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(54) **Spring system of a roll towel dispenser**

(57) A spring system operatively connected to a dispenser drum (1) of a roll towel dispenser, being rotatable in a housing (2) and provided with a longitudinally extending knife (3) reciprocating between an inner and an outer position during each revolution of the dispenser drum (1) guided by a cam track (4) positioned in one or both end walls (2a) of the housing (2).The spring system comprises a short return spring (5) and a long positioning spring (6) connected eccentrically to one en d of the dispenser drum (1), at a common connection point (7), the other end of said springs (5, 6) being connected to a common connection point (8) near the back of the housing (2), whereby the positioning spring (6) is further led around a guide pin (9) positioned at such a position near the front of the housing (2), that the two springs (5, 6) form a triangle in each position during a revolution of the dispenser drum (1).

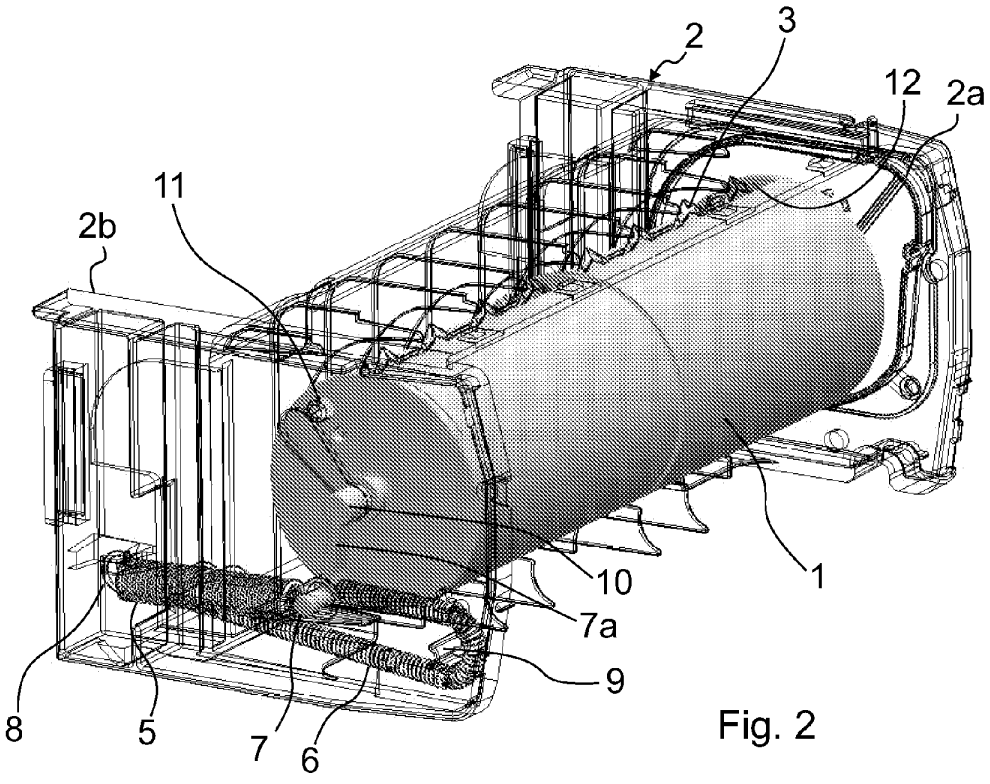

Fig. 2

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Description

[0001] The present invention concerns a spring system operatively connected to a dispenser drum of a roll towel dispenser, said dispenser drum being rotatable in a housing and provided with a longitudinally extending knife reciprocating between a retracted inner position and an extracted outer position during each revolution of the dispenser drum guided by a cam track positioned in one or both end walls of the housing.

[0002] In the art there is known a lot of dispensers with an above described dispenser drum. From document EP 0 573 558 B1 there is known a dispenser wherein a spring is operatively connected to the dispenser drum, which spring is loaded during a first half of rotation of the dispenser drum and unloaded during a next half of rotation. By using a single spring the start and stop position of the dispenser drum will be relatively unstable, due to the fact that the spring allows the drum to move to some extent almost freely clockwise and counterclockwise from a theoretical start and stop position, if the spring force is kept at a level, allowing rotation of the dispenser drum only by pulling an end of the towel web hanging out of a discharge of the dispenser. Due to this the length of the towel end hanging out of the discharge opening after discharge of a towel will vary a lot, perhaps leaving the end of the towel web inside the dispenser if no stop mechanism is used.

[0003] The object of the present invention is to overcome the above problem, which is achieved with a spring system, being characterized in that the spring system comprises a short return spring and a long positioning spring connected eccentrically to the dispenser drum, at a common connection point at one end of the dispenser drum, the other end of said springs being connected to a common connection point near the back of the housing, whereby the positioning spring is further led around a guide pin positioned at such a position near the front of the housing, that the two springs form a triangle in each position during a revolution of the dispenser drum, and the strength ratio between the return spring and the positioning spring is 70 /30 $\pm$ 5 % resulting in an interaction to return and stop the dispenser drum in an exact start and stop position. Due to this the length of a towel end hanging out of the dispenser after each dispensing cycle will always be exactly the same. Further the spring system will balance the rotation of the dispenser drum so that less pull force in needed to rotate the dispenser drum.

[0004] The interaction between the return spring and the positioning spring forces the dispenser drum to a start and stop position about 10 degrees counter clockwise from a position where the connection points of the spring ends and central axis of the dispensing drum are on a common straight line, which would be a somewhat unstable start and stop position if only a return spring is installed. Consequently the length of the towel end hanging out of the dispenser is longer than in a dispenser with only one spring.

[0005] The return spring will be loaded during turning of the dispenser drum up to 170° from said start and stop position while loading of the positioning spring will start during turning of said dispenser drum, when the connection point at the end of the dispenser drum passes a straight line between the guide pin and the central axis of the dispenser drum and will continue until the dispenser drum has been further turned 180°. Consequently the positioning spring will assist rotation of the dispenser drum during a first phase of a revolution of the dispenser drum by counteracting the return spring and also at a later phase after a towel has been cut, by first co-acting and then counteracting the return spring up to the start and stop position of the dispenser drum. This is a benefit to disabled people. Further the spring system enables use of a much more short fibred paper, i.e. weak and or thin paper, in the dispenser.

[0006] Due to the strength ratio between the return spring and the positioning spring the spring system will help further turning of the dispenser drum from 170° to said stop and start position of the dispenser drum.

[0007] The cam track guiding the position of the knife in the dispenser roll is shaped to swing the knife around a shaft gradually out through a longitudinal slot in the mantle of said dispenser drum to a position substantially radial to the central axis of the dispenser drum when said dispenser drum is turning from its stop and start position 180° and then to quickly swing the knife back into the dispenser drum.

[0008] The knife is preferably provided with a plurality of teeth longitudinally distributed along the knife and three deeper slots at uniform distance from each other along the length of the knife leaving three un-cut strings in a cutline across a paper towel web being cut by the knife, enabling pulling of the towel web out of the dispenser after cutting of the towel web.

[0009] In the following the invention will be described in more detail with reference to the enclosed drawing, wherein:

Fig. 1 shows an end view of a dispenser housing provided with a spring system according to the invention;

Fig. 2 shows a perspective view of the dispenser housing according to fig. 1, and

Fig. 3 shows an enlarged perspective view of an end wall of the housing provided with a cam track guiding the position of the knife of the dispenser.

[0010] In figures 1 and 2 a dispenser housing 2 provided with a spring system according to the invention is shown. Said spring system is operatively connected to a dispenser drum 1, which is mounted into the housing 2 to be rotatable around a central axis 10. The dispenser drum 1 is provided with a longitudinally extending knife 3 arranged to reciprocate between a retracted inner po-

sition and an extracted outer position during each revolution of the dispenser drum 1 guided by a cam track 4in one end wall 2a of the housing 2.

[0011] The spring system comprises a short return spring 5 and a long positioning spring 6 connected eccentrically to the dispenser drum 1 at a common connection point 7, preferably at an outer end of a crank 7a operatively connected to an outer end of the central axis 10 of the dispenser drum 1, extending out through a sidewall 2b opposite to the end wall 2a. The other end of said springs 5 and 6 are connected to a common connection point 8 near the back of the housing 2, whereby the long positioning spring 6 is further led around a guide pin 9 positioned at such a position near the front of the housing 2 , that the two springs 5 and 6 form a triangle in each position during a revolution of the dispenser drum 1. The strength ratio between the return spring 5 and the positioning spring 6 should be 70/30 $\pm$ 5 % in order to receive a smooth operation of the dispenser drum 1 and to return and stop the dispenser drum 1 in an exact start and stop position. Consequently the length of a towel end hanging out of the dispenser after each dispensing cycle will always be exactly the same. Further the spring system will balance the rotation of the dispenser drum 1so that less pull force in needed to rotate the dispenser drum 1.

[0012] According to a preferred embodiment of the invention the interaction between the return spring 5 and the positioning spring 6 forces the dispenser drum 1 to a start and stop position about 10 degrees counter clockwise from a position where the connection points 7 and 8 of the spring ends and a central axis 10 of the dispensing drum 1 are on a common straight line, which would be a somewhat instable start and stop position if only the return spring is installed. Consequently the length of the towel end hanging out of the dispenser is longer than in a dispenser with only one spring.

[0013] The knife is provided with a plurality of teeth 3a longitudinally distributed along the knife 3 and three deeper slots 3b at uniform distance from each other along the length of the knife 3 leaving three un-cut strings in a cutline across a paper towel web being cut by the knife 3. Each end of the knife 3 is provided with a shaft 11 which is turnable in a hole in each end wall of the dispenser drum 1. The end of the shaft 11 facing the end wall 2a with the cam track 4 is provided with a crank shaped cam follower 3c extending into said cam track 4. The cam track 4 is shaped to swing the knife 3 around said a shaft 11 gradually out through a axially extending slot 12 in mantle of said dispenser drum 1 to a position substantially radial to the central axis 10 of the dispenser drum 1 when said dispenser drum 1 is turning from its stop and start position 180° and then to quickly swing the knife 3 back into the dispenser drum 1.

[0014] The operation of a dispenser provided with a spring system according to the invention is as follow. A paper towel web is led from a towel roll around the dispenser drum 1 and out of the dispenser. When a user starts pulling the end of the paper web hanging out of the dispenser, the dispenser roll 1 starts turning from the start and stop position. The return spring 5 will be loaded during turning of the dispenser drum 1 up to 170° from said start and stop position while loading of the positioning spring 6 will start during turning of the dispenser drum 1 after the connection point 7 at the end of the dispenser drum 1 passes a straight line between the guide pin 9 and the central axis 10 of the dispenser drum 1 and will continue until the drum has been further turned 180°. During the turning of the dispenser roll 1 the knife 3 will start to gradually swing out through the slot 12 in the mantle of the dispenser drum 1 to gradually penetrate the towel web covering the slot 12 and will reach its extracted end position when the dispenser drum 1 has been turned 180° from the stop and start position. Due to the strength ratio between the two springs 5 and 6 the spring system will assist further turning of the dispenser drum 1 after it has been turned more than 170° from the start and stop position. When the turning of the dispenser drum 1 continues after the knife 3 has reached its outer extracted end position the knife will rapidly retract in to the dispensing drum 1 guided by the cam track 4 and remain there until the dispensing drum 1 has reached its stop and start position. A towel can then be tore off from the towel web along the transversal cutline cut by the knife, which cutline then is outside the dispenser at an exact distance from the dispenser and next dispensing cycle can start.

Claims

1. A spring system operatively connected to a dispenser drum (1) of a roll towel dispenser, said dispenser drum (1) being rotatable in a housing (2) and provided with a longitudinally extending knife (3) reciprocating between a retracted inner position and an extracted outer position during each revolution of the dispenser drum (1) guided by a cam track (4) positioned in one or both end walls (2a) of the housing (2), **characterized in that** the spring system comprises a short return spring (5) and a long positioning spring (6) connected eccentrically to the dispenser drum (1), at a common connection point (7) at one end of the dispenser drum (1), the other end of said springs (5, 6) being connected to a common connection point (8) near the back of the housing (2), whereby the positioning spring (6) is further led around a guide pin (9) positioned at such a position near the front of the housing (2), that the two springs (5, 6) form a triangle in each position during a revolution of the dispenser drum (1) and the strength ratio between the return spring (5) and the positioning spring (6) is 70 /30 $\pm$ 5 % resulting in an interaction to return and stop the dispenser drum (1) in an exact start and stop position.

2. A spring system according to claim 1, **characterized**

in that the interaction between the return spring (5) and the positioning spring (6) forces the dispenser drum (1) to a start and stop position about 10 degrees counter clockwise from a position where the connection points (7 and 8) of the spring ends and a central axis (10) of the dispensing drum (1) are on a common straight line.

3. A spring system according to claim 2, **characterized in that** the return spring (5) will be loaded when the dispensing drum (1) is turned up to 170° from said start and stop position while loading of the positioning spring (6) will start during turning of the dispensing drum (1) when the connection point (7) at the end of the dispensing drum (1) passes a straight line between the guide pin (9) and the central axis (10) of the dispenser drum (1) and will continue until the dispensing drum (1) has been further turned 180°.

4. A spring system according to claim 3, **characterized in that** the spring system will help further turning of the dispenser drum (1) from 170° to said stop and start position of the dispenser drum (1).

5. A spring system according to claim 4, **characterized in that** the cam track (4) is shaped to swing the knife (3) around a shaft (11) gradually out through a longitudinal slot (12) in mantle of said dispenser drum (1) to a position substantially radial to the central axis (10) of the dispenser drum (1) when said dispenser drum (1) is turning from its stop and start position 180° and then to quickly swing the knife (3) back into the dispenser drum (1).

6. A spring system according to claim 5, **characterized in that** the knife (3) is provided with a plurality of teeth (3a) longitudinally distributed along the knife (3) and three deeper slots (3b) at uniform distance from each other along the length of the knife (3) leaving three un-cut strings in a cutline across a paper towel web being cut by the knife (3).

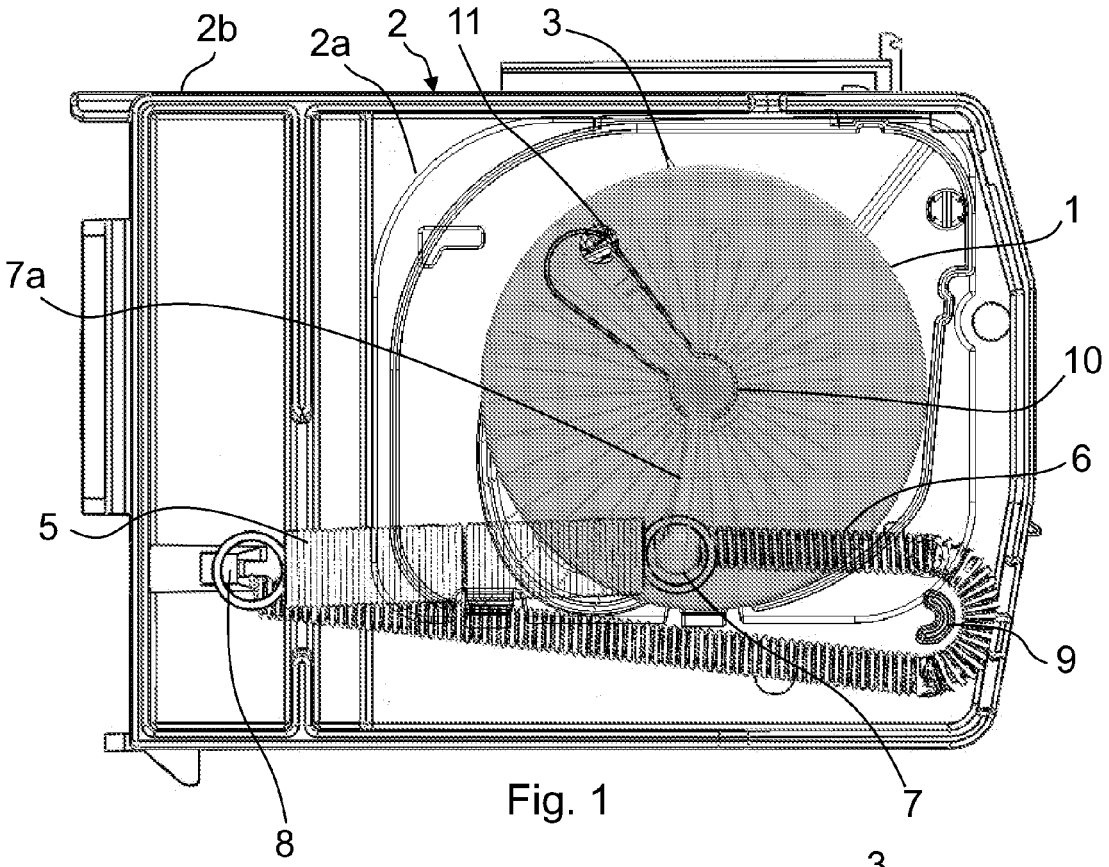

Fig. 1

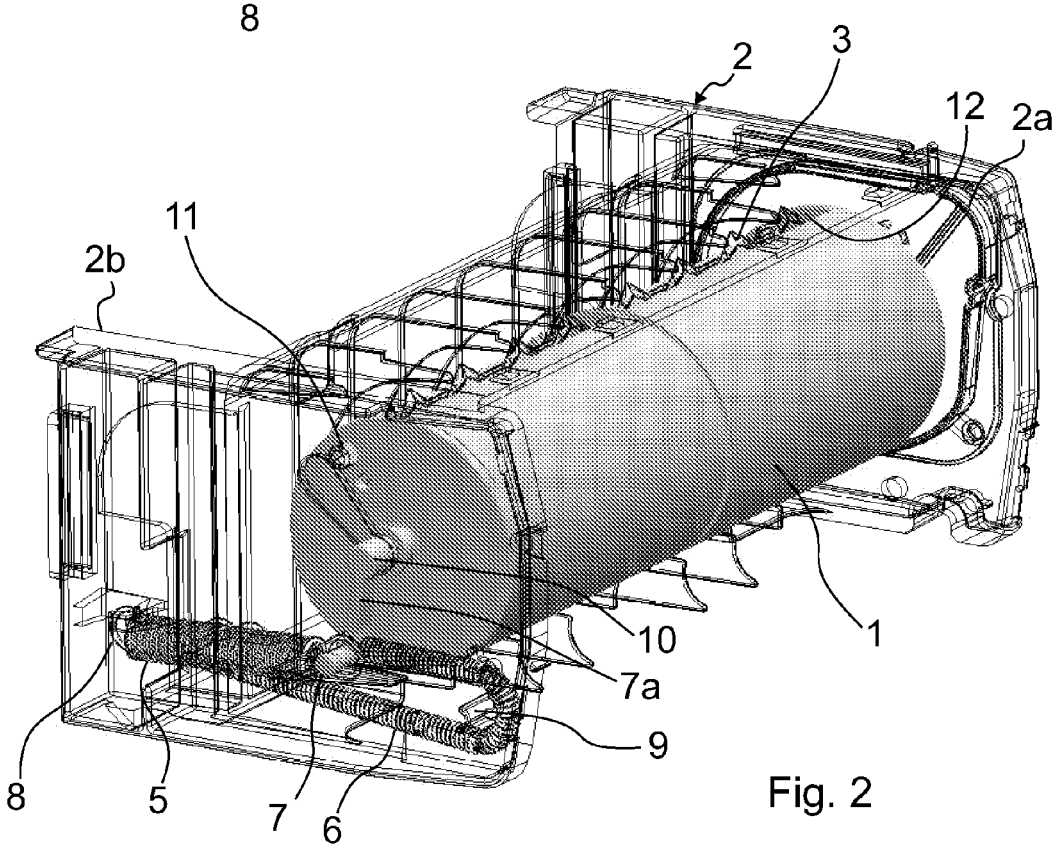

Fig. 2

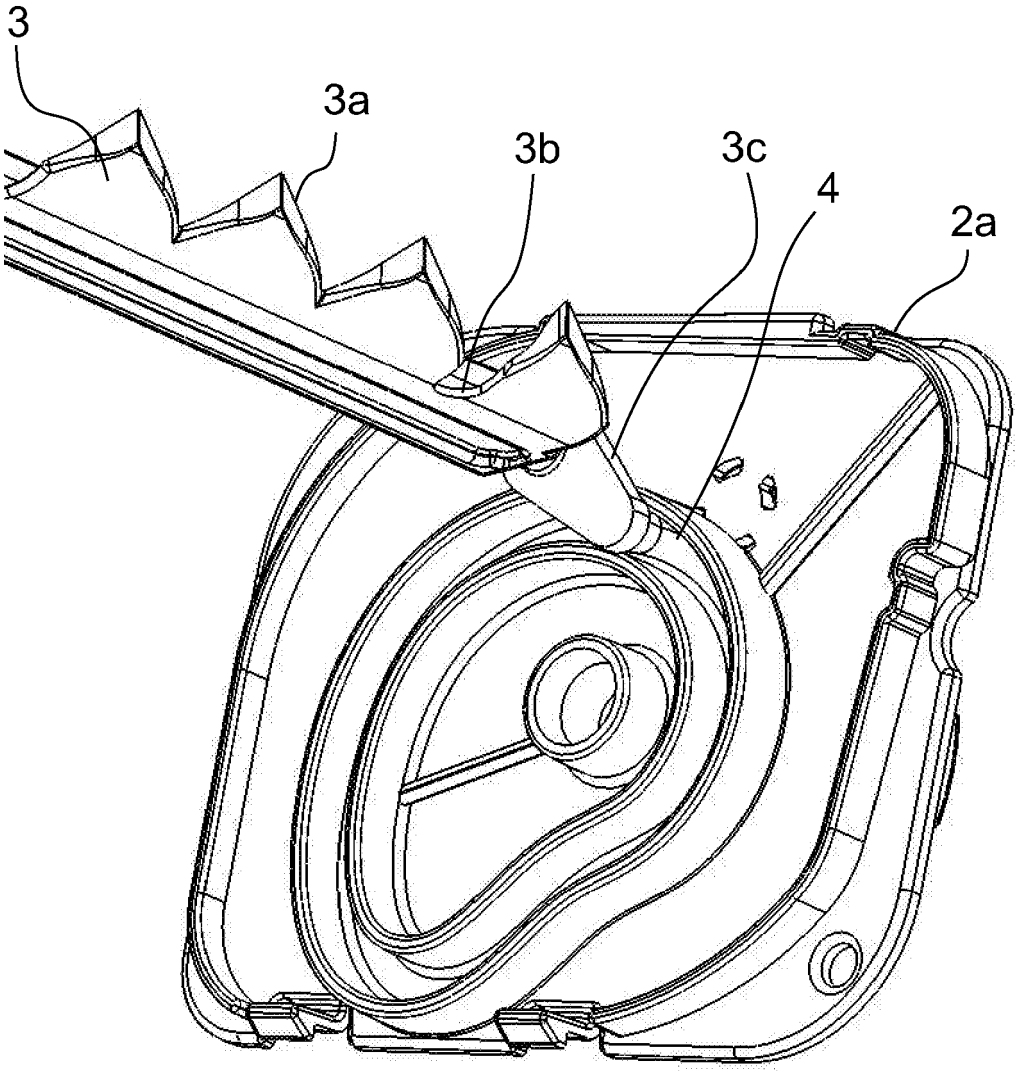

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 11 39 7519

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2006/266784 A1 (KANANEN DANIEL C [US]) 30 November 2006 (2006-11-30) * the whole document * -----	1	INV. A47K10/36
A	US 6 314 850 B1 (MORAND MICHEL [CA]) 13 November 2001 (2001-11-13) * the whole document * -----	1	

TECHNICAL FIELDS SEARCHED (IPC)

A47K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 February 2012	Delzor, François

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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13-02-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006266784 A1	30-11-2006	NONE	
US 6314850 B1	13-11-2001	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Patent documents cited in the description

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