(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 598 297 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
**17.01.2007 Bulletin 2007/03**

(51) Int Cl.:
***B65H 75/08*** *(2006.01)* ***B65D 85/672*** *(2006.01)*

(21) Application number: **04425350.8**

(22) Date of filing: **17.05.2004**

(54) **Core for rolls of sheet material**

Spulenkern für Bandmaterialrollen

Noyau pour rouleaux de bande

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
**AL HR LT LV MK**

(43) Date of publication of application:
**23.11.2005 Bulletin 2005/47**

(73) Proprietor: **Promopack SPA**
**25010 Montirone (Brescia) (IT)**

(72) Inventor: **Scotuzzi, Giovanni**
**25020 Gussago (Brescia) (IT)**

(74) Representative: **Petruzziello, Aldo et al**
**Racheli & C. S.p.A**
**Viale San Michele del Carso, 4**
**20144 Milano (IT)**

(56) References cited:
**EP-A- 0 729 911**
**DE-U- 8 713 881**
**FR-A- 1 258 421**
**US-A- 3 856 229**
**US-B1- 6 589 648**

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).

EP 1 598 297 B1

## Description

**[0001]** The present invention refers to a core for rolls of sheet material, in particular stretch film for packaging, such as LLDPE (linear low density polyethylene) film.

**[0002]** At present rolls of sheet material are generally wound on tubular cores made of cardboard or plastic, mainly of PVC (polyvinyl chloride).

**[0003]** The cores of the prior art have some drawbacks.

**[0004]** In fact, in order to be able to support the roll adequately, such cores are of great thickness with the result of an excessive waste of material, of a high core weight and of consequent transport problems.

**[0005]** PVC cores, besides being very expensive, have the drawback of not being compatible with other materials making up the roll, such as, for example, polyethylene; consequently they present known recycling problems.

**[0006]** Cardboard cores also present recycling problems because of the high silicate content. In addition, cardboard cores cannot be used in open environments because they suffer rapid deterioration due to damp.

**[0007]** Furthermore, cores according to the prior art often require additional plastic bushes, which are placed at the end of the core to allow the user to grip the core avoiding burning his/her hands because of sliding friction with the smooth surface of the core. Obviously the bushes add to the cost of the core.

**[0008]** US-A-3 856 229 and DE-U-8713881 disclose a core for rolls comprising a corrugated side wall with ribs oriented longitudinally. Such an arrangement does not provide stiffness and mechanical resistance to the radial stress exerted by a rolled film on the core.

**[0009]** The object of the present invention is to overcome the drawbacks of the prior art, providing a core for rolls of sheet material that is practical, inexpensive, simple to produce and at the same time able to ensure good stiffness and mechanical resistance to deformation.

**[0010]** Another object of the present invention is to provide such a core for rolls of sheet material that is compatible with the web of the roll and at the same time recyclable.

**[0011]** These objects are achieved in accordance with the invention with the characteristics listed in appended independent claim 1.

**[0012]** Advantageous embodiments of the invention are apparent from the dependent claims.

**[0013]** The core for rolls of sheet material according to the invention comprises a corrugated side wall. In this manner it is possible to save on the thickness of the material, which forms the core, at the same time ensuring an adequate stiffness and resistance to deformation of the core.

**[0014]** Further characteristics of the invention will be made clearer by the detailed description that follows, referring to a purely exemplary and therefore non limiting embodiment thereof, illustrated in the appended drawings, in which:

- Figure 1 illustrates a partially broken off perspective view of a core for rolls of sheet material according to the invention, and
- Figure 1A is an enlarged view of the detail enclosed in the circle A of Figure 1.

**[0015]** Figure 1 illustrates a core 1, substantially tubular, hollow on the inside and comprising a corrugated side wall 2. The corrugated side wall 2 has a plurality of annular ribs 3 which protrude radially outward alternating with a plurality of annular ribs 4 which protrude radially inward. The outer ribs 3 define annular spaces 30 inside the core 1 and the inner ribs 4 define annular spaces 40 outside the core 1.

**[0016]** With reference to Figure 1A, the outer ribs 3 and the inner ribs 4 have a substantially rectangular profile in axial section and the longitudinal dimension a of the outer ribs 3 is substantially equal to the longitudinal dimension a of the inner ribs 4. In this manner, the corrugated wall 2, seen in axial section, takes on a substantially square wave pattern. Purely by way of non limiting example, the longitudinal size a of each rib 3, 4 of the corrugated wall 2 can vary in the range from 3.4 mm to 3.8 mm. It is clear that the greater the density of ribs (3, 4) distributed over the length of the core 1, the smaller the longitudinal size a of the ribs and the greater the resistance to deformation of the core 1.

**[0017]** The length of the core 1 can be variable, according to requirements.

**[0018]** The thickness s of the corrugated side wall 2 of the core is fairly small. By way of example, the thickness s of the corrugated side wall 2 can range from 5 mm to 7 mm, depending upon some parameters, such as the material used, the core stiffness required and the density of the ribs (3, 4).

**[0019]** Two bush portions 5 are formed at the ends of the core 1. Each bush portion is defined by a substantially curved profile 6 on the outer side surface of the core 1. The bush portions 5 are of such a shape as to facilitate gripping of the core manually by the user.

**[0020]** The core 1 has an inside diameter $\phi_i$ defined by the inner ends of the inward protruding ribs 4 and an outside diameter $\phi_e$ defined by the outer ends of the outward protruding ribs 3.

**[0021]** The inside diameter $\phi_i$ is chosen according to the type of winding mandrel on which the core 1 is mounted. The outside diameter $\phi_e$, on the other hand, is chosen according to the stiffness, to the hardness and to the resistance of the material used to produce the core 1 and according to the overall weight of the roll which is wound on the core 1. Obviously, a great difference between the outside diameter $\phi_e$ and the inside diameter $\phi_i$ causes a weakening of the ribs 3 and 4 of the corrugated wall; on the other hand, a small difference between the outside diameter $\phi_e$ and the inside diameter $\phi_i$ causes a strengthening of the ribs 3 and 4 of the corrugated wall.

**[0022]** Purely by way of non-limiting example, the inside diameter $\phi_i$ can vary from 20 mm to 80 mm. In the

present invention four intermediate values for the diameter $\phi_i$, are preferably chosen, namely 25 mm, 38 mm, 50 mm and 76 mm.

**[0023]** In accordance with the inside diameter $\phi_i$, the outside diameter $\phi_e$, on the other hand, can vary according to the values set out in the table below:

| $\phi_i$ (mm) | $\phi_e$ (mm) |
|---|---|
| 25 | 34 - 37 |
| 38 | 47 - 50 |
| 50 | 59 - 63 |
| 76 | 85 - 95 |

**[0024]** In any case it should be noted that the core 1 according to the invention, thanks to the corrugated part 2, ensures a resistance to deformation and stiffness comparable with those of a conventional core having a considerably larger thickness, with a considerable saving in material for production of the core 1.

**[0025]** The core 1 according to the invention is preferably produced by extrusion of plastic materials. PE (polyethylene)-based materials and particularly LLDPE (linear low density polyethylene) are advantageously used. In this manner the core 1 is compatible with LLDPE films, thus even if it is in contact with some coils of the LLDPE film it is completely recyclable without any need to separate the two products.

**[0026]** Said PE core 1 presents the further advantage of also being able to be used outdoors and in damp environments since it does not suffer damp.

**[0027]** By way of example, the corrugated core 1 according to the invention weighs about 90 g compared with the 300 g of a conventional cardboard core and with the 480 g of a conventional PVC core. As a result, the corrugated core 1 according to the invention costs about one-third with respect to the conventional cardboard core and about one-ninth with respect to the conventional PVC core.

**[0028]** Numerous variations and modifications of detail within the reach of a person skilled in the art can be made to the present invention without thereby departing from the scope of the invention as set forth in the appended claims.

## Claims

1. A core (1) for rolls of sheet material with a corrugated side wall (2), **characterised in that** said corrugated side wall (2) comprises a plurality of annular ribs (3) protruding radially outward, alternating with a plurality of annular ribs (4) protruding radially inward.

2. A core (1) according to claim **1, characterised in that** said outward protruding ribs (3) define respective annular spaces (30) inside said core (1) and said inward protruding ribs (4) define annular spaces (40) outside said core (1).

3. A core (1) according to claim **1** or **2, characterised in that** said outer ribs (3) and said inner ribs (4) have a substantially rectangular profile in axial section, so that said corrugated wall (2) has a substantially square wave shape in axial section.

4. A core (1) according to any one of the preceding claims, **characterised in that** the thickness (s) of said corrugated side wall (2) is comprised in the range from 5 mm to 7 mm.

5. A core (1) according to claim **3** or **4, characterised in that** the longitudinal size (a) of said outer ribs (3) is substantially equal to the longitudinal size (a) of said inner ribs (4).

6. A core (1) according to claim **5, characterised in that** the longitudinal size (a) of said outer ribs (3) and of said inner ribs (4) is comprised in the range from 3.4 mm to 3.8 mm.

7. A core (1) according to any one of the preceding claims, **characterised in that** said corrugated wall (2) has an inside diameter ($\phi_i$) comprised between 20 mm and 80 mm.

8. A core (1) according to claim **7, characterised in that** said inside diameter ($\phi_i$) is chosen between the following values: 25 mm, 38 mm, 50 mm and 76 mm.

9. A core (1) ccording to any one of the preceding claims, **characterised in that** said corrugated wall (2) has an outside diameter ($\phi_e$) comprised between 34 mm and 95 mm.

10. A core (1) according to any one of the preceding claims, **characterised in that** it comprises, at least at one of its ends, a bush (5) defined by a substantially arched profile (6) to allow manual gripping by the user.

11. A core (1) according to claim **10, characterised in that** said bush (5) is made integral and in a single piece with said corrugated side wall (2).

12. A core (1) according to any one of the preceding claims, **characterised in that** it is produced by extrusion of plastic material.

13. A core (1) according to claim **12, characterised in that** it is made of PE (polyethylene)-based material.

14. A core (1) according to any one of the preceding claims, **characterised in that** it is used for winding

sheets of stretch packaging material, such as LLDPE (linear low density polyethylene).

**Patentansprüche**

1. Spulenkern (1) für Bandmaterialrollen mit einer gewellten Seitenwand (2), **dadurch gekennzeichnet, dass** die Seitenwand (2) eine Mehrzahl von radial nach außen hervorstehenden ringförmigen Rippen (3) umfasst, welche sich mit einer Vielzahl von radial nach innen hervorstehenden ringförmigen Rippen (4) abwechseln.

2. Spulenkern (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die nach außen hervorstehenden Rippen (3) jeweils ringförmige Räume (30) innerhalb des Spulenkerns (1) definieren und die nach innen hervorstehenden Rippen (4) ringförmige Räume (40) außerhalb des Spulenkerns definieren.

3. Spulenkern (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die äußeren Rippen (3) und die inneren Rippen (4) ein im axialen Querschnitt im Wesentlichen rechteckiges Profil aufweisen, so dass die gewellte Seitenwand (2) im axialen Querschnitt im Wesentlichen eine Rechteckwellenform aufweist.

4. Spulenkern (1) nach einem der vorhergehenden Ansprüche **dadurch gekennzeichnet, dass** die Stärke (s) der gewellten Seitenwand (2) den Bereich von 5 mm bis 7 mm umfasst.

5. Spulenkern (1) nach Anspruch 3 oder 4 **dadurch gekennzeichnet, dass** die Größe (a) der äußeren Rippen (3) in Längsrichtung im Wesentlichen der Größe (a) in Längsrichtung der inneren Rippen (4) entspricht.

6. Spulenkern (1) nach Anspruch 5, **dadurch gekennzeichnet, dass** die Größe (a) der äußeren Rippen (3) und der inneren Rippen (4) in Längsrichtung den Bereich von 3,4 mm bis 3,8 mm umfasst.

7. Spulenkern (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die gewellte Wand (2) einen Innendurchmesser (Φi) zwischen 20 mm und 80 mm umfasst.

8. Spulenkern (1) nach Anspruch 7, **dadurch gekennzeichnet, dass** der Innendurchmesser (Φi) aus den folgenden Werten ausgewählt wird: 25 mm, 38 mm, 50 mm und 76 mm.

9. Spulenkern (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die gewellte Wand (2) einen Außendurchmesser (Φe) zwischen 34 mm und 95 mm umfasst.

10. Spulenkern (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** dieser zumindest an einem seiner Enden eine Buchse (5) umfasst, die durch ein im Wesentlichen gebogenes Profil (6) definiert wird, welche eine manuelle Handhabung durch den Nutzer gestattet.

11. Spulenkern (1) nach Anspruch 10, **dadurch gekennzeichnet, dass** die Buchse (5) integral und einstückig mit der gewellten Wand (2) hergestellt ist.

12. Spulenkern (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** dieser durch Extrusion aus einem Kunststoff hergestellt ist.

13. Spulenkern (1) nach Anspruch 12, **dadurch gekennzeichnet, dass** dieser aus PE (Polyethylen) -basiertem Material hergestellt ist.

14. Spulenkern (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** dieser zum Aufwickeln von Bahnen dehnbaren Verpakkungsmaterials wie LLDPE (lineares Polyethylen niederer Dichte) verwendet wird.

**Revendications**

1. Noyau (1) pour rouleaux de matériau en bande, comportant une paroi latérale ondulée (2), **caractérisé en ce que** ladite paroi latérale ondulée (2) comprend une pluralité de côtes annulaires (3) saillant radialement vers l'extérieur alternant avec une pluralité de côtes annulaires (4) saillant radialement vers l'intérieur.

2. Noyau (1) selon la revendication 1, **caractérisé en ce que** lesdites côtes saillant vers l'extérieur (3) définissent des espaces annulaires respectifs (30) à l'intérieur dudit noyau (1) et lesdites côtes saillant vers l'intérieur (4) définissent des espaces annulaires respectifs (40) à l'extérieur dudit noyau (1).

3. Noyau (1) selon la revendication 1 ou 2, **caractérisé en ce que** lesdites côtes extérieures (3) et lesdites côtes intérieures (4) ont un profil sensiblement rectangulaire en section axiale, de sorte que ladite paroi ondulée (2) a une forme ondulée sensiblement carrée en section axiale.

4. Noyau (1) selon l'une quelconque des précédentes, **caractérisé en ce que** l'épaisseur (s) de ladite paroi latérale ondulée (2) est comprise dans la plage de 5 mm à 7 mm.

5. Noyau (1) selon la revendication 3 ou 4, **caractérisé en ce que** la dimension longitudinale (a) desdites côtes extérieures (3) est sensiblement égale à la di-

mension longitudinale (a) desdites côtes intérieures (4).

**6.** Noyau (1) selon la revendication 5, **caractérisé en ce que** la dimension longitudinale (a) desdites côtes extérieures (3) et des desdites côtes intérieures (4) est comprise dans la plage de 3,4 mm à 3,8 mm.

**7.** Noyau (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite paroi ondulée (2) a un diamètre intérieur (Φi) compris entre 20 mm et 80 mm.

**8.** Noyau (1) selon la revendication 7, **caractérisé en ce que** ledit diamètre intérieur (Φi) est choisi entre les valeurs suivantes : 25 mm, 38 mm, 50 mm et 76 mm.

**9.** Noyau (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite paroi ondulée (2) a un diamètre extérieur (Φe) compris entre 34 mm et 95 mm.

**10.** Noyau (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**il comprend, à au moins une de ses extrémités, une bague (5) définie par un profilé sensiblement arqué (6) pour permettre une saisie manuelle par l'utilisateur.

**11.** Noyau (1) selon la revendication 10, **caractérisé en ce que** ladite bague (5) fait partie intégrante et constitue une seule pièce avec ladite paroi latérale ondulée (2).

**12.** Noyau (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**il est produit par extrusion de matière plastique.

**13.** Noyau (1) selon la revendication 12, **caractérisé en ce qu'**il est composé de matériau à base de PE (polyéthylène).

**14.** Noyau (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**il est utilisé pour enrouler des bandes de matériau d'emballage étirable, comme du LLDPE (polyéthylène à faible densité linéaire).

FIG.1

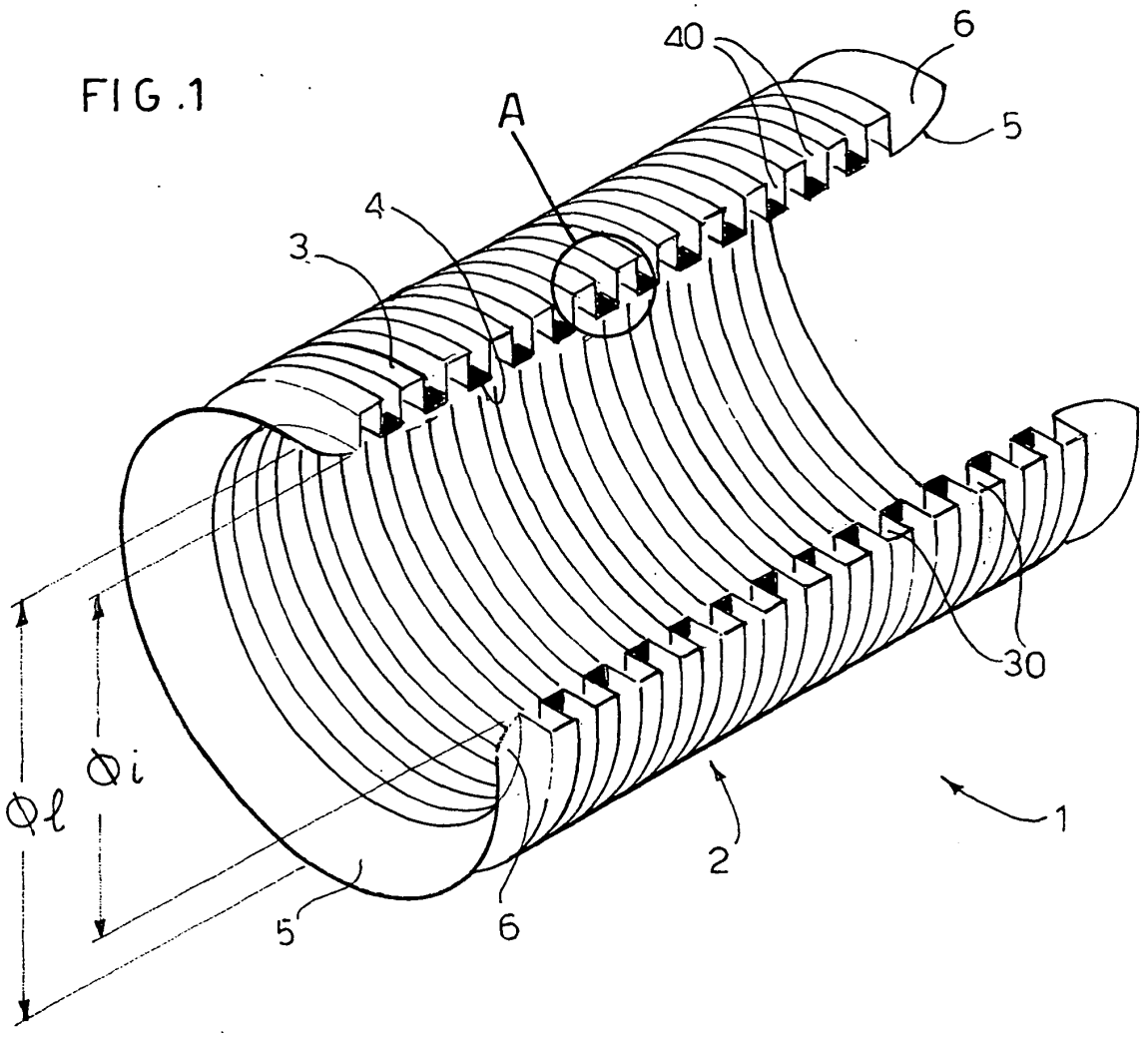



FIG.1A

