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(71) Applicant: **KONINKLIJKE PHILIPS N.V.** [NL/NL];
High Tech Campus 52, 5656 AG Eindhoven (NL).

(72) Inventors: **ZIJLSTRA, Aaldert, Geert**; High Tech Campus 5, 5656 AE Eindhoven (NL). **BAKKER-VAN DER KAMP, Gertrude, Riëtte**; High Tech Campus 5, 5656 AE Eindhoven (NL). **BERNTSEN, Luc**; High Tech Campus 5,

5656 AE Eindhoven (NL). **KOOIJKER, Klaas**; High Tech Campus 5, 5656 AE Eindhoven (NL). **VAN DER KOOL, Johannes, Tseard**; High Tech Campus 5, 5656 AE Eindhoven (NL).

(74) Agent: **PHILIPS INTELLECTUAL PROPERTY & STANDARDS**; High Tech Campus 5, 5656 AE Eindhoven (NL).

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(54) Title: BABY BOTTLE DEVICE

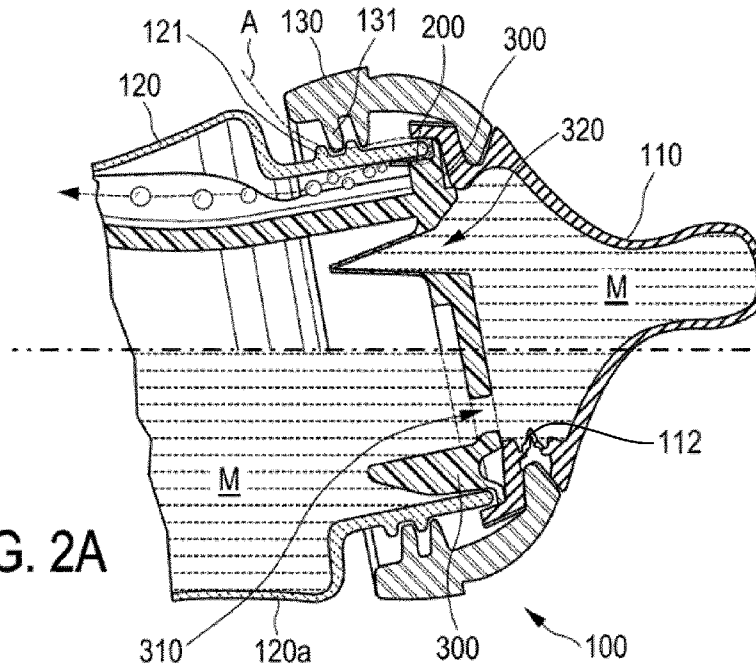


FIG. 2A

(57) Abstract: A baby bottle device (100) is provided which comprises a container (110) with a container volume (115), a teat (120) with a teat volume (125) and a valve unit (200). The teat comprises a first valve (112) for inletting air into the inside volume of the bottle (100). The inside volume of the bottle corresponds to the volume of the container (110) and the teat volume (125). The valve unit (200) with a second valve (210 – 230) is arranged outside the teat volume (125). The threshold of the vent unit is lower than the threshold of the first vent (112) in the teat.



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Declarations under Rule 4.17:

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Baby bottle device

FIELD OF THE INVENTION

The invention relates to a baby bottle device and a method of producing a baby bottle.

5 BACKGROUND OF THE INVENTION

During the baby feeding with a bottle, the baby may swallow air together with the milk from the bottle. This can result in colic. A colic is a condition some infants suffer from during early months and is caused by air in the digestive system. Air ingestion is unavoidable both in breast feeding and bottle feeding due to the presence of vacuum in the
10 infant's mouth during feeding. It is, however, desired to reduce the amount of air ingestion by the infant to reduce the risk of a colic.

WO 2018/162366 discloses a baby feeding bottle with a container, an adapter and a teat. Furthermore, a partitioning may be provided between the teat volume and the volume of the container. The partition allows fluid to flow from the container into the teat
15 and that air inside the teat volume can escape into the container volume in order to reduce the amount of air in the teat volume.

US 5 747 083 discloses a feeding bottle in which a flexible capsule or bag contains the milk. A space outside the flexible capsule or bag is vented by a valve unit, allowing it to collapse. Thus, there is no need for any air to enter the milk container volume.
20 However, this is a more complicated structure with many parts.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a baby bottle device with an improved colic prevention capability. It is in particular an object of the invention to provide a
25 baby bottle device which can efficiently prevent air flowing into a teat volume.

The invention is defined by the claims.

According to an embodiment, a baby bottle device is provided which comprises a container with a container volume, a teat with a teat volume and a valve unit. The teat comprises a first valve for inletting air into the inside volume of the bottle, in

particular into the teat. The inside volume of the bottle corresponds to the volume of the container and the teat volume. The valve unit with a second valve is arranged outside the teat volume. The threshold of the valve unit is lower than the threshold of the first vent in the teat.

Accordingly, the valve unit outside the teat volume will first be activated or let
5 in air before the valve in the teat will let in air. This is advantageous as the air inlet will occur at a position which is not inside the teat volume. This in turn is advantageous as an air inlet into the milk inside the teat volume can be avoided. Thus, the possibilities of colics in a baby will be significantly reduced.

According to another embodiment, there is a baby bottle device comprising a
10 container having a container volume to contain milk and a teat for attachment to the container and having a teat volume. The baby bottle device further comprises a valve unit arranged outside the teat volume for allowing air to flow into the container volume without coming into contact with milk inside the teat volume.

The teat does not need its own valve. Thus, only one valve is used, which
15 allows air to enter the space in the container volume outside the teat volume.

According to another embodiment, there is a teat coupling device for a baby
bottle device, the baby bottle device comprising a container having a container volume to contain milk and a teat for attachment to the container and having a teat volume. The teat coupling device comprises a valve unit for arranging outside the teat volume for allowing air
20 to flow into the container volume without coming into contact with milk inside the teat volume.

A teat device (assembly) comprises the teat coupling device and the teat.

This provides a teat coupling device for the baby bottle device of the
invention. The teat coupling device incorporates a valve unit. The teat itself may have at
25 least one first valve for allowing air to flow from the outside of the teat into the teat volume, and the valve unit then comprises a second valve, which has a lower cracking pressure than the first valve.

In all of these embodiments, the device may comprise an adapter for coupling
the teat and the container. This adapter may be considered to be part of the teat coupling
30 device. The valve unit can be arranged in the region of the adapter.

According to an embodiment of the invention, a partitioning element can be
provided between the teat volume and the container volume. This partitioning element may
be considered to be part of the teat coupling device.

According to an embodiment, the valve unit can be part of the partitioning element. Thus, only one piece needs to be manufactured.

In particular, such a valve can be embodied as a duckbill valve in the partitioning module.

5 According to a further embodiment, the valve of the valve unit can be attached at one end to the partitioning module and the other end can be pressed against the container or the adapter. Such an implementation can be advantageous in view of dimensional tolerances.

10 According to an embodiment, a baby bottle comprising a container, a teat, optionally an adapter and optionally a separator is provided. The separator can be implemented as a portioning element and is placed between the teat and the container. An air valve is integrated in the separator enabling an air flow into the bottle outside of the volume of the teat. The teat comprises a further valve. The valve in the separator can be implemented as a flexible sheet of material that when mounted in the bottle is in contact with a solid
15 surface, namely a wall of the container. The valve is part of the partitioning element. Hydrostatic pressure can press the flexible sheet of the valve unit against the surface of the wall of the container thus preventing leakage towards the outside of the bottle. When the bottle is in use and the baby is sucking, the air pressure difference with the outside atmosphere pushes the flexible sheet of material aside creating a channel for the inflow of air.

20 According to an aspect of the invention, a method of producing a baby bottle device is provided. A teat having a teat volume and at least a first valve is provided. A container having a container volume is also provided as well as a valve unit arranged outside the teat volume. The valve unit has a second valve which has a lower cracking pressure than the first valve.

25 It shall be understood that a preferred embodiment of the present invention can also be any combination of the dependent claims or above embodiments with the respective independent claim.

 These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter.

30

BRIEF DESCRIPTION OF THE DRAWINGS

In the following drawings:

Fig. 1 discloses a schematic representation of a baby bottle device,

Fig. 2A shows a further schematic cross section of a baby bottle device according to an embodiment,

Fig. 2B shows an enlarged portion of the baby bottle according to Fig. 2A,

Fig. 3A shows a further schematic cross section of a baby bottle device according to an embodiment,

Fig. 3B shows an enlarged portion of the baby bottle according to Fig. 3A,

Fig. 4A shows a further schematic cross section of a baby bottle device according to an embodiment, and

Fig. 4B shows an enlarged portion of the baby bottle according to Fig. 4A.

DETAILED DESCRIPTION OF EMBODIMENTS

Fig. 1 discloses a schematic representation of a baby bottle device. The baby bottle 100 comprises a container 120 with a container wall 120a, a teat 110 and optionally an adapter 130 for example in form of an attachment ring to attach the teat 110 to the container 120. The container 120 comprises a thread 121 which can interact with a thread 131 of the adapter 130 such that the teat 110 can be fastened to the container 120. The container 120 comprises a container volume 125 and the teat 110 comprises a teat volume 115. The teat 110 comprises at least one valve 112 and holes/apertures 116.

The valve 112 is defined in the vicinity of a lip of the opening to the container volume. It allows air to flow from the outside of the teat into the teat volume. There is for example an air passage past a gap between the lip of the container opening and the teat, and then to the valve 112 (this can be seen in Figure 2A). Thus, as milk is removed from the container, a resulting negative pressure in the air space behind the milk creates a pressure across the valve 112 and allows air to fill the container volume, via the teat, to replenish the volume vacated by the milk. The pressure is again equalized. The valve 112 is for example a flap valve. The valve 112 has a first cracking pressure (i.e. a differential pressure across the valve) at which the air is able to flow. The valve 112 is a one way valve, only allowing air to flow into the teat volume.

Note that the first valve 112 is a conventional known valve for allowing venting of the container through the teat. It is part of the design of the teat.

Optionally, a partitioning element 300 can be provided between the teat 110 and the container 120. Furthermore, a valve unit 200 is provided outside the teat volume 115. The valve unit 200 can in particular be provided in the region of the adapter 130 if an adapter is present. The valve unit 200 can be provided between the partitioning element 300 and the

wall 120a of the container 120. Accordingly, the valve function is moved away from the teat volume 115.

A (second) cracking pressure of the valve unit 200 is lower than the (first) cracking pressure of the valve 112 of the teat 110. Accordingly, the valve unit 200 will allow
5 air to enter into the bottle at a lower pressure than the valve 112 of the teat 110. The valve unit 200 can be part of the partitioning element 300. They can be provided as one piece.

According to an embodiment, the valve unit 200 can be provided between an open end of the container 120 and the adapter 130 or between the container wall 120a and the
10 partitioning element 300.

According to an embodiment, the valve unit 200 can be provided at the partitioning module 300 and can bear against the wall 120a of the container as shown in Fig. 2A.

Fig. 2A shows a further schematic cross section of a baby bottle device
15 according to an embodiment. Fig. 2B shows an enlarged portion of the baby bottle according to Fig. 2A. The bottle 100 comprises a container 120 with a wall 120a, a teat 110 and optionally an adapter 130. A partitioning element 300 is provided between a volume 125 of the container and a volume 115 of the teat 110. The partitioning element 300 comprises several openings 310, 320. A valve unit 200 is provided e.g. at the circumference of the
20 partitioning unit 300 and bears against a wall 120a of the container 120. The valve unit 200 allows outside air A to flow into the container volume 125 without coming into contact with the milk M inside the teat 110. The valve unit 200 is attached to the partitioning element 300 and can have a flexible material (like rubber, silicone rubber) such that a flexible arm 210 is pressed against the inside of the container wall 120a. The arm 210 and the partitioning element
25 300 can be manufactured by a 2K (two component) manufacturing, e.g. as one piece.

Fig. 3A shows a further schematic cross section of a baby bottle device according to an embodiment. Fig. 3B shows an enlarged portion of the baby bottle 100 according to Fig. 3A. The structure of the bottle as shown in Fig. 3A substantially corresponds to the structure of the bottle according to Fig. 2A. A valve unit 200 is provided
30 at the partitioning element 300 and interacts with the container wall 120a. Accordingly, an arm 220 of the valve 200 may press against the inside of the container wall. This can be beneficial in view of dimensional tolerances.

Fig. 4A shows a further schematic cross section of a baby bottle device according to an embodiment. Fig. 4B shows an enlarged portion of the baby bottle according

to Fig. 4A. The bottle according to Fig. 4A corresponds to the bottle according to Fig. 2A or 3A with the exception of the partitioning unit 300 and the valve unit 200. The valve unit 200 can comprise a duckbill valve 230 and is part of the partitioning element 300.

5 With the baby bottle device according to Fig. 2A, 3A or 4A, it is effectively possible to avoid that outside air coming through a vent is travelling through the milk before it can reach the inner volume of the container. Thus, the amount of air in the milk can be significantly reduced which is advantageous in view of a colic prevention.

The cracking pressure of the valve unit 200 (the second cracking pressure) is lower than the cracking pressure of the valve 112 (the first cracking pressure) in the teat.
10 Thus, it can effectively be avoided that air is entering through the teat volume such that the amount of air inside the milk is increased.

The valve unit 200 can be implemented as a flexible sheet of material which interacts with the wall 1200 of the container 120 and is attached to the partitioning element 300. As an example, a flexible arm may be pressed against an inside of the wall of the bottle.

15 In the embodiment of Fig. 2A and 3A, the valve unit 200 is arranged between the partitioning element 300 and a wall of the container.

The valve unit 200 according to Fig. 4A and 4B is implemented as a duckbill valve which is not in contact with the container wall.

In the examples above, the baby bottle device has two valves. One is in the
20 teat and one communicates with the container volume outside the teat volume. However, the teat does not need its own valve, since it is in any case rendered ineffective by the added valve unit. The advantage of the teat having its own valve is that the teat may be used with the container without the partitioning element 300 and hence without the valve unit defined by the partitioning element. It also means that a standard teat (with integrated valve) may be
25 used with the partitioning element.

The invention also provides an implementation in which the teat does not have its own valve. Such a teat could not be used without the valve unit, since there would then be no venting of the container volume.

The invention also provides a teat coupling device which implements the valve
30 unit, for example in the form of the partitioning element 300 and optionally also the adapter element 130.

The invention may thus be applied to baby bottles which are sold having a valve in the teat which functions to allow air into the bottle when liquid/milk leaves via the teat opening. The teat coupling device is an add-on device which can be bought separately

and inserted into the existing line of baby bottles to add a second function. The function of the teat coupling device is to keep the teat volume filled with liquid only with no bubbles.

The add-on separates the teat-volume from the main bottle-volume. Since the original air valve of a standard teat is located within the teat volume, which however now
5 needs to remain filled, this valve no longer should let air come in so that the valve unit of the teat coupling device can function.

Because the valve unit is located closer to the air volume in the bottle than the original teat valve, bubbling will be mostly non-existing or at least much less depending on the orientation of the bottle.

10 Other variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims.

In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality.

15 A single unit or device may fulfill the functions of several items recited in the claims. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

Any reference signs in the claims should not be construed as limiting the scope.

CLAIMS:

1. Baby bottle device (100) comprising

- a container (120) having a container volume (125) to contain milk, and
 - a teat (110) for attachment to the container and having a teat volume (115) and at least one first valve (112) for allowing air to flow from the outside of the teat into the teat volume
- 5 (115),

characterized in that the baby bottle device further comprises:

- a valve unit (200) arranged outside the teat volume (115) for allowing air to flow into the container volume without coming into contact with milk inside the teat volume,

10 wherein the valve unit (200) comprises a second valve (210, 220, 230), which has a lower cracking pressure than the first valve (112).

2. Baby bottle device (100) comprising

- a container (120) having a container volume (125) to contain milk, and
- a teat (110) for attachment to the container and having a teat volume (115),

15 characterized in that the baby bottle device further comprises:

- a valve unit (200) arranged outside the teat volume (115) for allowing air to flow into the container volume without coming into contact with milk inside the teat volume.

3. A teat coupling device for a baby bottle device, the baby bottle device

20 comprising a container having a container volume (125) to contain milk and a teat (110) for attachment to the container and having a teat volume (115),

characterized in that the teat coupling device comprises:

- a valve unit (200) for arranging outside the teat volume (115) for allowing air to flow into the container volume without coming into contact with milk inside the teat volume.

25

4. A teat device comprising:

- a teat coupling device as claimed in claim 3; and
- a teat (110).

5. Device according to any one of claims 1 to 4, further comprising an adapter (130) for coupling the teat (110) to the container (120), wherein the valve unit (200) is arranged in the region of the adapter (130).
- 5 6. Device device according to any one of claims 1 to 5, further comprising a partitioning element (300) between the teat (110) and the container volume (125), wherein the partitioning element (300) comprises at least one opening (310) for letting fluid in the container volume (125) flow into the teat volume (115).
- 10 7. Device according to claim 6, wherein the valve unit (200) is part of the partitioning element (300).
8. Device according to claim 6 or 7, wherein the valve unit (200) comprises a first arm (210) which is fixedly attached to the partitioning element (130) at its first side and
15 which at its second end is for lying against a wall (120a) of the container (120) to enable outside air (A) to enter into the container (120).
9. Device according to claim 6 or 7, wherein the valve unit (200) is attached to the partitioning element (300) and comprises an arm (220) which is for bearing against the
20 wall (120a) of the container (120).
10. Device according to claim 6 or 9, wherein the valve unit (200) comprises a duckbill valve (230), which is arranged in the partitioning element (300).
- 25 11. Method of producing a baby bottle device (100), comprising the steps of:
- providing a container (120) having a container volume (125) for containing milk,
- providing a teat (110) for attachment to the container, having a teat volume (115) and at least one first valve (112) for allowing air to flow from the outside of the teat
30 into the teat volume (115), and
- providing a valve unit (200) arranged outside the teat volume (115) for allowing air to flow into the container volume without coming into contact with milk inside the teat volume,

wherein the valve unit (200) comprises a second valve (210, 220, 230) which has a lower cracking pressure than the first valve (112).

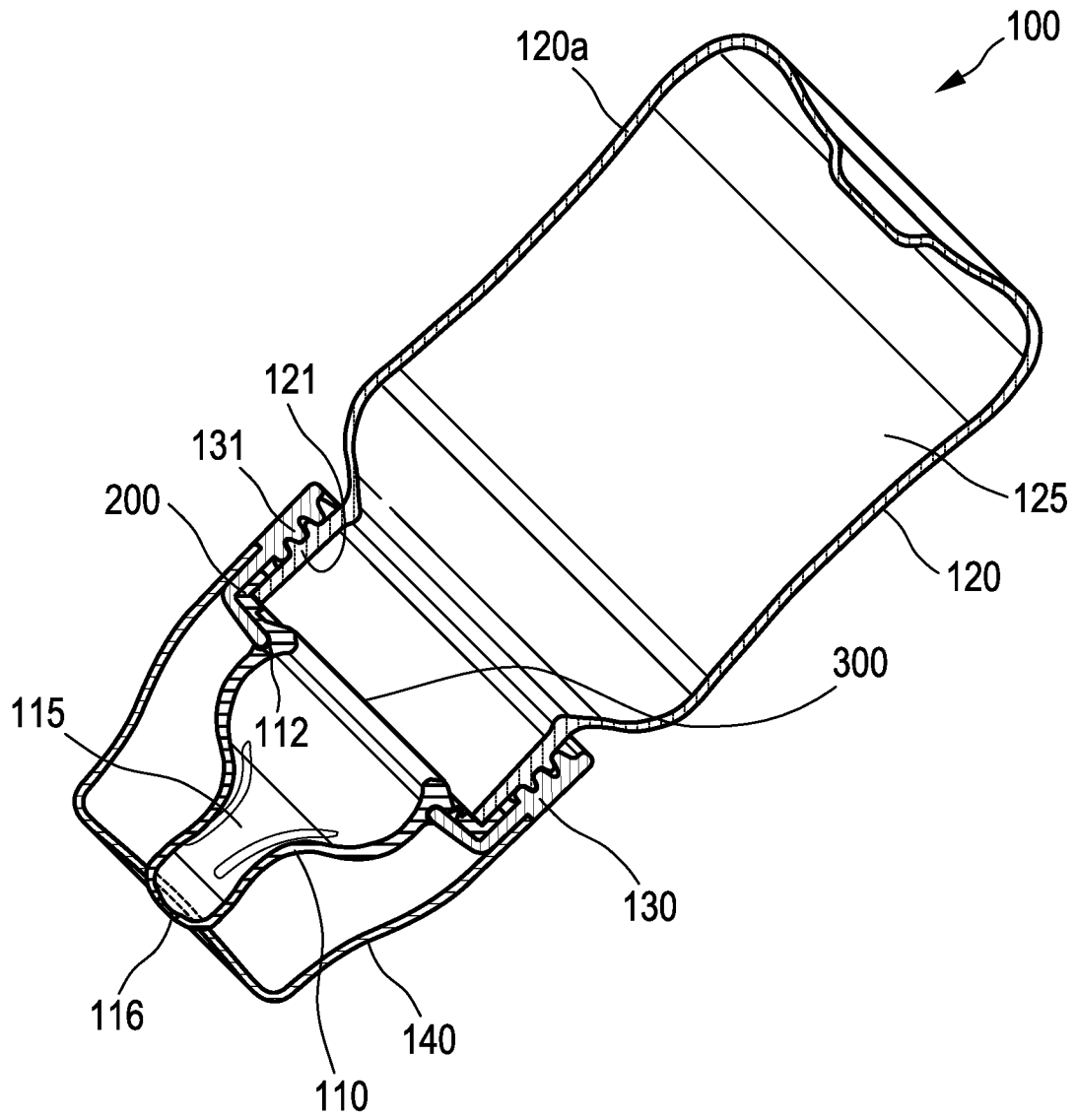


FIG. 1

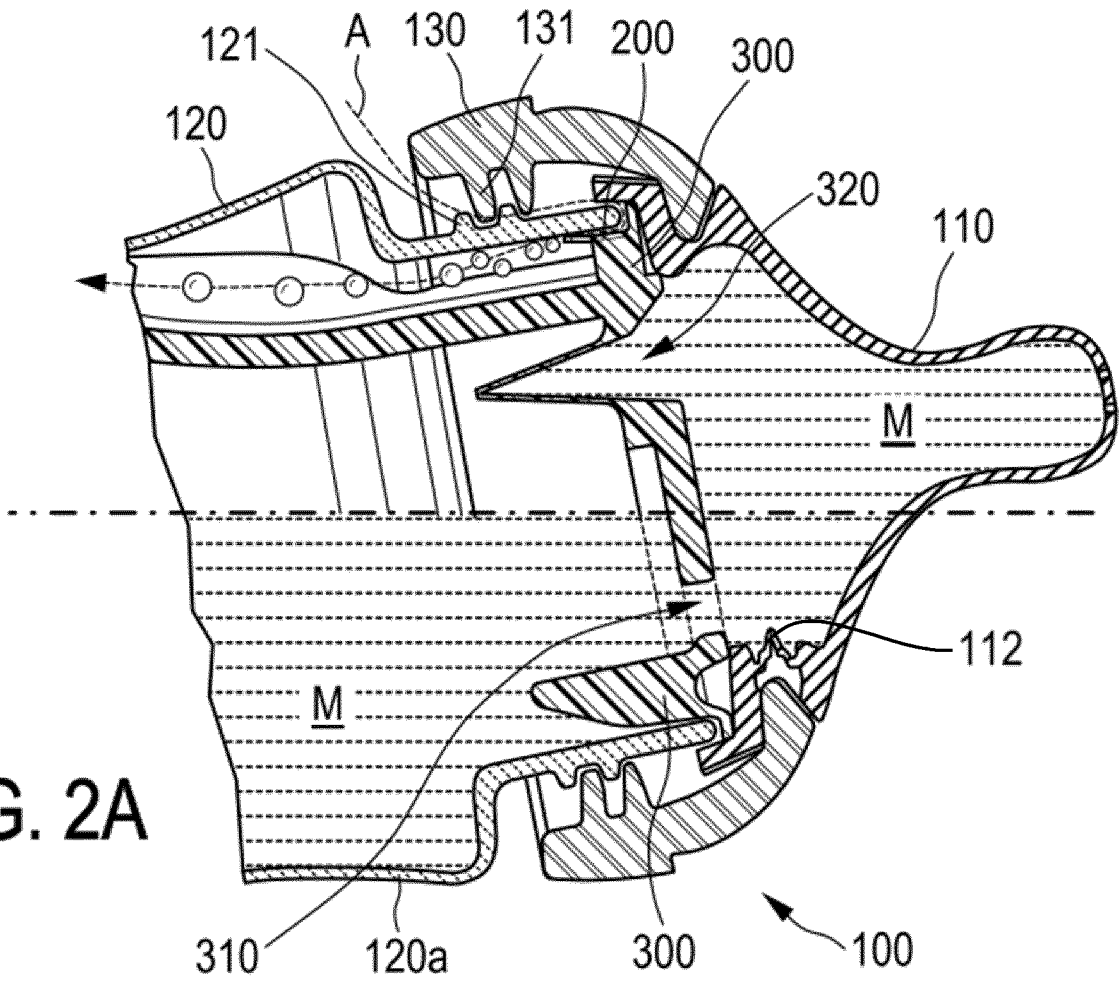


FIG. 2A

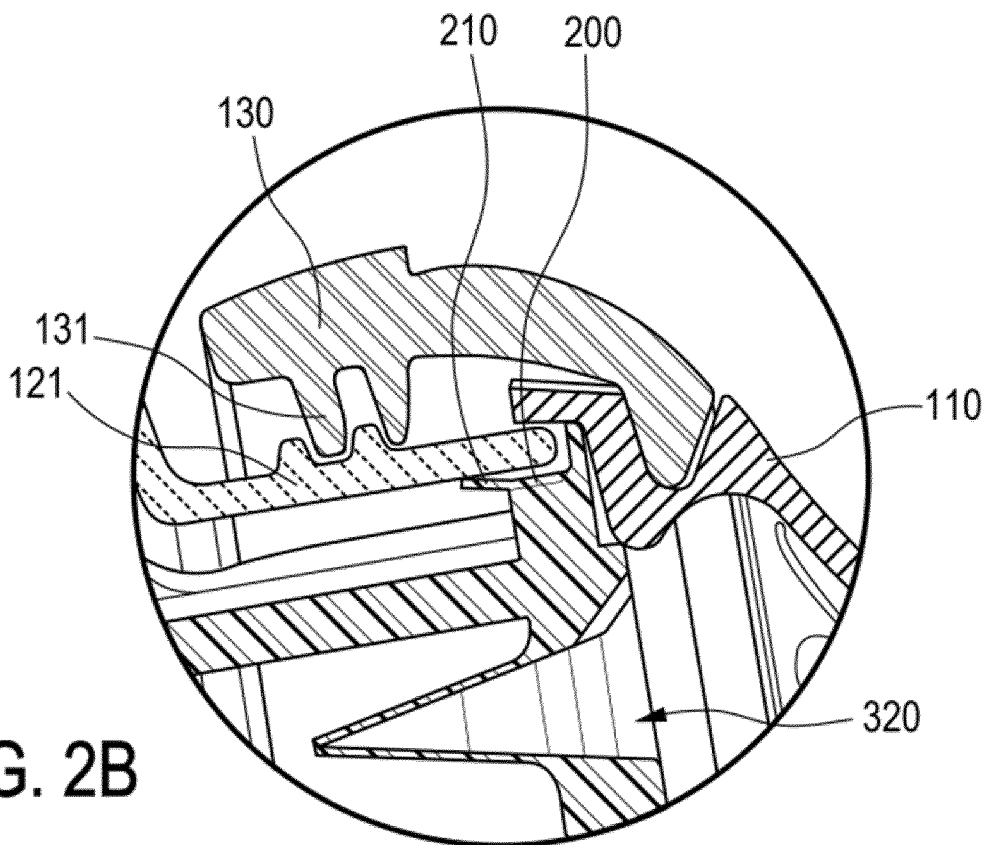


FIG. 2B

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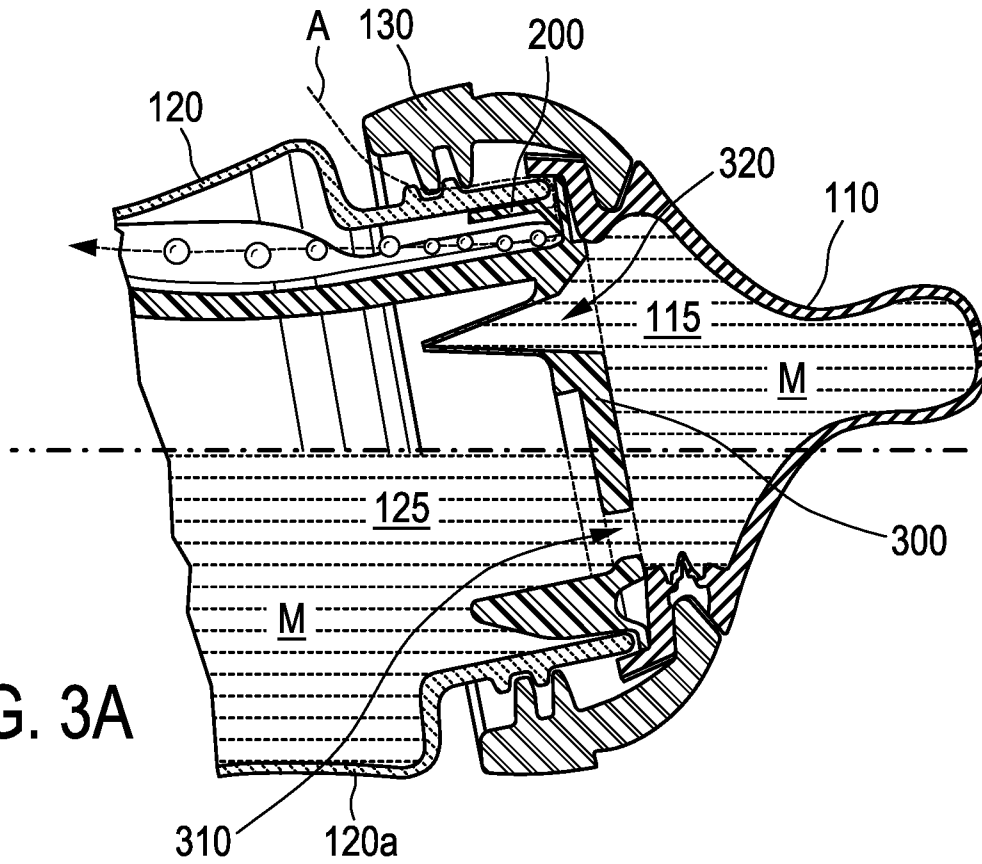


FIG. 3A

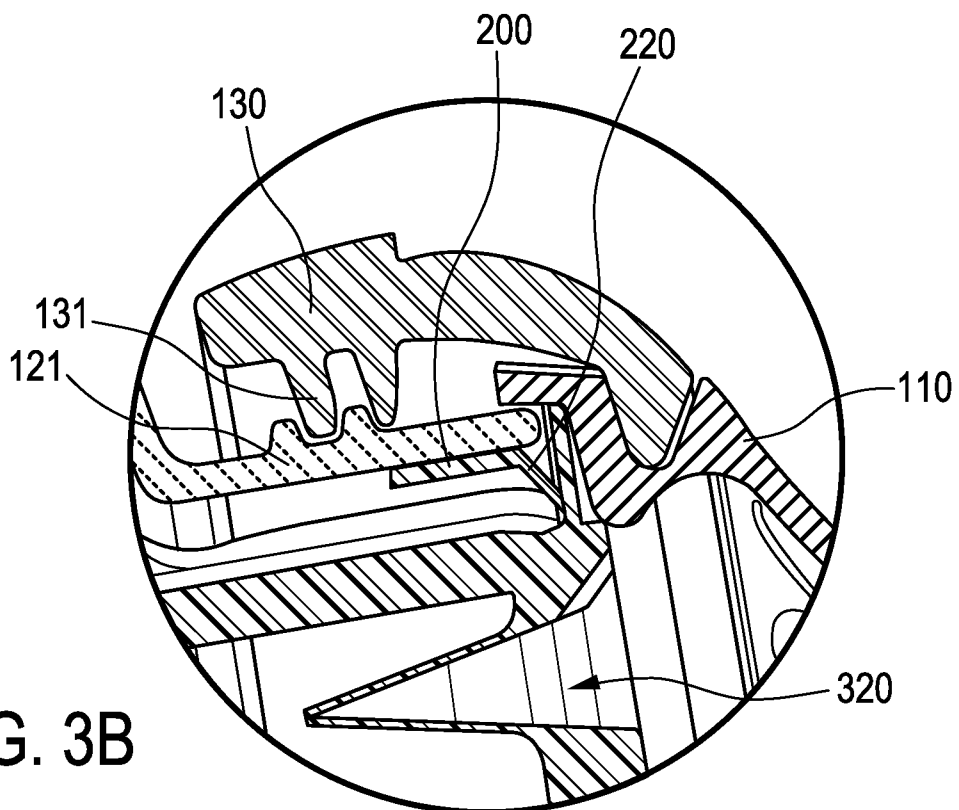


FIG. 3B

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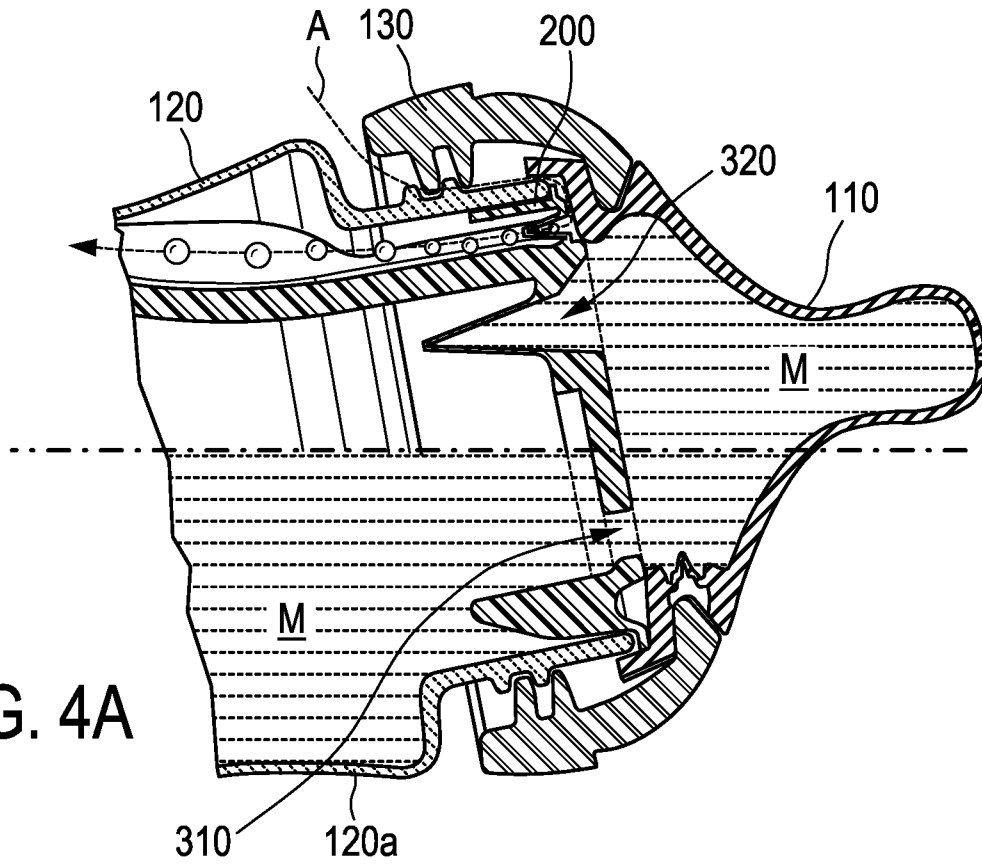


FIG. 4A

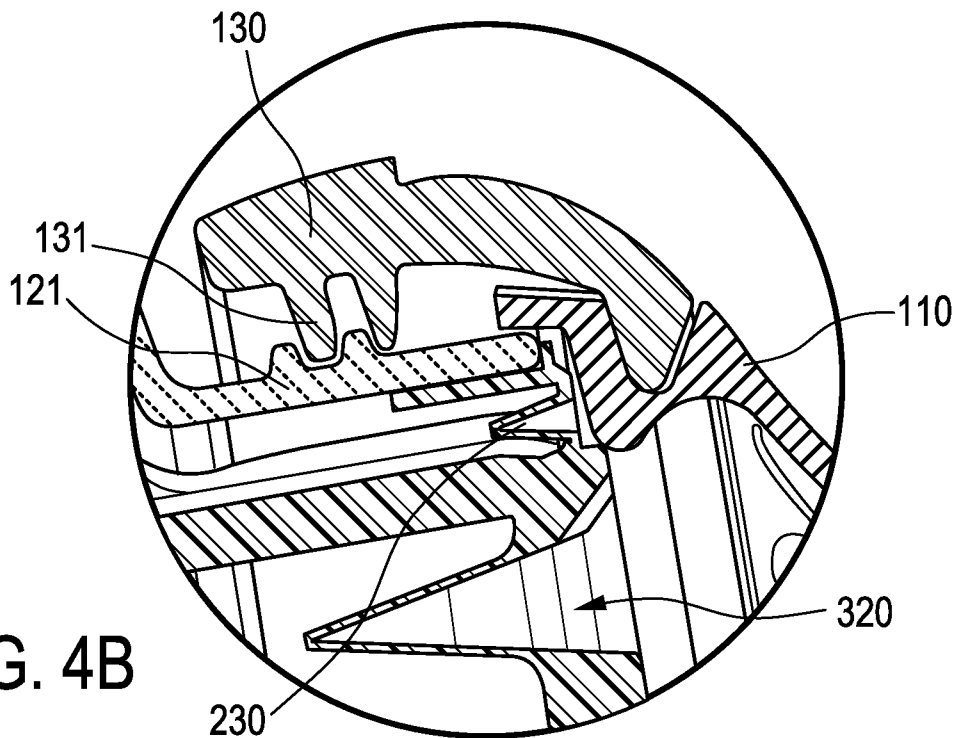


FIG. 4B

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2020/050004

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61J9/04 A61J11/02 A61J11/04
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)
A61J
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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	FR 1 364 632 A (MARION ANTOINE LOUIS EMILE) 26 June 1964 (1964-06-26) page 4, lines 5-9; figure 20	1
X	EP 1 354 579 A1 (GRASSET PIERRE [FR]) 22 October 2003 (2003-10-22) abstract; figures 1-3	2-10
X	WO 2006/103379 A1 (SAMSON ILAN ZADIK [GB]) 5 October 2006 (2006-10-05) abstract; figures 1,2	2
A		10
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Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>
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Date of the actual completion of the international search 12 February 2020	Date of mailing of the international search report 21/02/2020
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Birlanga Pérez, J
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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2020/050004

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 299 06 849 U1 (NUERNBERG GUMMI E HARTMANN KG [DE]) 15 July 1999 (1999-07-15) the whole document	1-8
A	----- DE 197 16 535 A1 (RUMMEL HEIKE [DE]; STROMSKI JOACHIM [DE] ET AL.) 6 November 1997 (1997-11-06) abstract; figures 1,2	1-8
A	----- CN 201 164 602 Y (NINGBO HAPPY BABY INFANT ARTIC [CN]) 17 December 2008 (2008-12-17) figures 1-3	10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/EP2020/050004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5747083	A	05-05-1998	NONE

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