



- (51) International Patent Classification:
B01L 3/00 (2006.01)
- (21) International Application Number:
PCT/EP2012/069142
- (22) International Filing Date:
27 September 2012 (27.09.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
11183127.7 28 September 2011 (28.09.2011) EP
- (71) Applicant: **BIOCARTIS SA** [CH/CH]; EPFL-Quartier de l'Innovation G, CH-1015 Lausanne (CH).
- (72) Inventors: **BOSMA, Rob**; Philips, Ouwenberg 11, NL-5641 Eindhoven (NL). **DE GIER, Ronald**; Philips, Tours-laan 39/D, NL-5627 Eindhoven (NL).
- (74) Agents: **GUTMANN, Ernest** et al.; Yves Plasseraud SAS, 3, rue Auber, F-75009 Paris (FR).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,

BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- with amended claims (Art. 19(1))

(54) Title: SEALING DEVICE FOR USE IN A CARTRIDGE FOR MEDICAL DIAGNOSTICS

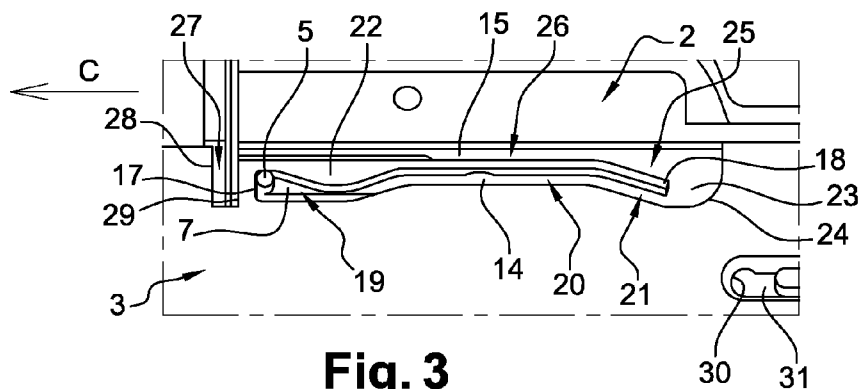


Fig. 3

(57) Abstract: The present invention relates to a sealing device for closing an introduction aperture, the sealing device comprising a fixed support (2) and a shutter (3) mounted movably in translation relative to the support between an extended position and a final retracted position, wherein the sealing device is in a final retracted configuration and wherein the shutter closes introduction aperture. The device includes locking means for preventing any movement of the shutter when it is in the final retracted position. The sealing device further comprises an intermediate retracted configuration, wherein the shutter is at least partly retracted. The sealing device also comprises motion guiding means (5, 7, 14) for guiding the movement of the shutter and designed so that the extension of the shutter is required to move the shutter from the intermediate retracted position to the final retracted position.

WO 2013/045587 A1

SEALING DEVICE FOR USE IN A CARTRIDGE FOR MEDICAL DIAGNOSTICS

The present invention relates to a sealing device for use in a cartridge.

5 Advanced biotechnology research is nowadays focusing on multiplexed biological assays, which require high reproducibility and reliability. Recently, a cartridge for automated medical diagnostics, as described in WO 2007/004103, has proved to be a promising yet simple and practical solution. Such a cartridge usually contains all necessary equipment and
10 reagents to run said diagnostic assays on a biological sample. The equipment in particular comprises various reagent compartments and a preparation chamber wherein a sample to be analyzed can be introduced and contacted with said reagents contained in the compartments. To allow the introduction of the biological sample in the preparation chamber, the latter usually comprises
15 an introduction aperture through which the biological sample can be introduced by the user via a swab.

 Preferably, the introduction aperture must be sealed once the biological sample has been introduced in the preparation chamber in order to avoid leakages and/or contaminations. Usually, a closure device is designated
20 to insure a tamper-proof sealing of the preparation chamber during and/or after the diagnostic assays, meaning that the preparation chamber cannot be reopened by the user under normal use conditions. Thus, this prevents any direct contamination of the user or of the biological material contained in the preparation chamber and vice-versa. A cartridge that is sealed in such a
25 tamper-proof manner will also ensure that the introduction opening will not be untimely reopened while the assay is running, which would invalidate the result of the biological assays due to possible contaminations of the preparation chamber.

 A typical closure device existing in the art comprises a support and
30 a closure element mounted movably in translation relative to the support between an extended position and a retracted position wherein the closure device is in a retracted configuration and wherein the closure element closes said aperture. The typical closure device further includes locking means for preventing movement of the closure element once the latter is placed in the
35 retracted position.

A cartridge equipped with this closure device presents however disadvantages:

The classical closure device may close untimely before the introduction of a biological sample which could render the cartridge unusable.

- 5 One will understand that a user may easily and inadvertently close the introduction aperture by simply pushing the closure element prior to introducing the biological sample. The untimely closure may also occur during the packaging and/or transport of the cartridge.

10 The present invention aims to remedy all or part of the disadvantages mentioned above.

The present invention fulfills these objectives and provides a sealing device for closing an introduction aperture, the sealing device comprising a fixed support and a shutter mounted movably in translation relative to the support between an extended position and a final retracted position, wherein when the shutter is in said final retracted position the sealing device is in a final retracted configuration and the shutter closes said introduction aperture, the device further including locking means for preventing any movement of the shutter when it is in the final retracted position, the sealing device being characterized in that it comprises an intermediate retracted configuration, wherein the shutter is at least partly retracted when the sealing device is in said intermediate retracted position, the sealing device being further characterized in that it comprises motion guiding means for guiding the movement of the shutter and designated so that the extension of the shutter is required to move the shutter from the intermediate retracted position to the final retracted position

Thus, the sealing device according to the present invention comprises an intermediate retracted position and motion guiding means to prevent the untimely closure. It is advantageous to store or carry a cartridge equipped with the sealing device according to the invention placed in its intermediate configuration. Said motion guiding means prevent the move of the shutter from the intermediate retracted position to the final retracted position by a direct thrust. The motion guiding means are such that they impose the shutter to be moved from the intermediate retracted position to the final retracted position by a motion that comprises its extension from the intermediate retracted position to an extended position. Then, once extended, the shutter can be retracted towards the final retracted position. Thus, a user cannot move

inadvertently the shutter from the intermediate retracted position to the final retracted position by a simple pushing motion on the shutter. The fact that the shutter must first be moved to an extended position before being retracted implies an intentional action of the user.

5 According to an embodiment of the present invention, the sealing device comprises switching means designed to shunt the movement of the shutter, when the shutter is being extended, so as to prevent the return of the shutter in the intermediate configuration. Advantageously, the switching means are designed to prevent the return in the intermediate retracted position when
10 the shutter has been extended beyond a switching position. The switching means prevent the user from pushing the shutter back into the intermediate retracted position, when it has been extended beyond the switching position. Thus, the user does not have to worry about whether the shutter has been pushed back in the final retracted position and not in the first retracted position.

15 According to an embodiment of the present invention, the sealing device further comprises retaining means designed to prevent the extension of the shutter beyond the extended position.

In a preferred embodiment, the retaining means comprise a second limit stop. The retaining means prevent the separation of the shutter from the
20 fixed support. The limit stop allows maintaining the shutter and the support assembled together and thus avoids the operator having to reinsert the extended shutter in the fixed support.

 According to an embodiment of the present invention, the motion guiding means comprise at least a guide-pin, at least a deformable tongue and
25 at least a guide groove cooperating together. Advantageously, the switching means comprise a deformable tongue and a first guide groove, said first guide groove being designated to cause an elastic deformation of said tongue in a third switching portion of said first guide groove comprising said switching position.

30 According to a possibility of the invention the sealing device comprises cutting means designed to cut a swab inserted in the introduction aperture when the shutter is moved towards the final retracted position. Thus, the cutting means allow the user to work safely and minimize the contamination of the swab comprising the sample, as the cutting means cut automatically the
35 swab. Advantageously, the cutting means comprise at least a cutting edge

mounted in a cutting slot and lying in the plane of the second plate of the shutter.

According to an embodiment of the present invention, the shutter and/or the support comprise or are made of polycarbonate.

5 According to an embodiment of the present invention, the shutter closes the introduction aperture when the sealing device is in the intermediate retracted configuration. Thus, the shutter ensure optimal storage conditions of the cartridge and in particular helps maintain a conditioned atmosphere during the storage and prevents the introduction of contaminants in the cartridge
10 before the introduction of the biological sample.

The present invention also relates to a cartridge for performing medical assays comprising a sealing device according to the present invention.

The present invention is further illustrated by the following detailed description set forth in view of the appended drawings, which represent an exemplary and explanatory embodiment of a sealing device not restrictive of
15 the invention, wherein:

figure 1 illustrates a bottom perspective view of the fixed support according to the present invention;

figure 2 illustrates a top perspective view of the closure device
20 according to the present invention;

figure 3 illustrates a partial bottom perspective view of the sealing device in the intermediate retracted configuration;

figure 4 illustrates a view similar to the figure 3 wherein the sealing device is in the extended configuration;

figure 5 illustrates a view similar to the figure 3 wherein the sealing device is in the final retracted configuration;

In order to avoid leakages and contaminations, a sealing device according to the present invention is designed to close an introduction aperture 1 provided in a diagnostic cartridge for introducing a biological sample. The
30 sealing device comprises a fixed support 2, shown in the figure 1, and a shutter 3, shown in the figure 2, designed to be movably mounted in translation on the fixed support 2. The sealing device further comprises motion guiding means, designed to guide the movement of the shutter 3 on the fixed support 2 when the shutter 3 is being extended.

35 The fixed support 2, illustrated in the figure 1, comprises a first plate 4 having a substantially rectangular shape and delineating the

introduction aperture 1. The first plate 4 is provided with two cylindrical guide-pins 5 at one of its ends that corresponds to the width of the plate 4. The two guide-pins 5 are symmetrically located with respect to the longitudinal axis of the first plate 4 and extend in a direction substantially perpendicular to the plane of the first plate 4, so as to protrude from a first contacting side 6 of said first plate 4. The guide-pins 5 are respectively located at the end of two tongues 7 which are elastically deformable. Each tongue 7 is positioned in a slot 8 of the first plate 4 and extends in a direction substantially parallel to the longitudinal axis A of said first plate 4. Advantageously the first plate 4 comprises at least two tips 9 elastically deformable located on the edge of the insertion aperture 1, said tips 9 defining a gap 10 between them adapted to pinch a swab.

The shutter 3, shown in the figure 2, comprises a second plate 11 substantially rectangular and designed to cover totally or partially the insertion aperture 1, depending of the relative positions of the shutter 3 and the fixed support 2. The shutter 3 further comprises a prehension handle 12 substantially rectangular in shape and which length corresponds substantially to the width of the second plate 11. The prehension handle 12 extends substantially perpendicularly from one of the edges defining the width of the second plate 11, and is intended to be grasped by the user and is intended to enable the user to move the shutter 3. The second plate 11 of the shutter 3 comprises on a second contacting side 13 two pairs of guide grooves, each pair comprising a first guide groove 14 and a second guide groove 15. Each first and second guide groove 14, 15 extends in a direction substantially parallel to the longitudinal axis B, shown in figure 2, of the second plate 11 and is disposed along an edge 16 forming the length of the shutter 3. Each first guide groove 14 extends between a first limit stop 17, located near the prehension handle 12, and a switching position 18 distant from the prehension handle 12. The first guide groove 14 comprises three portions 19, 20, 21 which extend successively from the first limit stop 17 to the switching position 18. The said first portion 19 comprises at one of its end the first limit stop 17 and is curved in such a way to form a boss 22. The second portion 20, substantially straight, is followed by a third switching portion 21 extending to the switching position 18. The third switching portion 21 is curved towards the longitudinal axis B of the second plate 11. The third switching portion 21 opens onto a linking area 23. The linking area 23 comprises advantageously retaining means formed by a second limit stop 24 arranged facing the switching position 18. Each second guide

groove 15 comprises three parts 25, 26, 27 of guide groove which extend successively from the switching position 18 towards the prehension handle 12. The first part 25 is curved toward the prehension handle 12 and towards the nearest edge forming the length of the second plate 11. The second part 26
5 extends the first part 25 and is substantially straight, extending between the nearest edge 16 of the second plate 11 and the first guide groove 14. The second portion 20 and the second part 26 of a given guide groove pair, are substantially parallel to each other. The third part 27 forms an extension of the second part 26 and extends perpendicularly to the longitudinal axis B of the
10 second plate 11, between the first limit stop 17 of the first guide groove 14 and the prehension handle 12. Walls of the third part 27 form a second and third limit stop 28, 29. Advantageously, the shutter 3 further comprises cutting means. The cutting means comprises a cutting edge 30 disposed in a cutting slot 31 located at the opposite end of the prehension handle 12. The cutting
15 edge 30 lies in the plane of the second plate 11 of the shutter 3.

The motion guiding means of the sealing device comprise the cylindrical guide-pins 5, the tongues 7 and the first and second guide grooves 14, 15.

The motion guiding means are designed so that the shutter 3 is
20 moved along a first path between the intermediate retracted position and the extended position and along a second path between the extended position and the final retracted position. The switching means induce an elastic deformation of at least a part of the motion guiding means during the switching from the first path to the second path.

25 The shutter 3 and the support 2 are made of polycarbonate.

In working order, the shutter 3 is mounted on the fixed support 2 so that the first contacting side 6 of the fixed support 2 is positioned facing the second contacting side 13 of the shutter 3, so that each guide-pin 5 is inserted in a first guide groove 14. When the guide-pins 5 are in contact with a first limit
30 stop 17, the sealing device is in an intermediate retracted configuration as shown in the figure 3. The displacement of the shutter 3 by the operator induces the movement of each guide-pin 5 in a first guide groove 14 and/or in a second guide groove 15. Each first limit stop 17 blocks guide-pins 5 and prevents the operator from pushing the shutter 3 in the direction opposite to the
35 direction indicated by the arrow C shown in the figure 3 to 5. From the intermediate retracted position and in order to open the insertion aperture 1, the

operator has to pull the shutter 3 to move the guide-pins 5 along the first portion 19 of the guide groove 14, in the direction indicated by the arrow C. The boss 22 is designed to prevent the movement of the guide-pins 5 without the intervention of the operator. Indeed, the orientation and the form of the boss 22 as well as the form and orientation of the tongues 7 are chosen in order to require the deformation of the tongues 7, therefore requiring the operator to increase its effort while pulling the shutter 3 from the intermediate retracted position. When the operator continues to pull the shutter 3 in the direction indicated by the arrow C, the guide-pins 5 come out into the second portion 20 of the first guide groove 14. The operator, when continuing to pull the shutter 3, further induces the displacement of the guide-pins 5 from the second portion 20 to the third switching portion 21. The form of the third switching portion 21 and the movement of the guide-pins 5 in the third switching portion 21 bring the guide-pins 5 closer to the longitudinal axis A of the plate 11 and induce a deformation of the tongues 7, when the shutter 3 is displaced and until the guide-pins 5 arrive in the switching position 18. The movement of the guide-pins 5 in the first portion 19, in the second portion 20 and in the third switching position 18 is possible in the direction indicated by the arrow C or in the opposite direction. When the guide-pins 5 are moved in the direction indicated by the arrow C, beyond the switching position 18, the guide-pins 5 come out into the linking area 23 and the tongues 7 spring back to their initial form immediately after the switching position 18 is gone past. The initial form of the tongues 7 is chosen in such a way that each guide-pin 5 is facing the first part 25 of the second guide groove 15, in the linking area 23, when the tongues 7 are not bent. Immediately after the switching position is gone past when the guide-pins 5 are moved in the direction indicated by the arrow C, the sealing device is in the deployed configuration as shown in the figure 4. The guide-pins 5 can be moved within the linking area 23 in the direction indicated by the arrow C or in the opposite direction. Advantageously, the second limit stop 24 of the linking area 23 blocks the guide-pins 5 and prevents the operator from pulling the shutter 3 further and prevents from moving the guide-pins 5 beyond the linking area 23. Thus, the shutter 3 cannot be disassembled from the fixed support 2 by pulling it. In the extended position, the operator may insert through the insertion aperture 1 of the sealing device a swab comprising a biological sample to be analyzed. To proceed to do the assays on the sample in the proper conditions, the shutter 3 must be locked. The operator must therefore

push the shutter 3 in the direction opposite to the direction indicated by the arrow C. In doing so, the operator leads the cylindrical guide-pins 5 to leave the linking area 23 and to enter the second guide groove 15 past the switching position 18. Indeed, considering the form of the tongues 7 and the forms of the guide groove 14, 15, the guide-pins 5 cannot enter the third switching portion 21 of the first guide groove 14. The first part 25 is curved and forces the operator to increase its effort while pushing the shutter 3 in the direction opposite to the direction indicated by the arrow C as the guide-pins 5 move along the first part 25 and the tongues 7 are being bent. The movement of the cylindrical guide-pins 5 in the first and second parts 26, 27 is possible in the direction indicated by the arrow C as well as in the opposite direction. The form of the tongues 7 and the forms and positions of the first and second parts 25, 26 are chosen so that the tongues 7 are bent when the guide-pins 5 are in the first and second parts 25, 26. When the operator continues to push the shutter 3, the guide-pins 5 enter the third part 27 which causes the tongues to spring back to their initial form immediately. When the guide-pins 5 are in the third part 27, the second and third limit stop 28, 29 form locking means and block the guide-pins 5 in order to prevent the shutter 3 from being moved. In this configuration, the sealing device is in the final retracted configuration as shown in the figure 5. The sealing device in the final retracted position is locked and cannot be deployed, preventing from contaminations and leaks during the biological assays. Advantageously, when the swab is inserted inside the insertion aperture 1 and maintained by the tips 9, the cutting means are designated so that the swab is introduced inside the cutting slot 31 in order to be cut by the cutting edge 30 during the movement of the shutter 3 towards the final retracted position.

Other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and example be considered as exemplary only, with the true scope and spirit of the invention being indicated by the following claims.

CLAIMS

1. A sealing device for closing an introduction aperture (1), the sealing device comprising a fixed support (2) and a shutter (3) mounted movably in translation relative to the support (2) between an extended position and a final retracted position, wherein when the shutter (3) is in said final retracted position the sealing device is in a final retracted configuration and the shutter (3) closes said introduction aperture (1), the device further including locking means for preventing any movement of the shutter (3) when it is in the final retracted position, the sealing device being characterized in that it comprises an intermediate retracted configuration, wherein the shutter (3) is at least partly retracted when the sealing device (3) is in said intermediate retracted position, the sealing device being further characterized in that it comprises motion guiding means for guiding the movement of the shutter (3) and designated so that the extension of the shutter (3) is required to move the shutter (3) from the intermediate retracted position to the final retracted position.
2. Sealing device according to claim 1, comprising switching means designed to shunt the movement of the shutter (3), when the shutter (3) is being extended, so as to prevent the return of the shutter (3) in the intermediate configuration.
3. Sealing device according to claim 2, wherein the switching means are designed to prevent the return in the intermediate retracted position when the shutter (3) has been extended beyond a switching position (18).
4. Sealing device according to any one of claims 1 to 3, wherein the motion guiding means comprise at least a guide-pin (5), at least a deformable tongue (7) and at least a guide groove (14, 15) cooperating together.
5. Sealing device according to claim 4, wherein the switching means comprise a deformable tongue (7) and a first guide groove (14), said first guide groove (14) being designated to cause an elastic deformation of said tongue (7) in a third switching portion (21) of said first guide groove (14) comprising said switching position (18).

6. Sealing device according to any one of claims 1 to 5, further comprising retaining means designed to prevent the extension of the shutter (3) beyond the extended position.
- 5
7. Sealing device according to claim 6, wherein said retaining means comprise a second limit stop (24).
8. Sealing device according to any one of claims 1 to 7, further comprising cutting means designed to cut a swab inserted in the introduction aperture (1) when the shutter (3) is moved towards the final retracted position.
- 10
9. Sealing device according to claim 8, wherein the cutting means comprise at least a cutting edge (30) mounted in a cutting slot (31) and lying in the plane of the second plate (11) of the shutter (3).
- 15
10. Sealing device according to any one of claims 1 to 9, wherein the shutter (3) and/or the support (2) comprise or are made of polycarbonate.
- 20
11. Sealing device according to any one of claims 1 to 10, wherein the shutter (3) closes the introduction aperture (1) when the sealing device is in the intermediate retracted configuration.
- 25
12. Cartridge for performing medical assays comprising a sealing device according to any one of claims 1 to 11.

AMENDED CLAIMS

received by the International Bureau on 11 February 2013 (11.02.2013)

1. A sealing device for closing an introduction aperture (1), the sealing device comprising a fixed support (2) and a shutter (3) mounted movably in translation relative to the support (2) between an extended position and a final retracted position, wherein when the shutter (3) is in said final retracted position the sealing device is in a final retracted configuration and the shutter (3) closes said introduction aperture (1), the device further including locking means for preventing any movement of the shutter (3) when it is in the final retracted position, the sealing device being characterized in that it comprises an intermediate retracted configuration, wherein the shutter (3) is at least partly retracted when the sealing device (3) is in said intermediate retracted position, the sealing device being further characterized in that it comprises motion guiding means for guiding the movement of the shutter (3) and designed so that the extension of the shutter (3) is required to move the shutter (3) from the intermediate retracted position to the final retracted position.
2. Sealing device according to claim 1, comprising switching means designed to shunt the movement of the shutter (3), when the shutter (3) is being extended, so as to prevent the return of the shutter (3) in the intermediate configuration.
3. Sealing device according to claim 2, wherein the switching means are designed to prevent the return in the intermediate retracted position when the shutter (3) has been extended beyond a switching position (18).
4. Sealing device according to any one of claims 1 to 3, wherein the motion guiding means comprise at least a guide-pin (5), at least a deformable tongue (7) and at least a guide groove (14, 15) cooperating together.
5. Sealing device according to claim 4, wherein the switching means comprise a deformable tongue (7) and a first guide groove (14), said first guide groove (14) being designated to cause an elastic deformation of said tongue (7) in a third switching portion (21) of said first guide groove (14) comprising said switching position (18).

6. Sealing device according to any one of claims 1 to 5, further comprising retaining means designed to prevent the extension of the shutter (3) beyond the extended position.
- 5
7. Sealing device according to claim 6, wherein said retaining means comprise a second limit stop (24).
8. Sealing device according to any one of claims 1 to 7, further comprising cutting means designed to cut a swab inserted in the introduction aperture (1) when the shutter (3) is moved towards the final retracted position.
- 10
9. Sealing device according to claim 8, wherein the cutting means comprise at least a cutting edge (30) mounted in a cutting slot (31) and lying in the plane of the second plate (11) of the shutter (3).
- 15
10. Sealing device according to any one of claims 1 to 9, wherein the shutter (3) and/or the support (2) comprise or are made of polycarbonate.
- 20
11. Sealing device according to any one of claims 1 to 10, wherein the shutter (3) closes the introduction aperture (1) when the sealing device is in the intermediate retracted configuration.
- 25
12. Cartridge for performing medical assays comprising a sealing device according to any one of claims 1 to 11.

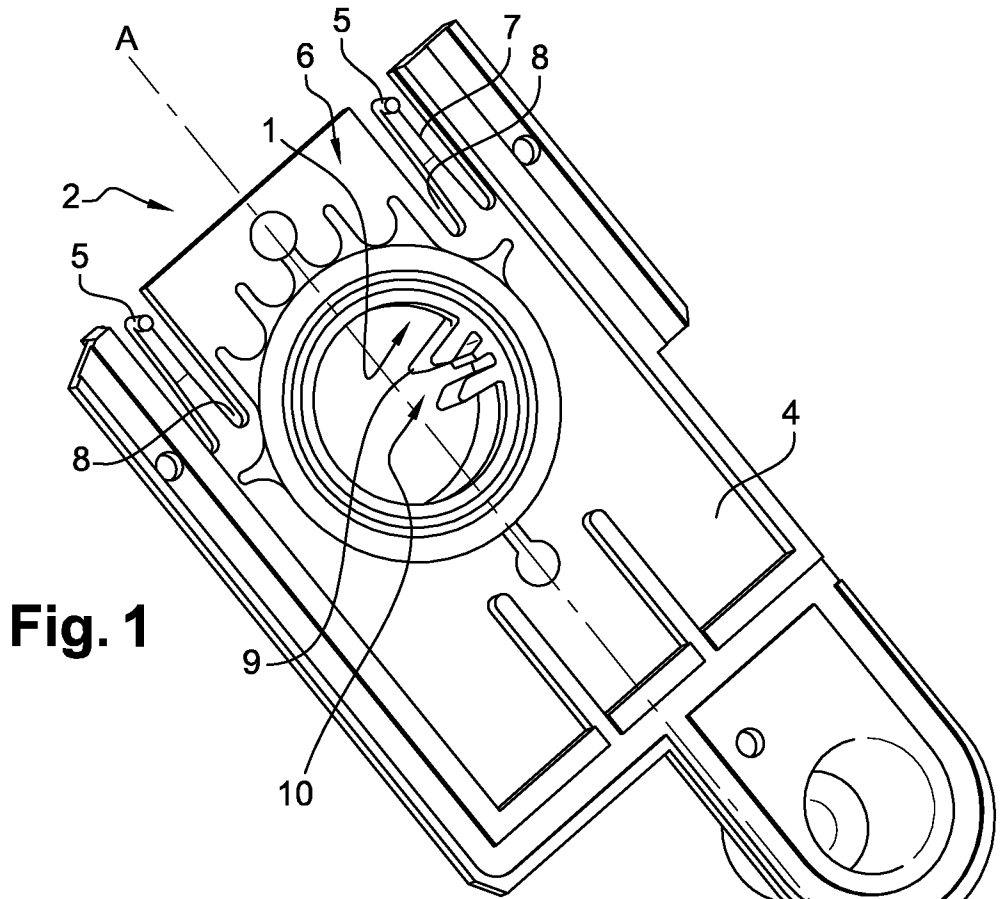


Fig. 1

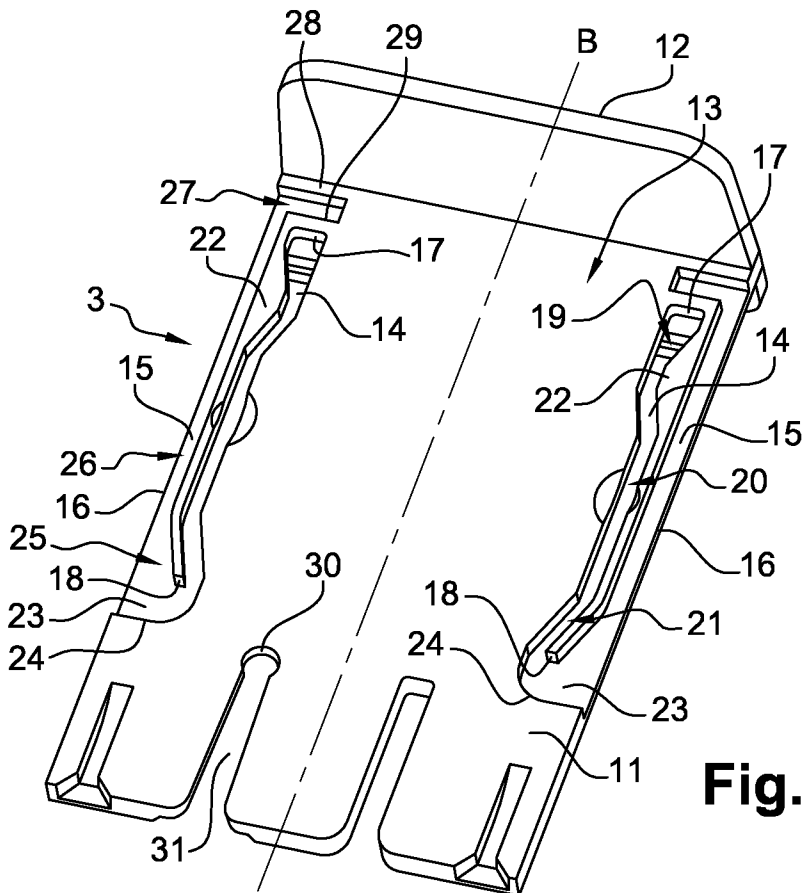


Fig. 2

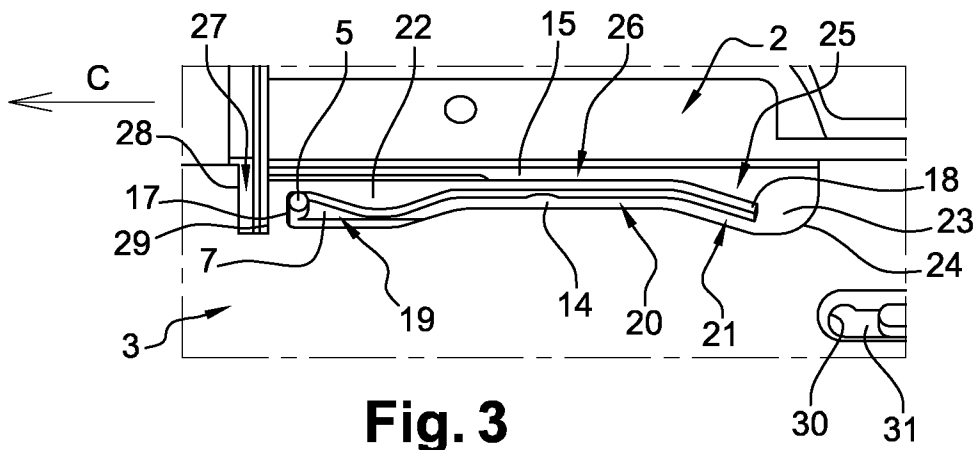


Fig. 3

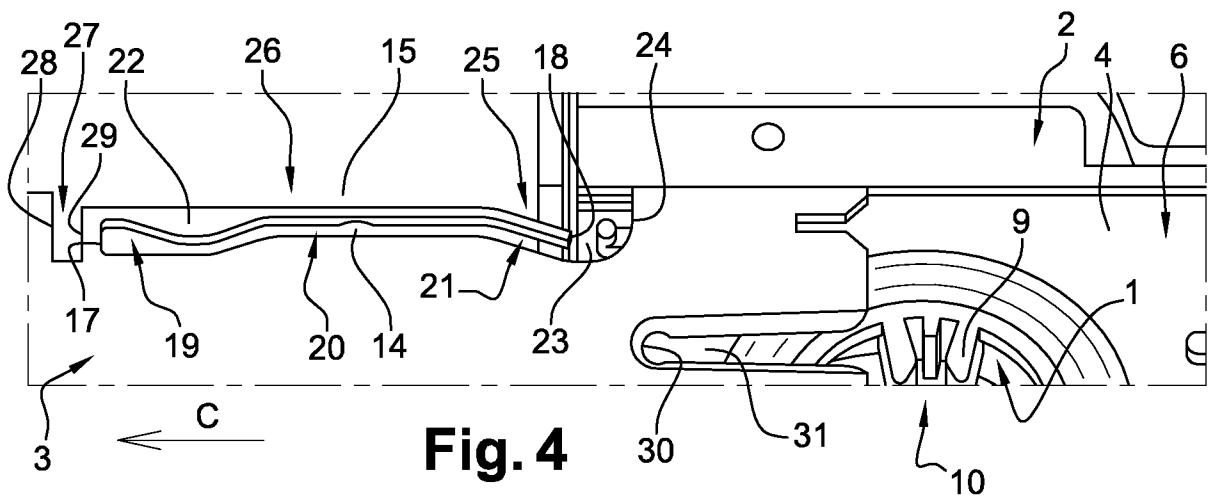


Fig. 4

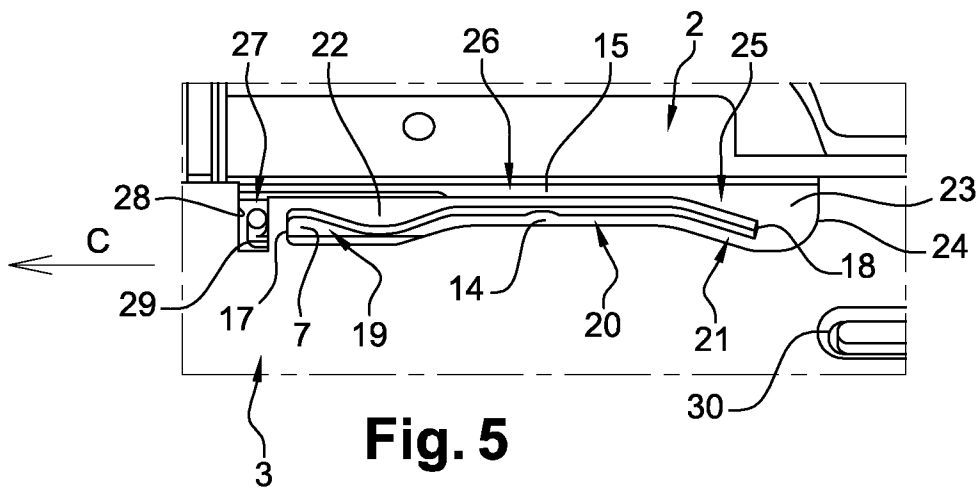


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/069142

A. CLASSIFICATION OF SUBJECT MATTER
INV. B01L3/00
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)
B01L A61B G01N

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	WO 2010/109445 A1 (UNIV RAMOT [IL]; STERER NIR [IL]; ROSENBERG-NEVO MELVYN [IL]) 30 September 2010 (2010-09-30)	1-3,6,7, 10-12
Y	page 2, line 1 - page 3, line 10 page 4, line 1 - page 4, line 20 page 6, line 30 - page 8, line 3 page 11, line 21 - page 11, line 9; claims 2,12,13	4,5,8,9
X	----- GB 2 453 743 A (PORVAIR FILTRATION GROUP LTD [GB]; BRITISH BIOCELL INTERNAT LTD [GB]) 22 April 2009 (2009-04-22)	1-3,6,7, 10-12
Y	figures 1,4,5,6,7	4,5,8,9
X	----- US 7 611 669 B1 (CRISANTI ANDREA [GB] ET AL) 3 November 2009 (2009-11-03)	1-3,6,7, 9-12
Y	figures 2-6	4,5,8,9
	----- -/--	

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "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)
- "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

"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

"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

"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

"&" document member of the same patent family

Date of the actual completion of the international search 21 November 2012	Date of mailing of the international search report 10/12/2012
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 de Biasio, Arnaldo

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/069142

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2011/075667 A2 (ABBOTT POINT OF CARE INC [US]; VERRANT JOHN A [US]; BLUM JOHN N [US];) 23 June 2011 (2011-06-23) figures 3,4,7,8 -----	4,5
Y	WO 2010/127464 A1 (BIOCARTIS SA [CH]; ZEIJLSTRA HARMINA [NL]; DE GIER RONALD [NL]; VAN DE) 11 November 2010 (2010-11-11) figures 1,2,4 -----	8,9
A	EP 1 374 989 A2 (AGILENT TECHNOLOGIES INC [US]) 2 January 2004 (2004-01-02) figures 4-14 -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/069142

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2010109445	A1	30-09-2010	NONE

GB 2453743	A	22-04-2009	GB 2453743 A 22-04-2009
		WO 2009050436	A1 23-04-2009

US 7611669	B1	03-11-2009	AT 285074 T 15-01-2005
		AU 773087	B2 13-05-2004
		AU 7805900	A 23-04-2001
		CA 2395057	A1 19-04-2001
		DE 60016779	D1 20-01-2005
		DE 60016779	T2 08-12-2005
		EP 1222462	A2 17-07-2002
		ES 2237460	T3 01-08-2005
		HK 1044373	A1 22-04-2005
		US 7611669	B1 03-11-2009
		WO 0127627	A2 19-04-2001

WO 2011075667	A2	23-06-2011	AU 2010330825 A1 12-07-2012
		CA 2784353	A1 23-06-2011
		CN 102762289	A 31-10-2012
		EP 2512647	A2 24-10-2012
		US 2011206557	A1 25-08-2011
		WO 2011075667	A2 23-06-2011

WO 2010127464	A1	11-11-2010	CN 102413936 A 11-04-2012
		EP 2427270	A1 14-03-2012
		US 2012282616	A1 08-11-2012
		WO 2010127464	A1 11-11-2010

EP 1374989	A2	02-01-2004	EP 1374989 A2 02-01-2004
		US 2003235520	A1 25-12-2003
		US 2006078463	A1 13-04-2006
