Abstract: Single packed roll product comprising: a roll (10) of web material having a cylindrical shape with a cylinder barrel (13) and opposite first (11) and second (12) ends, wherein the web material is to be fed from the center of the roll; a wrapper (14) covering at least part of the cylinder barrel (13) and at least part of both the ends (11, 12); and a first disc-shaped stability imparting member (15) disposed between the wrapper (14) and the first end (11) of the roll; characterized by a second disc-shaped stability imparting member (16) disposed between the wrapper (14) and the second end (12) of the roll and at least one connecting member (17) connecting the first (15) and second (16) disc-shaped stability imparting members.
Single packed roll product

TECHNICAL FIELD

The present invention relates to a single packed roll product, wherein a roll of web material, such as tissue paper or non-woven is packaged by means of a flexible wrapper or wrapping. Web material made of tissue paper or non-woven has many uses, for example as wipes or towels. Even more particularly, the invention relates to a roll product which enables that individual portions of the web material may be dispensed from the roll interior without the necessity of placing the roll product in a dispenser, specifically designed for this purpose.

BACKGROUND

WO-A-2007/124473 describes such a single packed roll product in which a roll of web material is wrapped by means of a plastic film tightly encasing the circumferential surface of the roll, thereby increasing axial stiffness of the product and protecting the roll from becoming wet or soiled. To preserve the axial strength and the cylindrical shape of the roll even if web material is removed from the roll and the residual amount of web material is low, a rigid disc is disposed between a first end of the roll and the wrapper.

Even though the container thus described works well for its intended purpose, it has been found that the wrapper at the second end of the roll opposite to the rigid disc may become damaged during transportation, storage and use of the product, thereby increasing the risk that the roll may become wet and soiled at its second end.
Even further, it has been found that the more of the web material is depleted, the higher the risk that the roll will collapse losing its stability. Such risk is even further increased if the product is provided with a handle making the product portable.

BRIEF DESCRIPTION OF THE INVENTION

Accordingly, it is the object of the present invention to provide a single packed roll product as described above, which is improved regarding the protection of the roll from the elements as well as regarding its stability even if the residual amount of web material during use becomes low.

This object is solved by a single packed roll product as defined in claim 1. Embodiments of the present invention are named in the dependent claims. Further features of the invention are named in the following brief description of the invention as well as the description of a particular embodiment.

The single packed roll product of the invention comprises a roll of web material. The roll may be a coreless roll. A coreless roll is a roll consisting of the web material only without a core made of stiff material such as cardboard. The web material may be of any type but preferably is tissue paper or non-woven. The web material may be continuous or comprise a plurality of transverse perforations or weakenings facilitating separation of the web material into individual portions. The roll has a cylindrical shape with a cylinder barrel and opposite first and second ends, i.e. a top and a bottom. The roll product is configured to dispense the web material of the roll starting from the center of the roll, thus relating to a so-called center feed roll. Further, the roll product is configured to enable individual portions of the web material to be removed from the roll interior without the necessity of placing the roll in a particular dispenser.
In other words, the roll product of the present invention provides a cost effective light weight and protective web material dispensing system.

Accordingly, a wrapper is provided which covers at least part of the cylinder barrel (i.e. the circumferential side) and at least part of both the top and the bottom. However, it is preferred that the wrapper tightly encases the entire cylinder barrel and/or the entire ends of the roll. The wrapper is preferably flexible and may for example be made of a plastic film, paper or other suitable material. Preferably, the wrapper is made of a water-resistant material and may be partially or fully transparent. Even more preferred, the wrapper is a shrink packaging even though also stretch packaging or other packaging techniques and equipment may be employed.

Further, a first and second disc-shaped stability imparting member is disposed between the wrapper and the first end and the second end of the roll, respectively. The first and second stability imparting member may be a rigid disc and may be made from any material that is capable of imparting a certain stability and rigidity to the roll product. The preferred material is corrugated board but any appropriate material such as plastic, stiff paper, cardboard, etc. may be used. The term "rigid" as used herein in connection with the disc-shaped stability imparting members means that is should be sufficiently rigid so as to spread downwardly directed axial loads across the first and second ends of the roll to withstand bending or tearing during use and storage of the roll product and particularly maintain its shape under radially inwardly directed forces tending to collapse the cylindrical shape of the roll of web material once the web material of roll is nearly depleted. The stability imparting members may have a circular or annular shape. It is, however, also conceivable that the members have a polygonal shape approximating the shape of a circle. Further, the
largest dimension, e.g. the diameter of the stability imparting members (when circular or annular the diameter) should be less than the largest dimension (diameter) of the roll in its original condition, that is before use. This prevents the wrapper from becoming damaged in the packaging process by the edge of stability imparting members. In this context, the circular shape is preferred, because it has no corners that may increase the risk of damaging the wrapper.

Further and according to the present invention, the first and second disc-shaped stability imparting members are connected by at least one connecting member. Even though only one connecting member is preferred in view of the packaging process, two or more separate connecting members are possible. The connecting member may as well be rigid and is preferably made of the same material as the stability imparting members. In this context, the term "rigid" means that the connecting member should be sufficiently rigid to maintain the distance between the stability imparting members and to withstand bending or tearing during use and storage of the roll product and particularly to maintain said distance under axially directed forces, torsion or bending forces.

By means of the two stability imparting members disposed at the ends of the roll and the connecting member functioning as a spine and keeping the distance between the stability imparting members, the overall stability of the roll product is increased, particularly when compared to the prior art described in the introduction. In this context, the connecting member is configured to primarily take up axial and torsion forces, whereas the stability imparting members primarily provide for radial stability. Further, disposing the stability imparting members at both ends of the roll provides for protection in case the wrapper does not completely cover the ends of the roll and/or is damaged in those regions. For this reason, the protection of the ends
of the roll is improved particularly when compared with the prior art named in the introduction.

According to one preferred embodiment of the present invention, the connecting member and the first and second disc-shaped stability imparting members are integrally formed in one piece preferably of the same material. This configuration enables a cost-efficient production of the unit consisting of the stability imparting members and the connecting member and also improves handling and storage at the manufacturing site.

In this context, it is conceivable to die-cut this unit from a blank of material. In order to fold the stability imparting members against the ends of the roll in the manufacturing process so as the extend perpendicular to the longitudinal extension of the connecting member, it is preferred to connect the stability imparting members via folding lines to the connection member. This folding line may be linear. Alternatively, it is as well conceivable to provide a curved folding line flush with the circumference of the stability imparting member. Thus, no corners are formed at the ends of the folding line in the folding process as compared to the use of a straight folding line. It may also be conceivable to have longitudinal creases or embossings at the connecting member to facilitate bending or curving thereof so that the connecting member assumes a curved shape in cross-section transverse to its longitudinal direction.

The connection member is selected regarding its width, particularly when selecting a straight folding line, so that the width is equal to or less than the radius of the paper roll in its original condition, i.e. before use. This width is particularly selected so that when the connecting member with its longitudinal extension perpendicularly intersects with the disc-shaped stability imparting members at e.g. a
folding line, the formed corners are small enough to not penetrate and damage the wrapper.

On the other hand, the width of the connection member should be sufficient to provide the intended rigidity (see above). Thus, the minimum width depends on the material used for the connecting member and its stiffness. The minimum width further depends on the size and/or weight of the roll product. In this context, both the material and the dimensions of the disc-shaped stability imparting members as well as the connecting member should be selected so that the roll product should withstand a drop test at 70% of its weight in its original condition (i.e. before use) from a height of 1 m with a vertical orientation of the roll product at least 10 times without imparting its original cylindrical shape.

In this connection, it has been proven that the width of the connection member particularly when using corrugated board as material should be more than 1 cm, preferably more than 2 cm and even more preferred more than 3 cm. This minimum width has been proven to fulfill the requirements for the intended purpose (drop test above) of one particular example, wherein the unit of the discs and the connecting member was made of corrugated board and the roll had a diameter of 19 cm and a height of 20 cm and the entire roll product weighted about 1.3 kg in its condition before use. In this example, the diameter of the discs was about 18.5 cm and, therefore, less than the diameter of the roll in its original condition before use. In other examples it may well be conceivable that the minimum width is less than 1 cm.

According to an even further embodiment, it is preferred to provide a handle to the roll product making it portable. The handle may be fixed to the wrapper preferably by means of adhesive or any other suitable material. The handle may, however, as well be fused or welded to the wrapper. The
handle may be made of a flexible material. The ends of the handle may, particularly in this case, be provided with an adhesive layer in order to adhere the ends to the wrapper. The handle may well be made of a composite material having a film-like or tape-like part as well as a reinforcing part made of paper. For example, the tape-like part may be made of the same material as the wrapper for recycling purposes such as a plastic film. This plastic film may for example be reinforced by a paper layer partially or fully extending along the plastic film. The handle may be fixed to the wrapper at any position but preferably is fixed at opposite ends to the wrapper at a portion coextensive with the first and second ends of the roll, respectively.

Once the paper product is carried by means of the handle, the risk exists that a bending force is applied to the roll of web material with the result that the roll collapses, particularly in cases in which a certain amount of web material has already been dispensed from the roll. In order to prevent or reduce this risk, it is preferred that the handle extends at least partly coextensive with the connecting member so that the forces when carrying the roll product by means of the handle are taken up by the connecting member and/or the stability imparting members.

In order to enable that the web material may be dispensed from its center at least one of the first and second disc-shaped stability imparting members has a dispensing opening. The dispensing opening is preferably disposed in the center of the corresponding stability imparting member. If both stability imparting members have the dispensing opening, the roll product is symmetric and the user may use it in opposite vertical orientations, wherein either of the first and second ends may form the top and the bottom, respectively.

Preferably the dispensing opening has the shape of a square or triangle with inwardly curved legs. In this connection,
"inwardly curved" means that the legs are convex toward the center of the square or triangle. This configuration has been proven advantageous because the web material will be clamped (held) in the corners of the dispensing opening to prevent the web material from falling back through the dispensing opening after a portion of web material has been separated from the roll.

Further, the dispensing opening should be configured as big as possible, but not bigger than the hole/void in the center of the roll of web material. In particular, the dispensing opening is configured so that at least one corner of the square or triangle is situated in plan view within the area defined by the void of the roll (i.e. above the void). Preferably, the circle contacting (through) the corners of the square or triangle, the center of the circle and the center of the square or triangle being congruent, has a diameter equal to or smaller than the diameter of the void in the center of the roll in its original condition, that is before use. The dispensing opening is, however, configured as big as possible to allow easy access to the roll but not bigger than the void in the center of the roll in its original condition to provide sufficient coverage of the roll to obtain the effects of the present invention and particularly enable spreading of the forces in a radial direction and axial direction over the entire end surface of the roll.

The wrapper may have a reclosable opening. The opening may either be covered by a lid or a label or other reclosable member such as a tape. It extends at least partially coextensive with the dispensing opening of the stability imparting member. Alternatively, the wrapper may be pierceable to form such opening. In this instance, it may be conceivable to also provide a label or other means enabling closing of the opening once it has been formed by piercing.
the wrapper. The piercing may even be assisted by forming a perforation or other weakening in the wrapper.

According to a further embodiment of the present invention and in order to further increase the stability and prevent collapsing of the roll, it may be conceivable to fix the first and/or second disc-shaped stability imparting members to the first or second end of the paper roll respectively. This may be achieved by tapes taping the stability imparting members at their circumferential portions to the cylinder barrel of the roll. Alternatively, the face of the disc-shaped stability imparting members facing the first and second ends of the roll may at least in portions be provided with an adhesive to glue said face to the respective ends of the roll.

According to an even further embodiment, a radially extending cutout may be provided in one or both of the first and second disc-shaped stability imparting members to provide an indicator relating to the residual amount of web material on the roll. By means of such cutout, the user can visually monitor how many web material remains on the roll and when to purchase a new one.

BRIEF DESCRIPTION OF THE DRAWINGS

Further features and advantages of the present invention which may be combined with one or more of the features named above as long as the features do not contradict each other are described in the following description of a preferred embodiment. This description refers to the accompanying drawings, in which

Figure 1 shows a perspective view of a roll product according to an embodiment of the present invention with the roll product being placed on the side corresponding to one end of the roll;
Figure 2 shows a perspective of the roll product of Figure 1 placed on a side corresponding to the cylinder barrel of the roll;

Figure 3 shows a plan view of the unit consisting of the first and second disc-shaped stability imparting members and the connecting member as used in the product shown in Figures 1 and 2.

Figure 4 shows a plan view of the handle as used in the product shown in Figures 1 and 2.

DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

The roll product of Figure 1 is a single packed roll product comprising a roll 10 of web material, particularly tissue paper or non-woven. The web material is rolled so that the roll has a cylindrical shape with first and second ends 11 and 12 and a cylinder barrel 13. In Figure 1 the end 11 (first end) forms the top, whereas the second end 12 forms the bottom. Further provided is a transparent wrapper 14 which is formed in this embodiment by a plastic film, particularly a shrink film. In this embodiment, the wrapper 14 completely encases the entire roll including the cylinder barrel and the ends.

A first circular rigid disc 15 is disposed between the first end 11 of the roll and the wrapper 14, one face of the disc 15 being in contact with the first end 11 of the roll 10. A second rigid and circular disc 16 is disposed between the wrapper 14 and the second end 12 of the roll 10 as is best visible from Figure 2. The face of the second rigid disc 16 is also in contact with the second end 12 of the roll.

As is also visible from Figures 2 and 3, the two discs 15 and 16 are connected by a connecting member 17 extending with its
longitudinal extension parallel to the center axis of the roll 10. The connecting member is integrally formed with the discs 15 and 16 in one piece of material. The discs 15, 16 and the connecting member 17 are separated via folding lines 18 enabling folding of the discs 15 and 16 relative to the connecting member 17 so as to extend perpendicular to the longitudinal extension of the connecting member 17. The folding lines 18 in the embodiment are formed by straight lines. Thereby small corners 19 are formed at the transition between the discs 15 and 16 and the connecting member 17 upon said folding (see Figure 2).

The width W in a direction transverse to the longitudinal direction (extension) of the connecting member 17 is, thus, selected so that the corners 19 may be kept as small as possible in order to prevent piercing of the wrapper 14 in the region of the corners 19. In one particular example, the length L of the connecting member 17 in the longitudinal direction may be 20 cm, whereas the width W may be 5 cm. In one particular embodiment, the unit of the discs 15 and 16 and the connecting member 17 is made of corrugated board and the roll has a diameter of 19 cm and a height of 20 cm and the entire roll product weights about 1.3 kg in its condition before use. In this example, the diameter of the discs 15 and 16 should be about 18.5 cm and, therefore, less than the diameter of the roll in its original condition before use. Thus, the ratio of the length L and the width W of the connecting member 17 is about 4 and should be 4 or less.

It has been proven advantageous that the width should not be more than half the diameter that is not more than 9.5 cm in case of the above-mentioned roll with a diameter of 19 cm. However, the width should be more than 1 cm of the roll. The minimum width is directed by the rigidity to be provided by the connecting member as regards torsion, axial forces and bending forces particularly when carrying the roll product by means of the handle (see later). The maximum width is
primarily governed by preventing corners 19 in regard of possible damaging of the wrapper 14. If a curved folding line is employed, the width may even be broader than above-mentioned as so corners will be formed.

As is best visible from Figure 3 in combination with Figure 1, the disc 15 is provided with a dispensing opening 22. The dispensing opening has a rectangular shape with curved legs 20 (star-shape), wherein the circle 21 connecting (through) the corners of the square is equal to or smaller than the void (not shown) in the center of the roll 10 in its original condition before use. Thereby, it may be ensured that at least one of the corners of the square is situated in plan view above the void in the center of the roll. This enables that a user can easily grip the inner end of the web material and extract the end through the dispensing opening 22 at the same time providing sufficient surface contact between the face of the disc 15 and the end 11 of the roll in order to increase stability and maintain the shape of the roll even if a certain amount of web material is dispensed. Moreover, the web material may be held in the corners of the dispensing opening to prevent the web material from falling back through the dispensing opening 22 after separation of a portion of the web material during use.

Further, a radially extending, preferably longitudinal cutout 23 is provided in the disc 15 which serves as an indicator for visually indicating the residual amount of web material on the roll so that the user can recognize in advance when the roll is completely depleted.

The discs 15 and 16 may be connected to the roll 10. This may either be achieved by adhering a tape to the upper faces of the respective discs 15 and 16 at their peripheral region and to the cylinder barrel 13 of the roll 10. Alternatively, it may also be conceivable to provide and adhesive on the faces of the discs 15 and 16 in contact with the ends 11 and
12 of the roll. The adhesive is provided particularly in the peripheral region, but may extend over the entire face. Fixing the discs to the roll further assists keeping the cylindrical shape of the roll when a certain and particularly a high amount of web material is already dispensed.

Furthermore, a flexible handle 24 is provided which is adhered to the wrapper in a portion coextensive with the first and second discs 15 and 16. Particularly, only the ends 25 of the handle 24 are adhered to the wrapper 14 (see Figure 4). The handle 24 extends between its ends coextensive with the connecting member 17 as may be best seen from Figure 2. Thus, when carrying the roll product by means of the handle 24, any bending forces are absorbed by the connecting member 17 and the discs 15 and 16.

Before use, the wrapper is completely closed even in the region coextensive with the dispensing opening 22. In order to use the product, a user needs to pierce the wrapper 14 in that region but pressing a thumb against the wrapper 14 and through the dispensing opening 22. Thereby, the wrapper ruptures and the user may extract the inner end of the web material through the dispensing opening and the pierced part of the wrapper for use. Subsequently, it may be conceivable to loosen a label disposed at the outer surface of the wrapper and use it for reclosing the pierced opening in the wrapper 14.

Moreover, a label 26 may be provided at the outer surface of the wrapper 14 by adhesive. Alternatively, the label 25 may as well be disposed between the wrapper 14 and the cylinder barrel 13 of the roll 10 without being particularly fixed.

As described above, the single packed roll product of the present invention provides a packaged roll product that may because of its packaging be used without the need of placing the product in a separate dispenser. In addition, it
provides a product that is stable even though it is portable and even in cases in which a large amount of web material has already been dispensed. Further and even if the wrapper 14 is damaged at the upper or lower side coextensive with the ends 11 and 12 of the roll 10, the discs 15 and 16 prevent the roll from becoming wet or soiled and, thus, provide for a further protection against the elements.
1. Single packed roll product comprising:
   a roll (10) of web material having a cylindrical shape
   with a cylinder barrel (13) and opposite first (11) and
   second (12) ends, wherein the web material is to be fed from
   the center of the roll;
   a wrapper (14) covering at least part of the cylinder
   barrel (13) and at least part of both the ends (11, 12); and
   a first disc-shaped stability imparting member (15)
   disposed between the wrapper (14) and the first end (11) of
   the roll;
   characterized by
   a second disc-shaped stability imparting member
   (16) disposed between the wrapper (14) and the second end
   (12) of the roll and
   at least one connecting member (17) connecting the
   first (15) and second (16) disc-shaped stability imparting
   members.

2. Roll product according to claim 1, wherein the first and
   second disc-shaped stability imparting members (15, 16) and
   the connecting member (17) are integrally formed in one
   piece.

3. Roll product according to claim 2, wherein a folding
   line (18) is provided between the connecting member (17) and
   the first and/or the second disc-shaped stability imparting
   member.

4. Roll product according to any one of the preceding
   claims, wherein the width (W) of the connection member (17)
   is not more than the radius of the roll (10) in its original
   condition.

5. Roll product according to any one of the preceding
   claims, wherein the width (W) of the connection member (17)
is more than 1 cm, preferably more than 2 cm and even more preferred more than 3 cm.

6. Roll product according to any one of the preceding claims, wherein the roll product further comprises a handle (24).

7. Roll product according to claim 6, wherein the handle (24) extends at least partly coextensive with the connecting member (17).

8. Roll product according to claim 6 or 7, wherein the handle (24) is made of flexible material.

9. Roll product according to any one of the preceding claims, wherein at least one of the first and second disc-shaped stability imparting members (15, 16) has a dispensing opening (22).

10. Roll product according to claim 9, wherein the dispensing opening (22) has the shape of a square or triangle with inwardly curved legs (20).

11. Roll product according to claim 10, wherein at least one of the corners of the square or triangle is situated in plan view within the area of a void in the center of the roll in its original condition.

12. Roll product according to claim 10 or 11, wherein the circle (2) contacting the corners of the square or triangle has a diameter equal to or smaller than the diameter of a void in the center of the roll in its original condition.

13. Roll product according to any one of claims 9 to 12, wherein the wrapper (14) has a reclosable opening at least partly coextensive with the dispensing opening or is
pierceable to from an opening at least partly coextensive with the dispensing opening.

14. Roll product according to any one of the preceding claims, wherein at least one of the first and second disc-shaped stability imparting members (15, 16) is fixed to the first or second end (11, 12) of the paper roll, respectively.

15. Roll product according to any one of the preceding claims, wherein at least one of the first and second disc-shaped stability imparting members (15, 16) has a radially extending cutout (23) for visually indicating the residual amount of web material on the roll.
PCT
INTERNATIONAL SEARCH REPORT
(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference FOR FURTHER ACTION see form PCT/ISA/210 (first sheet) (July 2009)
156381aa/ans
International application No.
PCT/EP2012/061563

International filing date (day/month/year)
18/06/2012
(Earliest) Priority Date (day/month/year)

Applicant
SCA HYGIENE PRODUCTS AB

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.
X it is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report
   a. With regard to the language, the international search was carried out on the basis of:
      X the international application in the language in which it was filed
      I a translation of the international application into ________, which is the language
         of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b))
   b. □ This international search report has been established taking into account the rectification of an obvious mistake
      authorized by or notified to this Authority under Rule 91 (Rule 43.6E>3(a)).
   c. □ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. i.

2. □ Certain claims were found unsearchable (See Box No. II)

3. □ Unity of invention is lacking (see Box No III)

4. With regard to the title,
   X the text is approved as submitted by the applicant
   I the text has been established by this Authority to read as follows:

5. With regard to the abstract,
   X the text is approved as submitted by the applicant
   I the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant
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6. With regard to the drawings,
   a. the figure of the drawings to be published with the abstract is Figure No. 1, 2
      □ as suggested by the applicant
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      □ as selected by this Authority, because this figure better characterizes the invention
   b. □ none of the figures is to be published with the abstract

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## INTERNATIONAL SEARCH REPORT

**PCT/EP2012/061563**

### A. CLASSIFICATION OF SUBJECT MATTER

INV. B65D83/08

### ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65D

### Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>wo 2007/124473 A2 (SELLARS ABSORBENT MATERIALS IN [US]; SELLARS JOHN C [US]; BALLAS JERRY) 1 November 2007 (2007-11-01) cited in the application claims 1, 2</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>DE 94 09 907 Ul (LOHMANN GMBH &amp; CO KG [DE]) 18 August 1994 (1994-08-18) figure 2</td>
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<td>A</td>
<td>DE 33 45 977 Al (KEI ENBURG GUENTER) 27 June 1985 (1985-06-27) page 10, paragraph 2 - page 11, paragraph 1; figure 2</td>
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**Date of the actual completion of the international search**

1 March 2013

**Date of mailing of the international search report**

11/03/2013

**Name and mailing address of the ISA**

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<td>14-01-2009</td>
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<td>US 2008017750 A1</td>
<td>24-01-2008</td>
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<td>WO 2007124473 A2</td>
<td>01-11-2007</td>
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