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(72) Inventors; and

(71) Applicants: MELKI, Jean [SE/SE]; Adolf Zethelius gata 7, 724 78 Västerås (SE). WALLÉN, Emma [SE/SE]; Karlfeldtsгатan 13c, 722 22 Västerås (SE).

(74) Agent: PATENTFIRMAN HENRIK FRANSSON AB; Kopparbergsvägen 6, 722 13 Västerås (SE).

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(54) Title: MIXING BOTTLE WITH TWIST ACTION VALVE

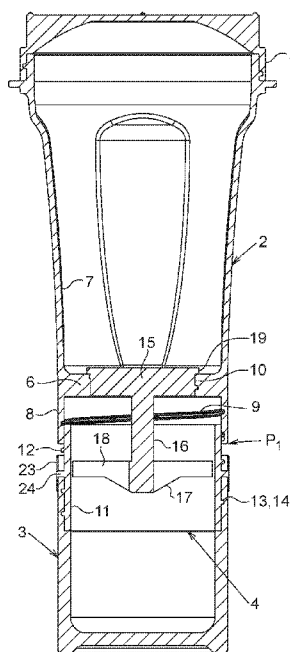


Fig. 1

(57) Abstract: A mixing bottle (1) comprising a first container (2) connectable to a second container (3) via a valve insert (4), the valve insert having at least one helically threaded (12) end adapted for engagement with a helically threaded (9) end of the first container. In a first position of engagement (P1) between the first container and the valve insert, a valve body (15) supported by the valve insert (4) is seated sealingly in a valve seat (10) formed in the threaded end of the first container. In a second position of engagement (P2) achieved by rotation of the first container relative to the valve insert, the valve body (15) is displaced from the seat (10) to provide communication between the first (2) and second (3) containers via the valve insert (4).

**Mixing bottle with twist action valve**

## TECHNICAL FIELD OF THE INVENTION

The present invention relates to a mixing bottle. In particular, the invention relates  
5 to a mixing bottle comprising a first container connectable to a second container,  
wherein the internal volumes of the containers can be set in fluid flow  
communication by relative rotation of the first and second containers.

## BACKGROUND AND PRIOR ART

10 Mixing bottles for beverage or liquid nutrients are typically arranged with at least two  
compartments each containing a mixing ingredient, wherein the ingredients are kept  
separated until they are allowed to be mixed upon a prescribed action by the user.  
This action can involve the rupture of a separating membrane, or the pushing open  
of a one-way valve at an interface between the two compartments, or the rotation of  
15 the compartments relative to each other in order to open a valve that provides  
communication between the two compartments, e.g.

A twist-action mixing bottle is previously disclosed in US 2014/367283 A1. A two  
20 housings container is disclosed, wherein manual rotation of the housings engages a  
cam actuated seal cutter which cuts through one or more seals, allowing the  
contents in the housings to mix. Since reuse of this twist-action mixing bottle  
requires fitting of new seals in replacement of the ruptured ones, this bottle is not  
adapted for repeated loading, by a consumer, with ingredients that are to be kept  
separated until use.

25 Another mixing bottle with twist action is known from US 9004301 B2. This bottle  
comprises an upper chamber with a seal in its bottom, a lower chamber having a  
seal in its top in face-to-face contact with the seal of the upper chamber, wherein  
apertures in the seals respectively can be mated by relative rotation of the chambers  
and seals to provide fluid flow communication between the chambers. An example of  
30 a similar solution is disclosed in US 2009/178940 A1.

The last mentioned twist-action mixing bottle with valve discs in face-to-face contact may suffer from clogging as ingredients, such as liquid and pulverized admixture, mix between the valve discs in their closed positions, especially if repeated use has resulted in play between the discs.

5

#### SUMMARY OF THE INVENTION

The object of the present invention is to provide a mixing bottle having a twist-action valve that avoids the problems of prior art twist-action mixing bottles.

10 The object is met in a mixing bottle comprising a first container connectable to a second container via a valve insert, the valve insert having at least one helically threaded end adapted for engagement with a helically threaded end of the first container. In a first position of engagement between the first container and the valve insert, a valve body which is supported by the valve insert is seated sealingly in a  
15 valve seat which is formed in the threaded end of the first container. In a second position of engagement, achieved by rotation of the first container relative to the valve insert, the valve body is displaced from the seat to provide communication between the first and second containers via the valve insert.

20 It will be understood that in rotation to shift the first container from the first to the second position of engagement, the second container will be carried in rotation relative to the first container by its connection to the other end of the valve insert.

It will likewise be understood that rotation guided by the helical threads on the first  
25 container and the valve insert causes an axial relative displacement which is used for lifting, or lowering as the case may be, the valve body from the valve seat.

More precisely, in one embodiment, the first position of engagement is located between, such as half-way between, the entrance and the end of the helical thread  
30 on the valve insert, whereas the second point of engagement is located more closely to or in the very end of the helical thread on the valve insert. In this embodiment, the valve body will be displaced into the first container as the first container is screwed further onto the threads towards the second position of engagement.

In another embodiment, the first position of engagement is located closely to or in the very end of the helical thread, whereas the second position of engagement is located between, such as half-way between, the entrance and the end of the helical thread on the valve insert. In this embodiment, the valve body will be displaced out  
5 of the first container as the first container is screwed off the threads towards the second position of engagement.

The valve seat is arranged as an opening through an end wall in the threaded end of the first container, the valve body and valve seat both being circular in shape. In one  
10 embodiment a radially protruding flange is arranged on the valve body to define the seated position through abutting contact with the upper side of the end wall surface that surrounds the rim of the opening and defines the entrance to the valve seat. A sealing ring of elastic material may be arranged about the valve body, underneath  
15 the flange.

In one embodiment, the valve body and valve seat each carries a helical thread, the pitch of which is adapted to the pitch of the helical threads on the valve insert and on the first container to provide equal axial displacement upon rotation. In result,  
20 the valve body is guided by threaded engagement as it rotationally moves in the valve seat, which may further contribute to seal the passage through the end wall of the first container.

In one embodiment, a temporary stop against relative rotation may be arranged on the valve insert to define the first position of engagement (i.e., the closed and sealed  
25 condition).

A temporary stop may be arranged to provide an audible, a visual or a physically perceptible indication as the first container is rotated passed the stop to move from the first towards the second position of engagement (i.e., the open and non-sealed  
30 condition). The temporary stop may be realized in the form of a lug or heel that is deformed elastically or flexes from engagement with the first container as the same is rotated to move along the helical threads.

In one embodiment, such condition indicator may be realized in the form of a coaming that circumscribes the valve insert at a position where the first container must move inside of the coaming as it is shifted from the first to the second position of engagement. A toothed periphery may be arranged on the first container to provide  
5 a rattle sound which alerts the user that the first and second containers are being set in a communicating state.

The valve insert is a hollow cylindrical body with an axial length and coupling means arranged in its ends for coupling to the first and second containers. The valve body is  
10 formed in one end of a central post, the other end of which is supported in the ends of a set of arms that reach radially from an inner surface of the hollow valve insert body.

The valve insert has an externally or internally threaded first end for coupling to the  
15 first container as explained. For coupling to the second container, the second end of the valve insert may be threaded internally or externally. In alternative embodiments, the second end of the valve insert may be formed with a bayonet coupling or with snap lock means as long as sufficient sealing between the valve insert and the second container can be ensured. A sealing element, such as a sealing  
20 ring, may be arranged at the interface between the valve insert and the second container, if appropriate.

In general use, the first and second containers are filled with mixing ingredients by  
25 the user.

The second container may be arranged to be manually pre-filled by a user, or factory pre-filled with an admixture ingredient which is temporarily protected underneath a tearing-off or a screwing-off lid, until the second container being coupled to the valve  
insert.

In one embodiment, the second container may be realized in the form of a disposable mixed material product, comprising a threaded plastic ring which is secured in the  
30 open end of a wax coated or plastic coated paper container.

## SHORT DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will be described below with reference made to the drawings, wherein

- Fig. 1 is a longitudinal section through a mixing bottle in sealed (non-mixing) condition,  
5  
Fig. 2 is a partly broken away sectional view showing a coupling region of the mixing bottle in unsealed (mixing) condition,  
Fig. 3 is an elevational view of a valve insert included in the mixing bottle,  
Fig. 4 is an end view of the valve insert of Fig. 3, and  
10 Fig. 5 is a perspective view showing an alternative container for the mixing bottle.

## DETAILED DESCRIPTION OF EMBODIMENTS

With reference to the drawings, a mixing bottle 1 comprises a first container 2, a  
15 second container 3 and a valve insert 4 by which the first and second containers can be interconnected.

The first container 2 has an open end to which a lid 5 can be attached through a threaded connection. The opposite end is closed by an end wall 6, beyond which the  
20 wall 7 of the first container is extended in the form of a cylindrical skirt 8. The inner surface of the skirt 8 is formed with a helical thread 9. An opening through the end wall 6 forms a cylindrical valve seat 10.

The valve insert 4 has a hollow cylindrical body 11, in a first end carrying an  
25 externally formed helical thread 12 mating with the thread 9 in the end of the first container. In its second end, the valve insert 4 carries an external thread 13 adapted for engagement with an internal thread 14 formed on the second container 3.

A valve body 15 is supported in an end of a post 16 that rises centrally through the  
30 hollow interior of the valve insert. The other end of the post is supported in a meeting portion 17 of a set of arms 18 which extend in radial directions from the inner surface of the hollow valve insert body 11.

The valve body 15, which is cylindrical in shape, has a diameter adapted for seating the valve body in the valve seat 10. A flange 19 extends radially outside the diameter of the valve body in the outer end of the valve body. In seated position in the valve seat 10, the flange 19 abuts the region or the upper side of the end wall 6 which  
5 defines the opening that provides the valve seat 10. A sealing ring 20 (see Fig. 2) may be arranged underneath the flange 19. Alternatively, a set of two or more sealing rings may be arranged in concentrically spaced relation underneath the flange in a type of labyrinth seal, if appropriate (not shown).

10 The valve seat 10 can be formed internally with a helical thread 21 for threaded engagement with a helical thread 22 formed on the exterior of the valve body 15. In such case, the thread pitch of helical threads 21 and 22 is adapted to the pitch of the helical threads 9 and 12 such that simultaneous revolution results in the same axial displacement in the two sets of threads.

15

About mid-way along the axial length of the cylindrical body 11, a coaming 23 is supported in the end of a radial flange 24 so as to extend circumferentially and radially spaced from the wall of the valve insert 4. The coaming 23 provides a frictional grip for the user's hand and fingers to support in the twisting action.

20

In Fig. 1 the mixing bottle 1 is shown in sealed state wherein the valve body 15 is fully seated in the valve seat 10. In the sealed state the first container 2 is inserted about half-way on the external thread 12 of the valve insert. This position constitutes the first position of engagement  $P_1$  in the illustrated embodiment. From  
25 this position, by rotation relative to the valve insert, the first container 2 is further inserted on the thread 12 towards the second position of engagement  $P_2$  as illustrated in Fig. 2, simultaneously displacing the valve seat from the valve body. In this non-sealed state, communication is established between the containers thus allowing the ingredients therein to mix with each other.

30

It will be realized that rotation of the first container in the opposite direction relative to the valve insert, whereby the first container returns from  $P_2$  to  $P_1$  position, will

again mate the valve seat with the valve body to re-establish the sealed state of Fig. 1, permitting refill of the first container.

Readily conceivable modifications of the illustrated embodiment include, e.g.,  
5 alternatively designed coupling means between the valve insert 4 and the second container 3. Accordingly, instead of a threaded engagement, the connection between the second container and the valve insert may include a bayonet coupling or a snap on attachment means, e.g.

10 The first and second containers 2 and 3 may both include transparent walls made of plastic or glass for visibility and in a quality that permits cleaning and reuse.

The second container 3 may, in commercially alternative concept, be realized as one factory pre-filled, disposable part of the mixing bottle 1. With reference made to Fig.  
15 5, the second container 3' may be manufactured in less costly material, such as paper or thin plastic. This alternative paper or plastic container can be made with opaque walls, optionally carrying instructions for use, nutrition information, advertisements etc. The disposable alternative advantageously carries a screwing-off or a tearing-off lid 24 for protection of the mixing product until the disposable  
20 container is coupled to the valve insert. An especially advantageous embodiment includes a multi-layer paper container arranged for disposal after use, carrying a tearing-off aluminium foil lid 24 and an external plastic thread 25 for coupling to the valve insert attached to a wax coated or plastic coated paper wall 26.

25 From studying the drawings it will be realized, that the flange 19 requires upon mounting that the valve body 15 is inserted from the open end of the first container for coupling to the other parts of the valve insert 4 underneath the end wall 6. To that end, the end of the post 16 and the meeting portion 17 shall be arranged to be non-rotationally connected through any means of gluing, welding/melting or form  
30 fitting.

In the above-mentioned embodiment including a threaded engagement between the valve body and the valve seat, however, a limited axial play in the connection



between the post 16 and the meeting portion 17 may be advantageous as it would permit an idling rotation of the valve body before it meshes with the thread 21 in the valve seat. A non-rotational connection with axial play can be arranged as a splines connection, e.g. In any case the thread 21 in the valve seat preferably comprises 2-4  
5 entrances in order to reduce the idling rotation and the corresponding axial play.

Other modifications that fall within the scope of the invention include, e.g., a mixing bottle wherein first and second containers are both non-transparent, as well as a mixing bottle which is disposable in its entirety. Still other modifications include a  
10 mixing aid or a strainer, such as a net or matrix structure, supported by the radial arms 18 in the valve insert so as to cover the open section of the valve insert, and which are effective, by shaking the bottle, for disintegrating and dissolving lumps of dry admixture ingredients, or effective for retaining insoluble elements in the admixture contained in the second container.

15

Finally, as indicated above, the valve mechanism can be reversed in the sense that the valve body can be arranged to seal against the seat from the opposite side of the end wall of the first container. In this alternative embodiment, the first and second positions of engagement will shift place such that in a sealed state the first container  
20 is screwed all the way to the bottom of the threads on the valve insert, while upon opening the valve, the first container is screwed off the valve insert until the valve seat is lifted from the valve body to provide communication between the first and second containers via the valve insert. In the reversed embodiment of the valve, a sealing flange may be arranged in the end of the valve body which is facing the radial  
25 arms. It will be realized, that in the reversed embodiment the valve body may be formed as an integrated part of the valve insert, thus avoiding the step of mounting the valve body through the seat opening in the end wall of the first container.

## CLAIMS

1. A mixing bottle (1) comprising a first container (2) connectable to a second container (3) via a valve insert (4), the valve insert having at least one helically threaded (12) end adapted for engagement with a helically threaded (9) end of the first container, wherein in a first position of engagement ( $P_1$ ) between the first container and the valve insert, a valve body (15) supported by the valve insert (4) is seated sealingly in a valve seat (10) formed in the threaded end of the first container, whereas in a second position of engagement ( $P_2$ ) achieved by rotation of the first container relative to the valve insert, the valve body (15) is displaced from the seat (10) to provide communication between the first (2) and second (3) containers via the valve insert (4).
2. The mixing bottle of claim 1, wherein the valve seat (10) is arranged as an opening through an end wall (6) in the threaded end of the first container (2), a radially protruding flange (19) on the valve body defines the seated position of the valve body by abutting contact with the upper side of the end wall (6) surrounding the valve seat (10).
3. The mixing bottle of claim 1 or 2, wherein the valve body (15) in seated position engages the valve seat through a threaded engagement (21; 22).
4. The mixing bottle of any of claims 2 to 4, wherein at least one of an audible, a visual or a physically perceptible indication is generated, as the first container (2) is rotated to move from the first ( $P_1$ ) towards the second ( $P_2$ ) position of engagement.
5. The mixing bottle of any previous claim, wherein the valve body (15) is formed in one end of a central post (16), the other end of which is supported in the ends of a set of arms (18) that reach radially from an inner surface of a hollow valve insert body (11).

6. The mixing bottle of claim 5, wherein the valve insert (4) has an externally or internally threaded end for coupling to the first container (2), and an externally or internally threaded end for coupling to the second container (3).
- 5 7. The mixing bottle of any previous claim, wherein the second container (3) is arranged to be pre-filled with ingredient for mixing, protected underneath a tearing-off or a screwing-off lid.
- 10 8. The mixing bottle of claim 7, wherein the second container (3') is a disposable mixed material product, comprising a threaded plastic ring (25) secured to a wax coated or plastic coated paper container (26).

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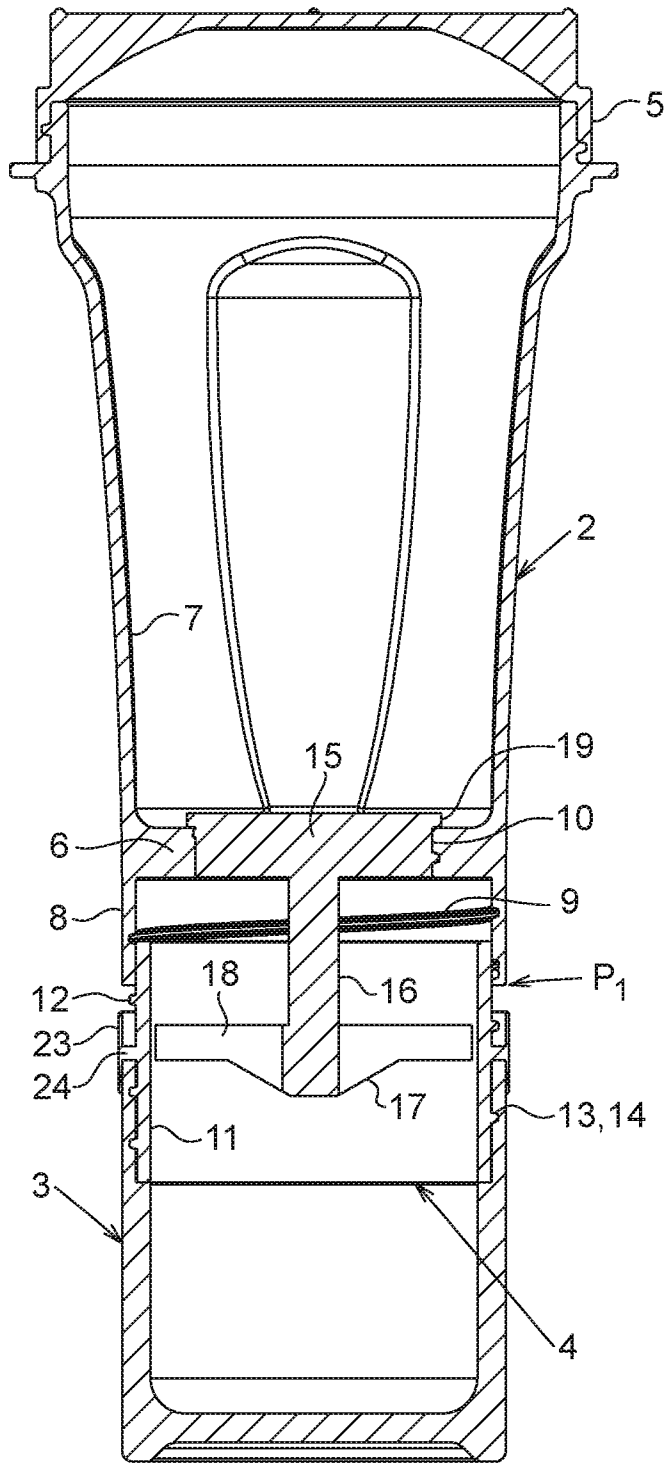


Fig. 1

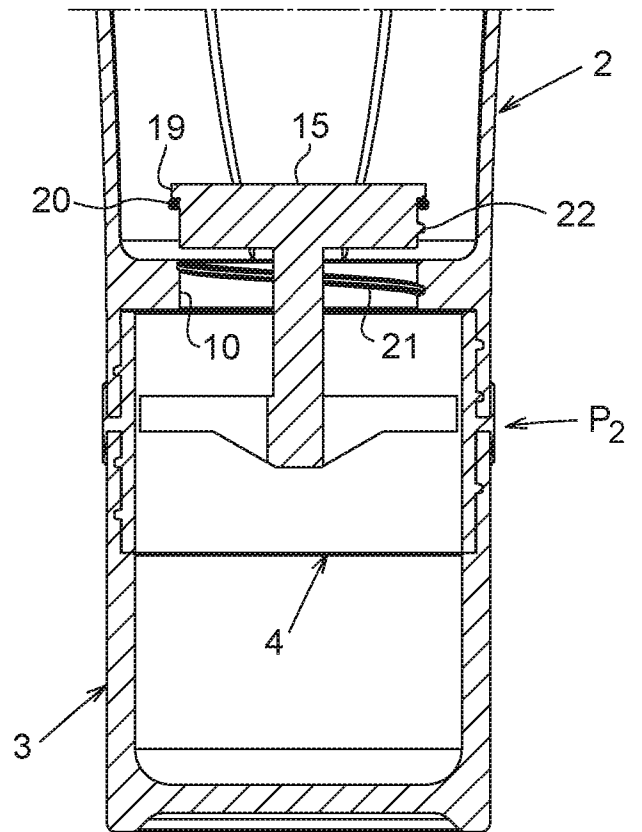


Fig. 2

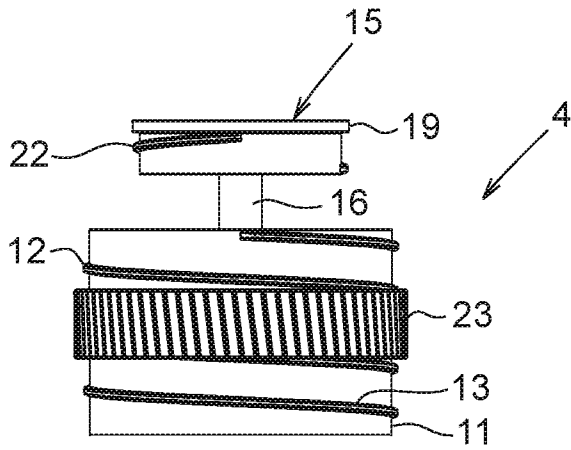


Fig. 3

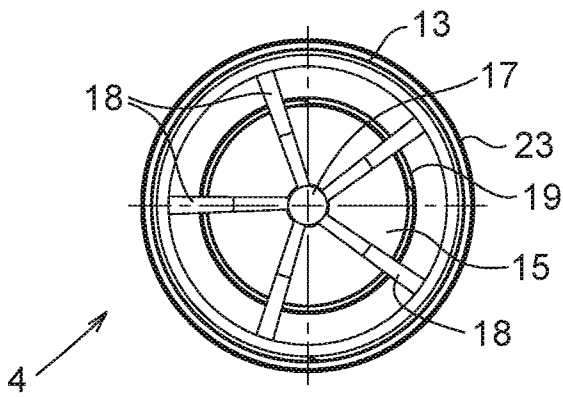


Fig. 4

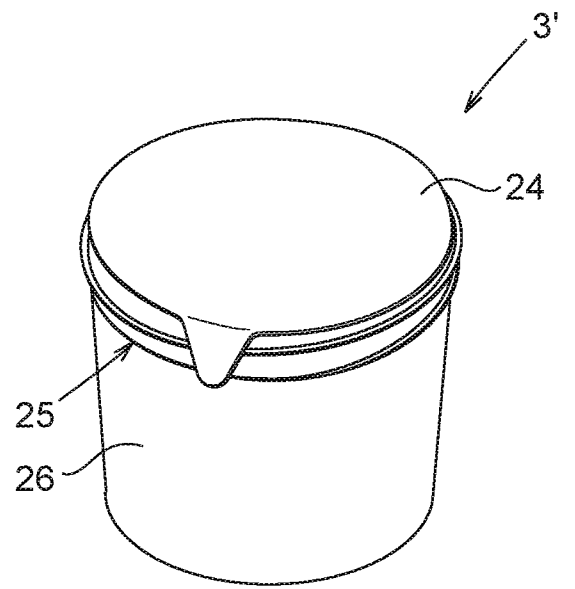


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No  
PCT/SE2018/051228

A. CLASSIFICATION OF SUBJECT MATTER  
INV. B65D81/32  
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

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 564 600 A (RENAULT PHILIPPE [FR]) 15 October 1996 (1996-10-15)	1,2,6
Y	column 4, line 1 - column 5, line 41 column 8, lines 15-31; figures 1-13 -----	3-5,7,8
Y	US 2014/001064 A1 (ALOIA ROLAND [US]) 2 January 2014 (2014-01-02) paragraph [0040]; figures 1-5 -----	3
Y	US 2014/131229 A1 (TIPPIT DOUGLAS [US] ET AL) 15 May 2014 (2014-05-15) paragraph [0045] - paragraph [0046]; figures 1-8 -----	4
Y	US 2016/318688 A1 (YANG FANG LIN [TW]) 3 November 2016 (2016-11-03) paragraph [0026]; figures 1-6 -----	5
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Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

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Date of the actual completion of the international search  24 July 2019	Date of mailing of the international search report  08/08/2019
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## INTERNATIONAL SEARCH REPORT

International application No

PCT/SE2018/051228

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3 734 393 A (STUMP P) 22 May 1973 (1973-05-22) column 2, line 61 - column 4, line 17; figures 1-3 -----	7,8

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/SE2018/051228

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5564600	A	15-10-1996	CA 2141967 A1 03-03-1994
			DE 69303486 D1 08-08-1996
			DE 69303486 T2 28-11-1996
			EP 0655045 A1 31-05-1995
			ES 2089841 T3 01-10-1996
			FR 2694920 A1 25-02-1994
			JP 3312734 B2 12-08-2002
			JP H08500314 A 16-01-1996
			US 5564600 A 15-10-1996
			WO 9404436 A1 03-03-1994
-----			
US 2014001064	A1	02-01-2014	NONE
-----			
US 2014131229	A1	15-05-2014	NONE
-----			
US 2016318688	A1	03-11-2016	NONE
-----			
US 3734393	A	22-05-1973	NONE
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