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(71) Applicant: **Ideepak Holding B.V.**
6039 AP Stramproy (NL)

(72) Inventor: **Aquarius, Pieter Theodorus Joseph**
3640 Kinrooi (BE)

(74) Representative: **Hatzmann, Martin et al**
Vereenigde
Johan de Wittlaan 7
2517 JR Den Haag (NL)

(54) **Device and method for dispensing a deformable web**

(57) Apparatus for dispensing a deformable web, comprising a transport element (5; 105) rotatable under the influence of a drive, and a web guide (11; 111) disposed opposite thereto, wherein the transport element (5; 105) and the web guide (11; 111) are arranged to cooperate, for the purpose of transport and deformation

of the web, wherein the drive (7) is fully integrated into the transport element (5; 105).

Further, the invention provides a method for dispensing a web.

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Description

[0001] The invention relates to an apparatus for dispensing a deformable web.

[0002] Such an apparatus is known per se from the prior art, see for instance WO2005/102677. The web created by this apparatus is for instance used as filler, for instance a cushion material, to fill up packages.

[0003] Disadvantages of known apparatuses are that they are relatively slow, sizeable, noisy and susceptible to trouble. The present invention contemplates an improved apparatus.

[0004] According to an aspect of the invention, the apparatus is characterized by the features of claim 1.

[0005] The apparatus for dispensing a deformable web advantageously comprises a preferably cylinder-shaped transport element rotatable under the influence of a drive, and a web guide disposed opposite thereto, the transport element and the web guide being arranged to cooperate, for the purpose of transport and deformation of the web.

[0006] According to a first aspect, the drive is completely integrated into the transport element. In this way, particularly fast, a web can be dispensed, and thereby deformed, for instance folded and/or creased. In addition, the present apparatus is relatively durable, and can be manufactured from few components. The number of components moving during use can be limited to a minimum. Further, an aspect of the invention provides for use of a cylinder-shaped transport element. With such a shape, high dispensing speeds can be achieved, in a reliable manner, in particular in that the cylinder-shaped transport element can engage the web over a relatively large contact surface. Particularly advantageous is an embodiment where both a cylinder-shaped transport element and a drive integrated therein are provided.

[0007] If the drive is completely integrated into the transport element, further, a particularly compact apparatus can be obtained, for instance without projecting parts. Use of a separate transmission, moreover, can thus be avoided, so that extra durable, easy-to-maintain and energy-efficient apparatus is achieved. The drive can for instance comprise a tube motor.

[0008] Advantageously, an outside of the transport element may be provided with friction enhancing projections. The projections (for instance relatively blunt studs) can ensure high web throughput speeds, and moreover bring about web deformation (for instance folding and/or crumpling) during web feed-through.

[0009] At least the outside of the transport element is preferably manufactured from friction enhancing material, in particular resilient friction enhancing material, in particular rubber.

[0010] According to a further elaboration, the apparatus is provided with a housing, arranged to hold a web to be dispensed. The housing is then preferably provided with an inner space which can be substantially closed off from an environment, arranged to fully enclose a web to be dispensed. Thus, the housing can properly protect the

web to be dispensed from unwanted ambient influences, such as moisture or manipulation, and moreover afford safety to bystanders during use of the apparatus. It is then further preferred if the housing is provided with at least one transparent wall, via which wall for instance the contents (web to be dispensed) are visible for the purpose of inspection.

[0011] A particularly advantageous embodiment of the apparatus is provided with a number of walls (for instance a front wall, rear wall, and sidewalls extending therebetween), which walls are provided with wall parts obliquely converging towards each other, extending to a web dispensing area. During use, inner sides of these wall parts may already provide for a web guidance, and/or a web deformation. In addition, in this way, a stable apparatus can be obtained, having a relatively high stiffness and strength, utilizing relatively lightweight wall materials. The walls mentioned can for instance be made of plastic, Plexiglas, glass, or the like, for instance from plastic plate material. The invention is not limited to these materials; other options include use of walls manufactured, for instance, from metal, an alloy, wood and/or the like.

[0012] A particularly compact, relatively low-noise apparatus is obtained when the housing is provided with an upper edge which surrounds a web passage, the housing being preferably provided with a cover structure which holds the transport element and the web guide, and preferably the drive, at a level above the upper edge.

[0013] Preferably, the transport element and the drive during operation are situated in or under the cover structure, at least under an upper wall of the apparatus defined by the cover structure.

[0014] A preferred embodiment comprises an apparatus designed to draw a web from a stationary web roll and dispense it. The apparatus may in particular be provided with a support to support a side of the web roll. Such a support can moreover afford stability to the apparatus, whether or not utilizing a web roll mass carried by the support. A weight of the web roll may for instance be active centrally on the apparatus during use.

[0015] The present invention furthermore concerns an advantageous method for dispensing a web, utilizing an apparatus according to the invention, wherein a web roll and the apparatus are disposed stationarily with respect to each other, wherein a web end of the stationary web roll is passed along the transport element and the web guide, wherein the drive imparts rotation to the transport element for dispensing the web. Preferably, a roll holder provided with the web roll is provided, with the roll holder being opened and brought into a position cooperating with the apparatus, to load the apparatus with the web roll.

[0016] The present invention furthermore concerns an advantageous method for dispensing a web, for instance utilizing an apparatus according to the invention, wherein a rotating cylinder-shaped web transport element and a stationary web guide cooperate with each other to deform, and further discharge, a web passed between

them.

[0017] Further advantageous elaborations of the invention are described in the subclaims. Presently, the invention will be further elucidated on the basis of exemplary embodiments and the drawing. In the drawing:

Fig. 1 shows a perspective drawing of a first exemplary embodiment of the invention;

Fig. 2 shows a side elevational view of the example shown in Fig. 1;

Fig. 3 shows a front elevational view of the example shown in Fig. 1;

Fig. 4 shows a top plan view of the example shown in Fig. 1;

Fig. 5 shows a perspective drawing of a second exemplary embodiment of the invention; and

Fig. 6 shows a detail of the second example, in a vertical section.

[0018] The same or corresponding features in this application are designated with the same or corresponding reference signs.

[0019] Fig. 1 shows an example of an apparatus 1 for dispensing a deformable web. The web W to be deformed in the example is manufactured from paper, and is creasable and foldable. The dispensed web can for instance have utility as dunnage, for instance a cushion material, to fill up packages.

[0020] The apparatus 1 is provided with a housing 10, arranged to hold the web W to be dispensed. The present housing 10 is provided with an inner space which can be substantially closed off from an environment, arranged to fully enclose the web W to be dispensed, for instance to increase safety of use of the apparatus, and to protect the web W. In this example, the housing 10 can receive the web W in a rolled-up condition, as a paper roll R.

[0021] Preferably, the housing 10 is manufactured wholly from plastic, and preferably with substantially closed walls 10a, 10b, 10c, 10d, 10e having a thickness of less than 1 cm, so that a relatively lightweight apparatus 1 can be obtained. By the use of a space that during use is substantially closed off (by a housing 10) from an environment, to hold paper web W to be dispensed, the apparatus 1 can be active in a relatively low-noise manner, at high web dispensing speeds.

[0022] The housing 10 may be provided with a front wall 10a, rear wall 10b, and opposite sidewalls 10c, 10d extending therebetween. The walls 10a, 10b, 10c, 10d in this case are provided with tapering wall parts 10at, 10bt, 10ct, 10dt extending towards an upper edge TR situated at a web dispensing area. The upper edge TR of the housing 10 (comprising upper edges of the tapering wall parts) surrounds a web passage.

[0023] The paper roll R during use extends between the walls 10a, 10b, 10c, 10d, on the bottom 10e and below the (horizontal) level of the tapering wall parts 10at, 10bt, 10ct, 10dt.

[0024] The bottom 10e forms a support for supporting

a side of the web roll R, in particular such that a centerline of the web roll R extends at right angles to a centerline of the transport element 5 already mentioned. In the example, web W during use is unwound from a radially inner part of the roll R (i.e. the roll R is unwound from the inside to the outside).

[0025] A roll supporting face defined by the bottom 10e is for instance larger than a web passage defined by the apparatus, situated opposite that support 10e, near a transport element 5 to be further discussed hereinafter.

[0026] The tapering wall parts 10at, 10bt, 10ct, 10dt provide a (truncated) pyramid-shaped top of the housing, whose (preferably smooth) inner side is configured to guide the paper web W from the roll R to transport element 5 and guide 11, via the passage surrounded by the upper edge R. This top of the housing can already preform, at least gather, the web W. Further, the apparatus 1 can thus engage web W from rolls of different dimensions, allowing relatively high dispensing speeds to be achieved in a reliable manner, both during web unwinding from relatively central locations in the inner space and when web W is being pulled from locations close to the walls 10a, 10b, 10c, 10d out of the inner space.

[0027] Preferably, the housing 10 is provided with at least one transparent wall. Each of the walls 10a, 10b, 10c, 10d may for instance be of transparent design. In addition, one or more wall may for instance be lightproof. In the example, at least one of the walls, viz. the front wall 10a, inclusive of a respective tapering part 10at, is of transparent design. As a result, both the web roll R and transport of the web W between roll R and the upper edge of the housing 10 are well visible from an environment during use. The housing 10 may be provided with a cover structure 51, 52, which holds a transport element 5 and a web guide 11 at a level above the upper edge of the housing 10. In this example, the transport element 5 and the drive 6 during operation (with a cover closed) are situated wholly in a space surrounded by the cover structure, under a top wall 52 of the apparatus, defined by the cover structure.

[0028] The housing 10 is preferably provided with an access closable by a wall, in this example comprising an access closable by a pivotable front wall 10a (door). The front wall 10a is coupled to a sidewall 10d by hinges (see also Fig. 5). The figures show a closed position of the front wall 10a. In an opened, outwardly pivoted position thereof, the inner space surrounded by housing 10 is accessible, for instance to insert a web roll R, and to draw web W from the roll and bring it to the cover 51, 52, in order to be taken over by the transport element 5. Preferably, the whole wall 10a, hence inclusive of a respective tapering upper part 10at, forms a movable component to close the access (see also Fig. 5). The apparatus 1 may for instance be provided with a retaining device 71, 72 to keep the front wall 10a in a closed position. In the exemplary embodiment, the retaining device is provided with a permanent magnet 71 (for instance arranged on a sidewall 10c) which engages a metal strip 72 (in this

case arranged on the door 10a) in a closed position of the door.

[0029] The apparatus 1 shown in Figs. 1-4 is of particularly compact and robust construction, and to this end is advantageously provided with a cylinder-shaped transport element 5 (having an outside of substantially circular cross section) rotatable under the influence of a drive, and a web guide 11 disposed opposite thereto. In particular, the apparatus is not provided with gears to deform the web. Nor is the apparatus provided with separate gears to transmit rotation of an external motor shaft to web transport means. This contributes to durability, reliability and a low noise level. The transport element 5 and the web guide 11 are arranged to cooperate, for the purpose of transport and deformation of the web W (laid along them).

[0030] The drive 7 in this example is fully integrated into the transport element 5, and is preferably a tube motor 7, the transport element 5 being a (cylinder-shaped) tube 5 driven by that motor 7.

[0031] The guide of the first example is a cylinder-shaped counter roller 11, rotatable about a respective axis. Rotation axes of this roller 11 and transport element 5 are parallel with respect to each other.

[0032] The outside of the transport element 5 is preferably uninterrupted, closed, and preferably wholly manufactured from friction enhancing material, in particular resilient friction enhancing material, in particular rubber. In this way, the transport element 5 can provide for good grip on the paper. The outside of the counter roller 11 may also be provided with such friction enhancing material.

[0033] The web guide 11 is movable from the web guide position moved to the transport element 5, shown in Figs. 2-4, to a release position moved away from the transport element 5 (shown in Fig. 1), and vice versa.

[0034] The present apparatus comprises a web dispensing head, in particular a cover structure 51, 52 as mentioned, provided with a first cover part 51, attached to the upper side of the housing 10, and a second cover part 52, which is movable (in particular pivotable) relative to the first cover part 52.

[0035] One cover part (in the example the first cover part 51) is provided with the drive 7 with transport element 5, and the other cover part (in the example the second cover part 52) is provided with the rotatable (itself non-driven) guide 11. In a closed position of the cover 51, 52, the cover preferably constitutes a substantially closed covering of the top of the housing 10, and of the transport element with motor 5, 6 and rotatable guide 11 held by the cover 51, 52. As a result, the cover 51, 52 can provide for a good reduction of acoustic transmission, to control broadcast of noise coming from the apparatus. Optionally, the apparatus may be provided on an inside thereof with sound-absorbing material, for instance acoustic foam or the like (not shown), to achieve further noise reduction. As follows from the figures, the cover parts 51, 52 may be provided on an inside thereof with for instance

wall parts 51a, 52a, which - viewed in front view - partly overlap rearwardly situated rotatable components 5, 11. The latter wall parts 51a, 52a bound a web dispensing gap with the cover 51, 52 closed. Sidewalls, a top wall and rear wall of the cover 51, 52 are preferably wholly closed, with the cover closed.

[0036] In the position of the cover parts 51, 52 when moved away from each other, guide 11 and transport element 5 are moved apart, such that web W can be passed between them (see Fig. 1). Thereupon, cover parts 51, 52 can be brought into the position moved towards each other, such that the web W is clamped between guide 11 and transport element 5, to be engaged by guide 11 and transport element 5 and to be discharged from the housing 10 at high speed.

[0037] Preferably, the apparatus 1 is provided with locking means, for instance releasable closing elements 53, to lock the cover parts 51, 52 in the position moved towards each other.

[0038] Further, it is advantageous when the apparatus (for instance cover 51, 52) is provided with spring means, arranged to spring-mount the web guide 11, and in particular to push the guide 11 under the influence of spring force in the direction of the transport element 5 (i.e. in a radial direction of the guide 11). The spring suspension of the counter roller 11 can provide a particular pressure, to transport the paper W. In this way, a particularly reliable operation of the apparatus can be achieved, while jamming of web W in the cover 51, 52 can be avoided. Further, the spring means 11 can bring about a proper web engagement between web guide 11 and driving tube 5, and also afford noise reduction.

[0039] The present apparatus 1 during use can draw web W from a stationary web roll R, fold it and dispense it. The apparatus is provided with only one transport element 5, drivable by a drive 7, to transport and deform the web. Preferably, the apparatus can dispense the web W at a speed of more than 100 meters per minute, in particular a speed of more than 150 meters per minute, more particularly a speed of at least 200 meters per minute.

[0040] As Figs. 1-4 show, the apparatus 1 during use can dispense web W, with the web roll R and the apparatus 1 being disposed stationarily with respect to each other. A web end of the stationary web roll R (with cover 51, 52 open) is passed along the transport element 5 and the web guide 11. The drive 7 imparts rotation to the transport element 5 for dispensing the web W.

[0041] Folded web W dispensed by the apparatus has for instance a tubular shape, provided with at least two longitudinal folds (see Figs. 1, 3). A web W dispensed over a particular length can be removed from a remaining web part, for instance be torn off, cut off or the like. To this end, the apparatus 1 can optionally be provided with tearing or cutting means (for instance a saw tooth strip) which may for instance be arranged on or near the head 51, 52.

[0042] The example shown in Figs. 5-6 differs from the

first example in that the web guide comprises a stationarily disposed guide element 111. In this case, an outside of the transport element 105 and an inside of the web guide 111 extending opposite thereto bound a deformation zone, of a circular segment-shaped cross section (see Fig. 6). The second example is designed in particular to crease the web W. Also, this example can provide a fold in the web W, as represented in the figures.

[0043] The rotatable transport element 105 is disposed on or near the upper end of the housing 110, and in particular connected, via the drive and two rigid coupling pieces 161, to a (in this case truncated pyramid-shaped) cover part 151 of the housing 110.

[0044] The rotatable transport element 105 extends between an inside of the web guide 111 on one side and a web accommodation space defined by the housing on the other side. In this example, the web guide 111 comprises an integral component of the housing, and in particular is integrated with a rear wall 110B of the housing 110.

[0045] In this example, an outside of the transport element 105 is provided with friction enhancing projections 106. The projections 106 preferably meet one or more of the following features, and more preferably each of the following features:

- the projections 106 are studs, having a diameter in the range of circa 0.5-5 cm;
- a thickness of each of the projections measured in radial direction is greater than 0.2 cm;
- a thickness of each of the projections 106 measured in radial direction is at least equal to or greater than a radial distance measured between an outer surface of the rotatable element 105 and the web guide 111;
- a neighbor distance between the studs is in the range of circa 1-10 cm; and
- the transport element is provided with more than 10 projections 106, and for instance fewer than 50.

[0046] The working of the second example comprises cooperation between the rotating cylinder-shaped web transport element 105 and a stationary web guide 11, to crease and further discharge the web W passed therebetween. Here, the projections 106, preferably stud-shaped, bring about crumpling during transport, along with a proper engagement of a paper web W. This example too can achieve high web discharge speeds, and is reliable, compact, low-noise and durable.

[0047] To those skilled in the art, it will be clear that the invention is not limited to the exemplary embodiments described. Various changes are possible within the framework of the invention as set forth in the following claims.

Claims

1. An apparatus for dispensing a deformable web, comprising a transport element (5; 105) rotatable under the influence of a drive, and a web guide (11; 111) disposed opposite thereto, wherein the transport element (5; 105) and the web guide (11; 111) are arranged to cooperate, for the purpose of transport and deformation of the web, wherein the drive (7) is fully integrated into the transport element (5; 105).
2. An apparatus according to claim 1, wherein the transport element is a cylinder-shaped transport element (5; 105).
3. An apparatus according to claim 1 or 2, wherein the drive is a tube motor, and the transport element is a tube driven by that motor.
4. An apparatus according to any one of the preceding claims, wherein the web guide (11) is a counter roller, in particular a rotatable cylinder-shaped roller (11).
5. An apparatus according to any one of the preceding claims, provided with spring means, arranged to push the web guide (11) under the influence of spring force in the direction of the transport element (5).
6. An apparatus according to any one of the preceding claims, wherein the web guide (11) is movable from a web guide position moved towards the transport element (5) to a release position moved away from the transport element (5), and vice versa.
7. An apparatus according to any one of the preceding claims, wherein the web guide (111) comprises a stationarily disposed guide element, wherein an outside of the transport element (105) and an inside of the web guide (111) extending opposite thereto bound a deformation zone, having a circular segment-shaped cross section.
8. An apparatus according to any one of the preceding claims, wherein at least the outside of the transport element (5) is manufactured from friction enhancing material.
9. An apparatus according to any one of the preceding claims, wherein at least the outside of the transport element (5) is provided with resilient material, in particular rubber.
10. An apparatus according to any one of the preceding claims, wherein an outside of the transport element (105) is provided with friction enhancing projections (106), which preferably meet one or more of the following features:

- the projections (106) are studs, having a diameter in the range of circa 0.5-5 cm;
 - a thickness of each of the projections measured in radial direction is greater than 0.2 cm;
 - a thickness of each of the projections (106) measured in radial direction is at least equal to or greater than a radial distance measured between an outer surface of the rotatable element (105) and the web guide (111);
 - a neighbor distance between the studs is in the range of circa 1-10 cm; and
 - the transport element is provided with more than 10 projections (106), and for instance fewer than 50.
11. An apparatus according to any one of the preceding claims, comprising a housing (10; 110), arranged to hold a web (W) to be dispensed.
12. An apparatus according to claim 11, wherein the housing (10; 110) is provided with an inner space which can be substantially closed off from an environment, configured to fully enclose a web (W) to be dispensed.
13. An apparatus according to claim 12, wherein the housing (10; 110) is provided with at least one transparent wall.
14. An apparatus according to any one of claims 12-13, wherein the housing is provided with a front wall (10a), rear wall (10b), and sidewalls (10c; 10d) extending therebetween.
15. An apparatus according to any one of the preceding claims, provided with substantially obliquely tapering wall parts.
16. An apparatus according to any one of claims 11-15, wherein the housing (10; 110) is provided with an upper edge which surrounds a web passage, wherein the housing (10; 110) is provided with a cover structure which holds the transport element (5; 105) and the web guide (11; 111) at a level above said upper edge.
17. An apparatus according to any one of claims 11-16, wherein the rotatable transport element (5; 105) is disposed on or near an upper end of the housing (10), and in particular is connected via the drive and at least one rigid coupling piece to the housing.
18. An apparatus according to any one of the preceding claims, designed to draw a web from a stationary web roll (R) and dispense it.
19. An apparatus according to any one of the preceding claims, wherein the apparatus is provided with a support (10e) to support a side of the web roll (R), in particular such that a centerline of the web roll (R) extends at right angles with respect to a centerline of the transport element (5; 105), wherein a roll supporting face defined by the support is larger than a web passage defined by the apparatus, situated opposite that support, near the transport element.
20. An apparatus according to any one of the preceding claims, provided with only one transport element (5) drivable by a drive to transport and deform the web.
21. An apparatus according to any one of the preceding claims, designed to dispense the web with a speed of more than 100 meters per minute, in particular a speed of more than 150 meters per minute, more particularly a speed of at least 200 meters per minute.
22. An apparatus for dispensing a deformable web, for instance an apparatus according to any one of the preceding claims, comprising a cylinder-shaped transport element (5; 105) rotatable under the influence of a drive, and a web guide (11; 111) disposed opposite thereto, wherein the transport element (5; 105) and the web guide (11; 111) are arranged to cooperate, for the purpose of transport and deformation of the web.
23. A method for dispensing a web, in particular a paper web, wherein a rotating cylinder-shaped web transport element (5) and a stationary web guide (11) cooperate with each other to deform and further discharge a web passed therebetween.

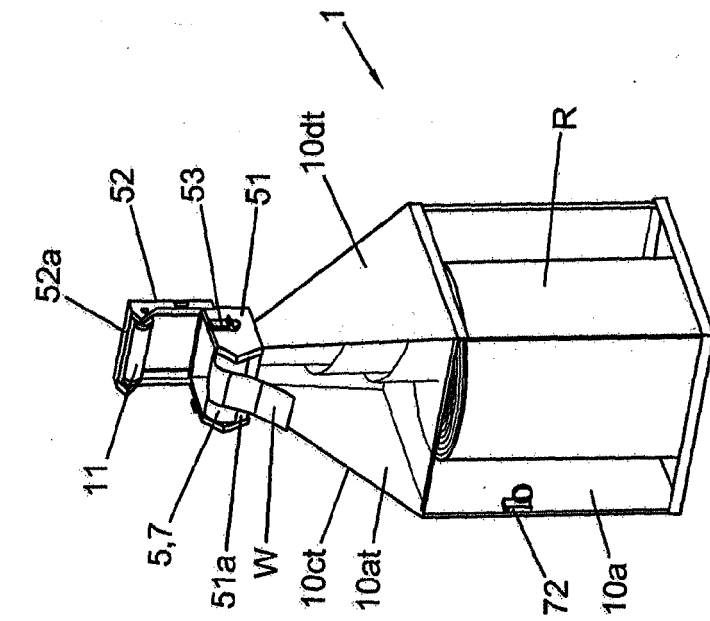


FIG. 1

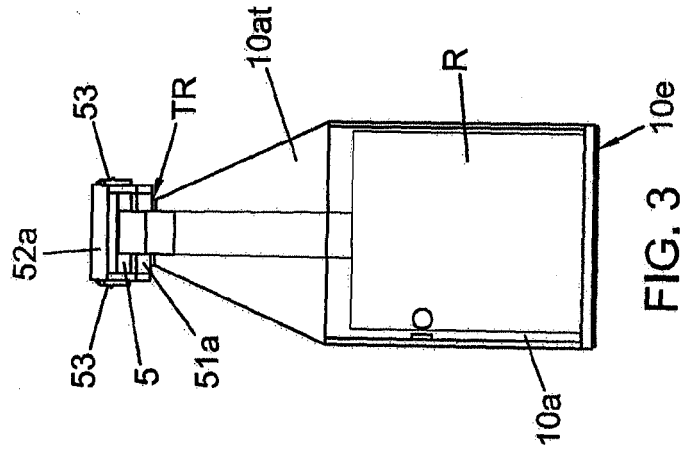


FIG. 3

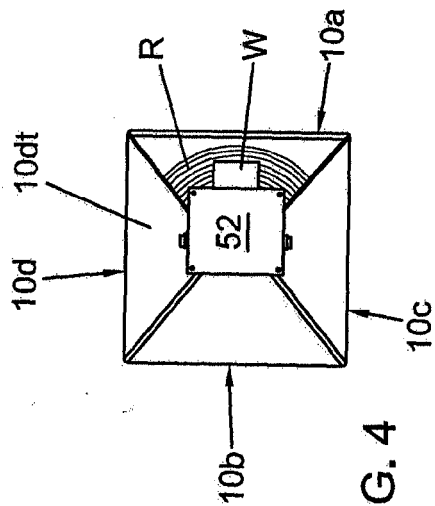


FIG. 4

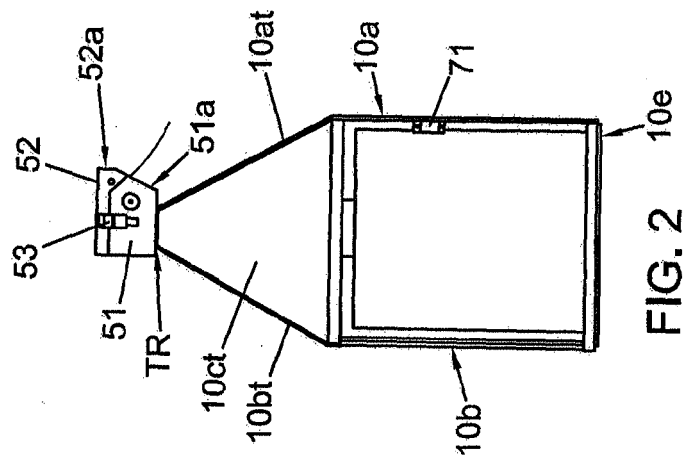


FIG. 2

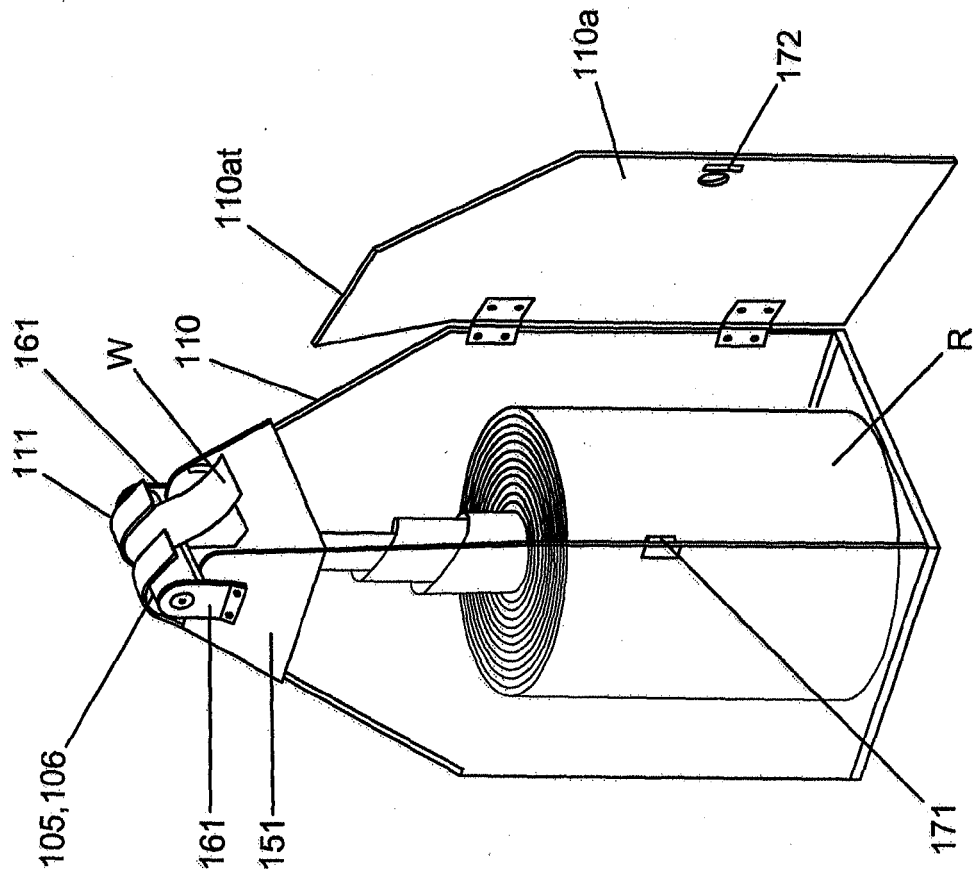


FIG. 5

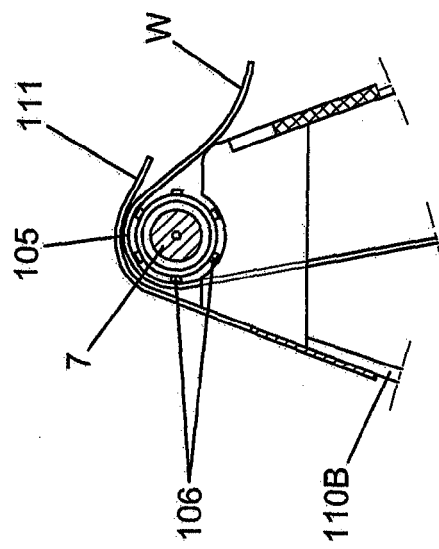


FIG. 6



EUROPEAN SEARCH REPORT

Application Number
EP 09 17 6695

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 852 380 A (REX PRODUCTS [US]; KANBAR MAURICE [US]) 7 November 2007 (2007-11-07)	1-3,5-6, 8-9, 11-12, 14-15, 17,20, 22-23	INV. B65H20/04
Y	* paragraph [0015] - paragraph [0022];	4,18,21	
A	figures *	7,10,16	
Y	----- WO 2006/087511 A (EASYPACK LTD [GB]; KEMPSTER MARK [GB]; THOMAS THEO [GB]) 24 August 2006 (2006-08-24) * page 4, line 11 - page 6, line 2 * * page 8, line 14 - page 9, line 30; figures *	4,18,21	
A	----- US 2004/026844 A1 (TORIUMI NAOYUKI [JP] ET AL) 12 February 2004 (2004-02-12)	10	
A	----- US 5 553 806 A (LUCAS ROBERT G [US]) 10 September 1996 (1996-09-10) * column 6, line 34 - line 60; figures 8,9 *	10	TECHNICAL FIELDS SEARCHED (IPC) B65H
A	----- US 2005/236096 A1 (JOYNER KENNY L [US] ET AL JOYNER KENNY LAMONT [US] ET AL) 27 October 2005 (2005-10-27) * paragraph [0015] - paragraph [0021]; figures 6-11 *	13	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 2 March 2010	Examiner Haaken, Willy
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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02-03-2010

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1852380	A	07-11-2007	CA 2560706 A1	02-11-2007
			CN 101121478 A	13-02-2008
			JP 4247270 B2	02-04-2009
			JP 2007297137 A	15-11-2007
			US 2007257147 A1	08-11-2007

WO 2006087511	A	24-08-2006	EP 1848314 A1	31-10-2007

US 2004026844	A1	12-02-2004	AU 2003240542 A1	22-12-2003
			JP 2004011734 A	15-01-2004
			WO 03104122 A1	18-12-2003

US 5553806	A	10-09-1996	CA 2149570 A1	20-11-1995
			DE 69504410 D1	08-10-1998
			DE 69504410 T2	01-04-1999
			EP 0683125 A2	22-11-1995
			JP 7309494 A	28-11-1995

US 2005236096	A1	27-10-2005	AU 2005201619 A1	10-11-2005
			CA 2504194 A1	23-10-2005
			GB 2413946 A	16-11-2005

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2005102677 A [0002]