 12) on which the core (2) rides.

8. A spool as claimed in claim 7, **characterised in that** said second protruding supports (7) extend arcuately between said first protruding supports so as to form an annular means jointly with said first supports, one side face of said annular means having a diameter size corresponding to or exceeding the diameter size of one side of the core.
9. A spool as claimed in claim 8, **characterised in that** said diameter sizes are adapted for press fit engagement between the protruding supports of the end discs and the core wall.

Patentansprüche

1. Aus Kunststoff hergestellte Spule zur Aufnahme eines wickelbaren Materials darauf, wie z.B. Band, Kabel, Draht und dergleichen, umfassend zwei vorzugsweise scheibenartige Endglieder (1), die durch einen röhrenförmigen Kern (2), welcher sich zwischen den Endscheiben (1) erstreckt, in räumlich getrennter Beziehung zusammengehalten sind, wobei die Endscheiben (1) und der Kern (2) mit Abschnitten von einander ergänzender Gestaltung ausgebildet sind, wobei die einander ergänzenden Abschnitte nach dem Zusammenbau der Spule ineinander gepasst sind, wobei die Endscheiben (1) mit vorstehenden Halterungen (6, 8) mit radialen Greifansätzen (8) darauf versehen sind, wobei die vorstehenden Halterungen axial von den einander zugewandten Seiten der Scheiben vorstehen, und wobei der Kern im Bereich seiner Enden mit Greifabschnitten versehen ist, die Greifkanten (18) umfassen, **dadurch gekennzeichnet, dass** die Greifansätze (8) dadurch, dass sie Verstärkungsrippen (10) aufweisen, die sich radial von den Greifansätzen (8) in Richtung auf die Mitte der Endscheibe (1) erstrecken, nicht elastisch, d.h. feste Greifansätze sind, und dass die Greifkanten (18) in der ineinander gepassten Position des Kerns und der Endscheiben angeordnet sind, um von den Greifansätzen (8) der Endscheiben in Eingriff genommen zu werden, nachdem letztere nach dem Ineinandergesetzen der Endscheiben und des Kerns an den Kerngreifabschnitten vorbeigezwungen wurden, während die Elastizität des Kunststoffmaterials des Kerns (2) durch Ausstrecken des Kerns in der umfänglichen Richtung genutzt ist.
2. Spule nach Anspruch 1, **dadurch gekennzeichnet, dass** die Greifansätze (6, 8) der Endscheiben (1) als hakenartige Zungen (8) gestaltet sind, die

eine keilförmige Seite (8a), welche von der zugehörigen Endscheibe abgewandt ist, und eine Greifkante (8b), die der zugehörigen Endscheibe zugewandt ist, zur Ineingriffnahme durch Einrasten mit den Greifabschnitten des Kerns umfassen.

3. Spule nach Anspruch 2, **dadurch gekennzeichnet, dass** die Greifzungen (8) radial nach außen gerichtet sind.

4. Spule nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** die Greifkanten (18), die im Kern (2) ausgebildet sind, durch Greiffaussparungen (16) ausgebildet sind, die in der Kernwand ausgebildet sind.

5. Spule nach Anspruch 4, **dadurch gekennzeichnet, dass** die Greiffaussparungen (16) Öffnungen sind, die sich durch die Kernwand erstrecken.

6. Spule nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** die Greifansätze (8) an den Endscheiben entlang eines kreisförmigen Bogens räumlich voneinander getrennt sind.

7. Spule nach Anspruch 6, **dadurch gekennzeichnet, dass** zwischen den vorstehenden Halterungen (8), die an den Endscheiben ausgebildet sind, zweite vorstehende Halterungen (7, 11) mit keilförmigen Schrägrampen (13, 12) vorgesehen sind, auf denen der Kern (2) aufsitzt.

8. Spule nach Anspruch 7, **dadurch gekennzeichnet, dass** sich die zweiten vorstehenden Halterungen (7) bogenförmig so zwischen den ersten vorstehenden Halterungen erstrecken, dass sie zusammenwirkend mit den ersten Halterungen ein ringförmiges Glied bilden, wobei eine Seite des ringförmigen Glieds eine Durchmessergröße aufweist, die der Durchmessergröße einer Seite des Kerns entspricht oder diese übersteigt.

9. Spule nach Anspruch 8, **dadurch gekennzeichnet, dass** die Durchmessergrößen zur Ineingriffnahme durch Einpressung zwischen den vorstehenden Halterungen der Endscheiben und der Kernwand geeignet sind.

Revendications

1. Bobine en matière plastique pour la réception d'un matériel bobinable tel que par exemple une bande, du câble, du fil métallique et similaire, comprenant deux organes d'extrémité en forme de disque de préférence (1) maintenus ensemble à distance réciproque par un noyau tubulaire (2) s'étendant entre lesdits disques d'extrémité, lesdits disques d'extré-

mité (1) et ledit noyau (2) sont formés par des portions de configuration complémentaire, lesdites portions complémentaires étant fixées les unes dans les autres sur un assemblage de ladite bobine, lesdits disques d'extrémités (1) étant munis de supports protubérants (6, 8), ayant des saillies de préhension radiale (8), lesdits supports protubérants faisant saillie axialement depuis les faces opposées desdits disques, et dans la zone de ses extrémités, ledit noyau est muni de portions de préhension comprenant des bords de préhension (18), **caractérisée en ce que** lesdits saillies de préhension (8) sont non résilientes, car elles présentent des âmes de renfort (10) s'étendant radialement depuis lesdites saillies de préhension (8) en direction du centre dudit disque d'extrémité (1), c'est-à-dire des saillies rigide de préhension, et **en ce que** lesdits bords de préhension (18) sont disposés, dans la position interconnectée du noyau et des disques d'extrémités, de manière à être en prise avec les saillies de préhension de disque d'extrémité (8) après que ces derniers, à l'interconnexion des disques d'extrémité et du noyau, aient été forcés à passer les portions de préhension de noyau tout en faisant usage de la résilience de la matière plastique du noyau (2) en étendant le noyau dans la direction circonférentielle.

2. Bobine selon la revendication 1, **caractérisée en ce que** les saillies de préhension (6, 8) des disques d'extrémité (1) sont configurées comme des languettes en forme de crochet (8) comprenant une face en forme de coin (8a) détournée du disque associé et un bord de préhension (8b) tourné en direction du disque associé d'extrémité pour un engagement encliqueté avec les portions de préhension dans le noyau.

3. Bobine telle que revendiquée dans la revendication 2, **caractérisée en ce que** les languettes de préhension (8) sont dirigées radialement vers l'extérieur.

4. Bobine telle que revendiquée dans l'une des revendications 1 à 3, **caractérisée en ce que** les bords de préhension (18) formés dans le noyau (2) sont formés par des cavités de préhension (16) formées dans la paroi du noyau.

5. Bobine telle que revendiquée dans la revendication 4, **caractérisée en ce que** les cavités de préhension (16) sont des trous s'étendant à travers la paroi de noyau.

6. Bobine telle que revendiquée dans l'une des revendications 1 à 5, **caractérisée en ce que** les saillies de préhension (8) sur les disques d'extrémité sont espacées le long d'un arc circulaire.

7. Bobine telle que revendiquée dans la revendication 6, **caractérisée en ce qu'**entre les supports saillants (8) formés sur des disques d'extrémité, des seconds supports (7, 11) protubérants sont munis de rampes inclinées coniques (13, 12) sur lesquels glisse le noyau (2). 5
8. Bobine telle que revendiquée dans la revendication 7, **caractérisée en ce que** lesdits seconds supports protubérants (7) s'étendent de manière précise entre lesdits premiers supports saillants de manière à former un moyen annulaire en commun avec lesdits supports, une face latérale dudit moyen annulaire ayant une dimension de diamètre égale ou supérieure à la taille de diamètre d'une face du noyau. 10 15
9. Bobine telle que revendiquée dans la revendication 8, **caractérisée en ce que** lesdites dimensions de diamètre sont adaptées pour réaliser un engagement serré par pression entre les supports saillants des disques d'extrémité et la paroi de noyau. 20

25

30

35

40

45

50

55

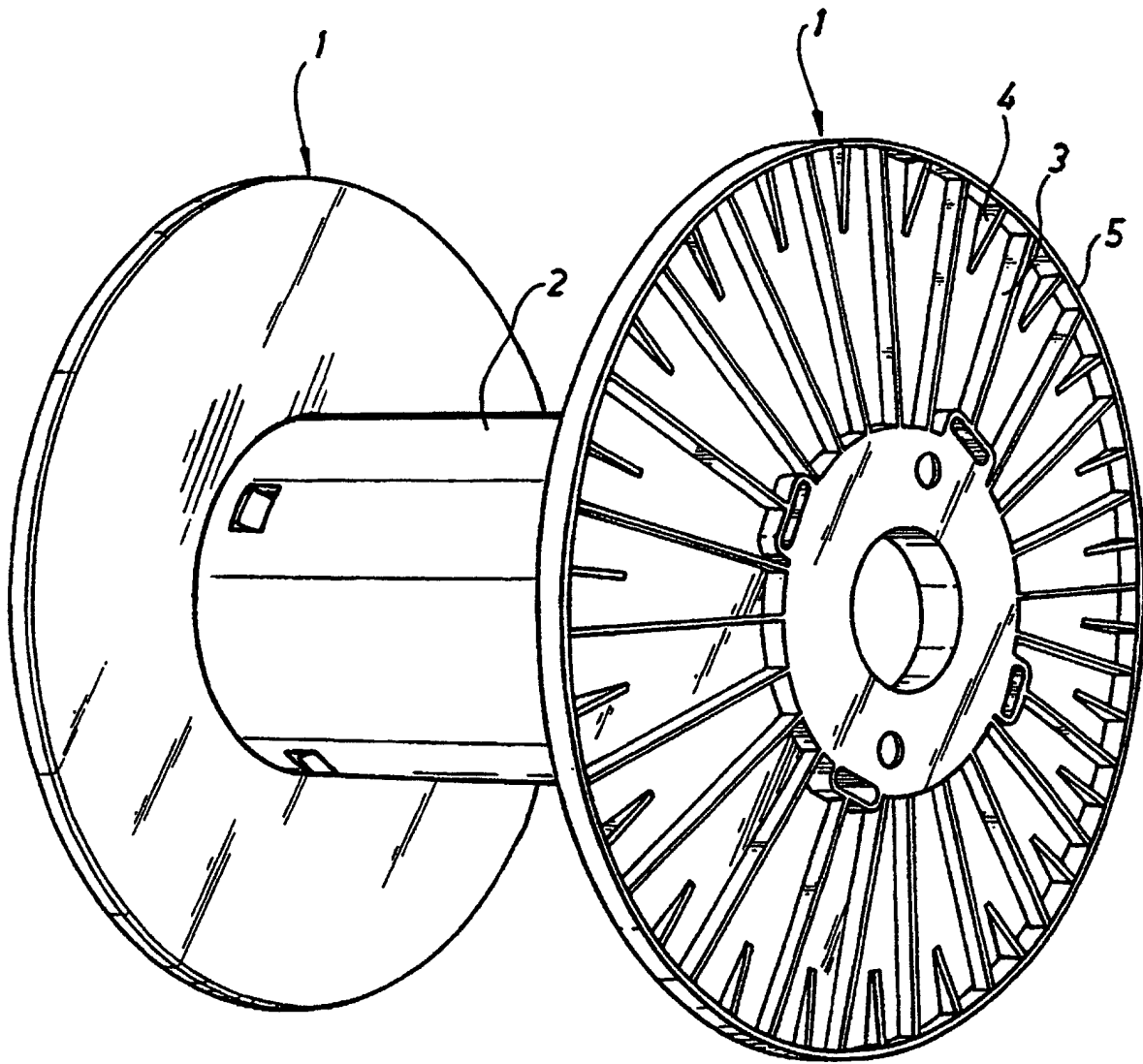


Fig. 1

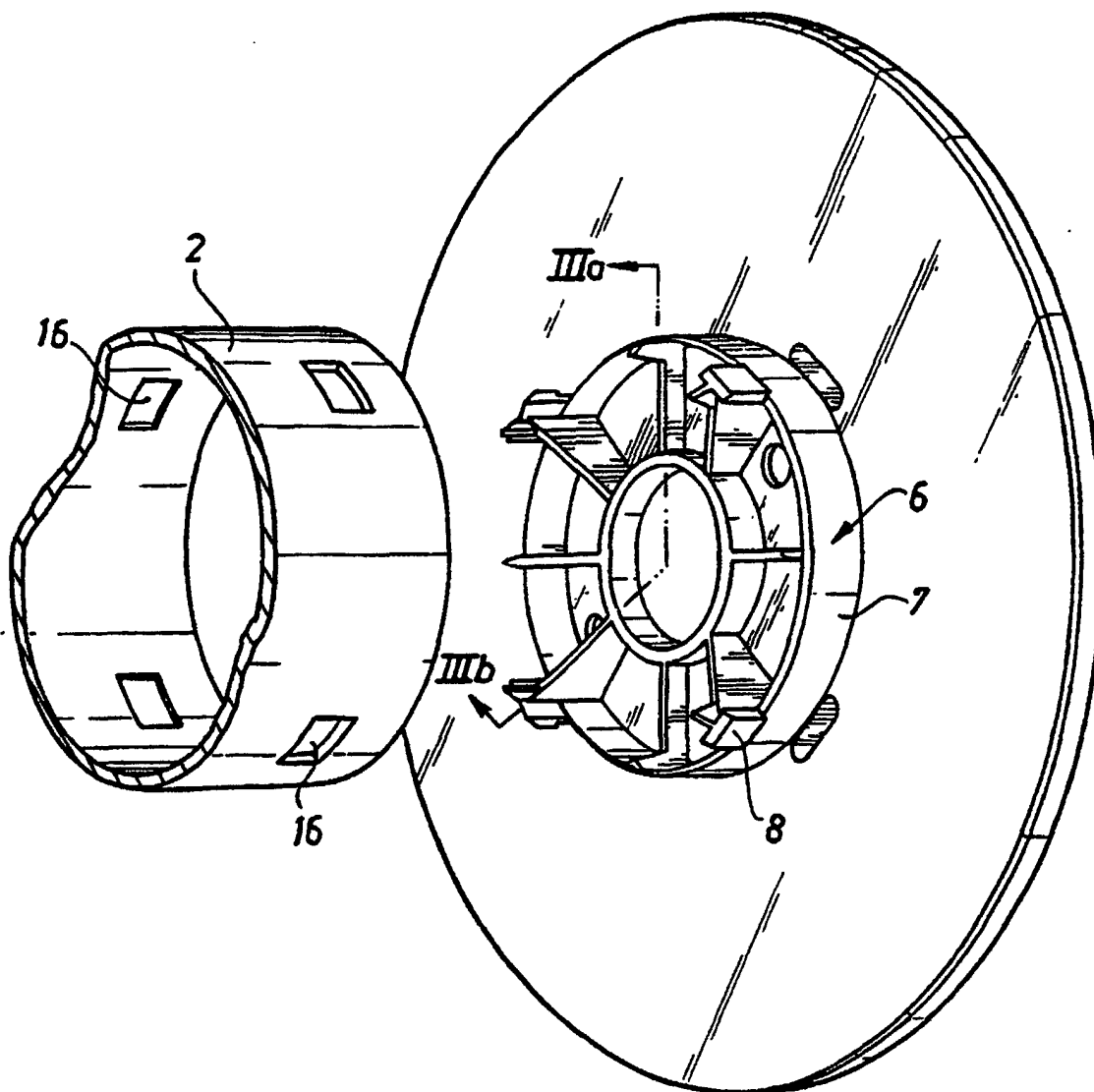
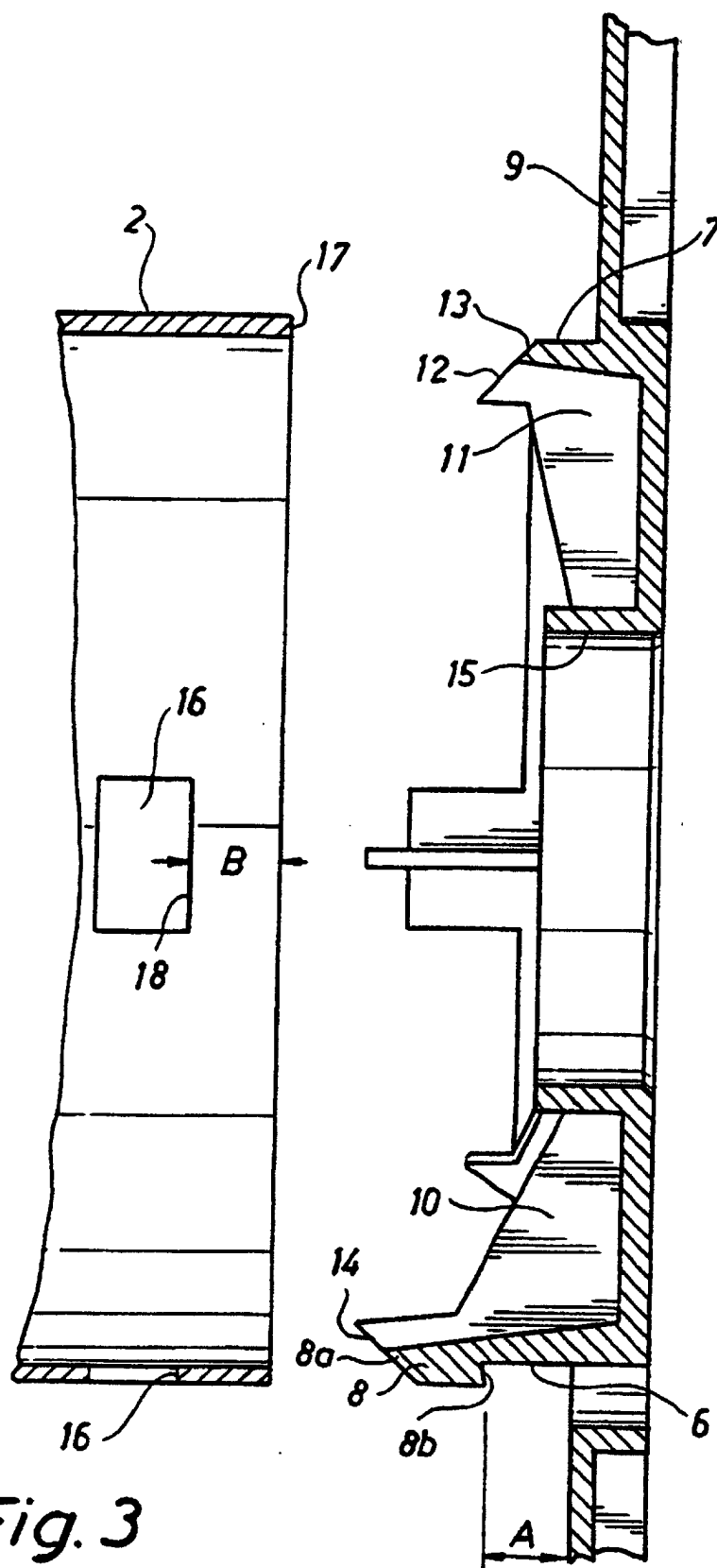


Fig. 2



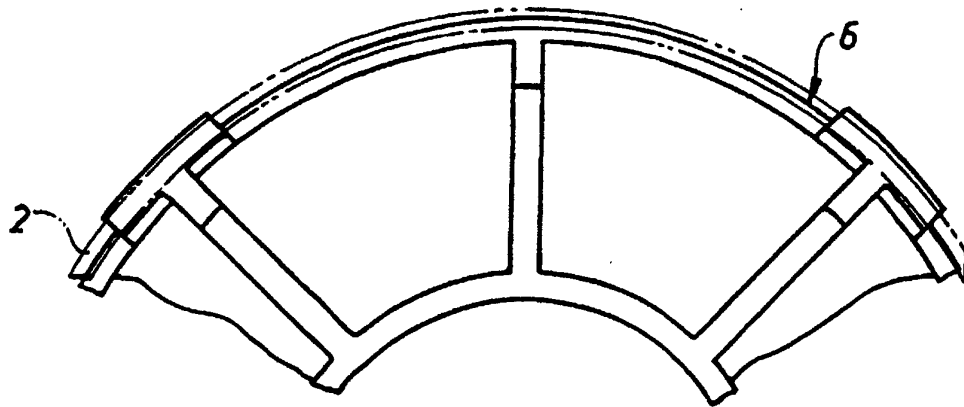


Fig. 4

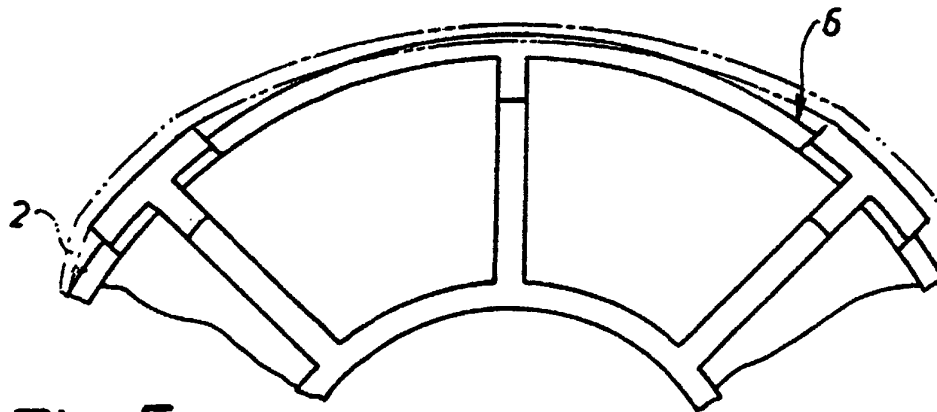


Fig. 5

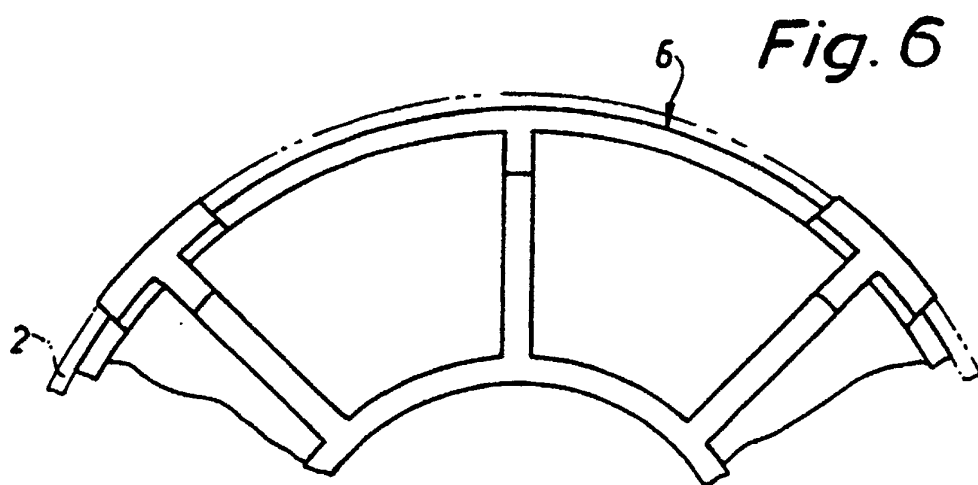


Fig. 6