(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
12 June 2014 (12.06.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/086403 A1

(51) International Patent Classification:
E02B 8/06 (2006.01) *E02B 7/16* (2006.01)

(21) International Application Number:
PCT/EP2012/074447

(22) International Filing Date:
5 December 2012 (05.12.2012)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant: **RAYCAP INTELLECTUAL PROPERTY LTD.** [CY/CY]; 66 Akropoleos Avenue, Strovolos, Nicosia 2012 (CY).

(72) Inventors: **KAGIANNAS, Argyrios**; 12 Orfanidou Str, Maroussi, GR-15126 Athens (GR). **CHEVALIER, Sylvain**; c/o Raycap S.A., 14 Telou & Petroutsou Street, GR-15124 Marousi (GR).

(74) Agent: **TBK**; Bavariaring 4-6, 80336 München (DE).

(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:

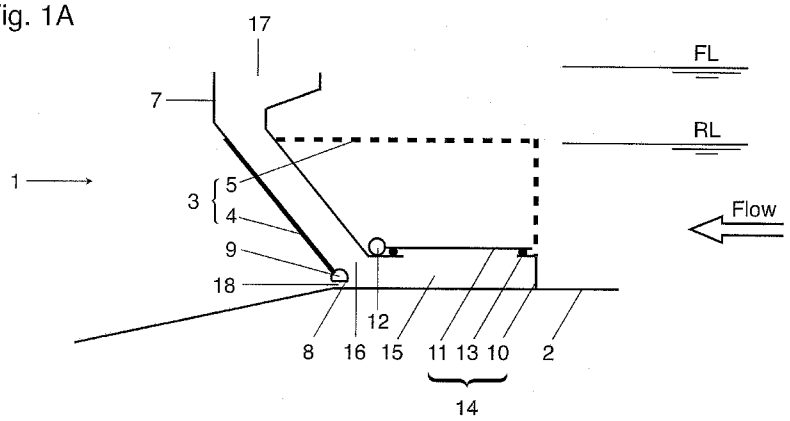
— *with international search report (Art. 21(3))*

— *with amended claims (Art. 19(1))*

WO 2014/086403 A1

(54) Title: GATE FOR FREE SPILLWAY WEIRS

Fig. 1A



(57) Abstract: A gate (1) for free spillway weirs (2) comprises a barrier (3) being tiltably supported on a weir (2) and movable between a first, water retaining position and a second, flood releasing position, a bottom structure (14) delimiting with the weir (2) in said first position of the barrier (3) a chamber (15) on the water retaining side of the barrier (3) filled with air and being pressed against the weir (2) by water pressure and thereby holding the barrier (3) in its water retaining position, and an inlet well (7) leading on its one end to an opening (17) set under a predetermined flood level (FL) and in said first position of the barrier (3) on its other end to an opening (16) connecting to the chamber (15), wherein when the chamber (15) is flooded through the inlet well (7) the barrier (3) is movable by means of the hydrostatic pressure to its flood releasing position thereby lifting the bottom structure (14). The bottom structure (14) comprises at least one foldable water pressure receiving part (11) delimiting the chamber (15), capable of being folded in a flow direction by the water flow after the bottom structure (14) has been lifted.

GATE FOR FREE SPILLWAY WEIRS

Technical Field

The invention relates to a Gate for free spillway weirs according to the preamble of claim 1.

Background Art

Excluding means involving a major risk such as sandbags, flashboards and fuse plugs, current practice for overspill dams design is such that the designer has to choose between free, gate and fusegate spillways.

Free spillways are extremely reliable but do not allow operating dams to full storage capacity.

Gate spillways, such as conventional and inflatable gates, allow operating dams to full storage capacity but are not fully reliable, because 30% of gate dam failures are due to gates not operating.

Fusegates are known as gates that are arranged side-by-side on a weir to form a watertight barrier in order to store water. In case of huge floods they are configured to automatically tip and to be washed away in order to protect the dam from being overtopped and/or to prevent reservoir banks flooding. Typically each gate is configured to tip for a predetermined flood level, so that multiple gates can be configured to gradually open as the flood level is rising.
Fusegate spillways in operation are fully reliable; allow operating dams to almost full storage capacity but fusegates are not reusable. They have to be evacuated if possible and replaced by new ones after tipping. They can damage the spill-

ways and create flow obstacles and inundations. These disadvantages are not acceptable when fusegates tip for floods of low return periods.

No technology combines the advantages of free, gate and fusegate spillways in operation while avoiding their disadvantages.

Document WO 9726412 A1 discloses an automatic gate including a barrier mounted on a hydraulic structure and movable between a raised position in which it holds back a body of water and a lowered position in which the water flows substantially unhindered thereover, as well as at least one elongate retaining element for holding the barrier in the raised position against the horizontal pressure from the body of water. The retaining element extends from the barrier to a reaction point to which it is connected by a linkage that may be inactivated automatically when the water reaches a predetermined level. The gate further includes a solid element movably mounted on the structure and coupled to the body of water so that it is stable while the water is below the predetermined level but becomes unstable and is moved when the water reaches the predetermined level. The linkage is inactivated by the movement of the solid element.

Document US 5032038 A discloses for the purpose of effecting a quasi-permanent raising of the normal water level of an impounded reservoir and thereby augmenting its storage capacity except during the passage of major floods, an invention that consists of installing on the sill of the spillway a water level raising means comprising at least one heavy element, the means or water level raising elements being capable of resisting the water loads when spilling moderate heads (for discharging the floods of shorter recurrence intervals) by virtue of their own weight but breaching by overturning at a predetermined head corresponding to a level not higher than a predetermined maximum water level in order to discharge larger floods.

Extended description of the Invention

The problem solved by the present invention is to further develop a gate for free spillway weirs according to the preamble of claim 1, so that the gate is improved with respect to its ability to be used to release water of huge floods. This problem is solved by a gate for free spillway weirs with the features of claim 1. Preferable embodiments are set forth in the dependent claims.

The gate according to the invention comprises a barrier being tiltably supported on a weir and movable between a first, water retaining position and a second, flood releasing position, a bottom structure delimiting with the weir in the first position of the barrier a chamber on the water retaining side of the barrier filled with air and being pressed against the weir by water pressure and thereby holding the barrier in its water retaining position, and an inlet well leading on its one end to an opening set under a predetermined flood level and in the first position of the barrier on its other end to the chamber. When the chamber is flooded through the inlet well the barrier is movable by means of the hydrostatic pressure to its flood releasing position thereby lifting the bottom structure. The gate for free spillway weirs is characterized in that the bottom structure comprises at least one foldable water pressure receiving part delimiting the chamber, capable of being folded in a flow direction by the water flow after the bottom structure has been lifted. Such a gate can be advantageously configured to have a water pressure receiving part that not only holds the barrier in a water retaining position when the gate is in its first position, but also adjusts in a flow direction when the gate moves to its second position in order to reduce the water resistance of the gate in the flood, for example.

Particularly advantageous is a water pressure receiving part that is tiltable by means of the water flow. Due to this modification the water receiving part can be automatically folded and adjusted by means of the water flow in the flow direction as soon as the barrier moves to its second position.

Additionally advantageous is a bottom structure that is foldable in itself.
Such a bottom structure would further reduce its resistance in the water, because it could fold to reduce its water resisting face significantly.

Further advantageous is a construction where the water pressure receiving part that is tiltable by means of the water flow to abut the barrier or the inlet well. Because of this technical measure the water pressure receiving part would align with the barrier in its second position and form a more compact gate that has less water resistance.

Additionally advantageous is a water pressure receiving part that abuts on a stop at a maximal angle with respect to the barrier before folding when the barrier is in its water retaining position. Due to this construction the gate would have a water pressure receiving part capable of holding the barrier through the stop in its water retaining position.

It is particularly advantageous that one first element of the bottom structure is integrally formed with the barrier. Such a gate would allow for a more direct transmission of forces between both the bottom structure and the barrier without the use of interconnecting parts.

It is additionally advantageous that the at least one water pressure receiving part of the bottom structure is tiltably hinged to the first element. The result of this arrangement is a gate with a compact bottom structure that is fairly simple constructed.

Further advantageous is having the first element as a frame and the at least one water pressure receiving part as a slab, wherein in the first position of the barrier the frame is supported on the weir and the slab is supported on the frame in a watertight manner such that the chamber is formed. This would ensure that when the barrier is in its first position the water pressure on the slab results in a force that presses the frame against the weir and thereby holds the barrier in a water retaining position.

Additionally advantageous is a gate, wherein when viewed from above the barrier has a U-shape with two side walls and one center wall and the opening towards a body of water. The benefit is an increased overflow edge due to the U-

shape of the gate. Furthermore, the bottom structure can be formed within the U-shape which would keep the gate compact.

Particularly advantageous is a gate, wherein both side walls of the barrier in its water retaining position substantially extend to the weir and define the chamber together with the bottom structure and the weir. Such a gate is compact and increases the stability of the bottom structure.

Further advantageous is a gate, wherein the bottom structure extends along a substantially flat free spillway weir. This way the gate can be tiltably mounted on a flat underground made of concrete, for example, which renders the process fast, easy and cost efficient.

Additionally advantageous is a gate, wherein the inlet well is formed as an integral part of the barrier and extends along a central wall of the barrier, the inlet well having the two openings on opposite sides of the barrier. The result of this is a gate that is more compact by not only bringing inlet well and barrier close to each other, but by causing the barrier to form one wall of the inlet well. Particularly advantageous is an inlet well that is completely incorporated in the central barrier wall such that the central barrier wall forms a flat surface on its water retaining side. It would form a barrier wall with an integrated inlet well and make the gate even more compact. More importantly, the flat surface achieved by this integration of inlet well and central barrier wall allows water and foreign objects carried by the flood to pass more easily through the gate when the barrier is in its second position.

Further advantageous is a gate, wherein the inlet well in the flood releasing position of the barrier serves as an outlet. This will increases the output of the gate in its open state by allowing water to flow through its inlet well both ways. In case of the above where the front barrier wall and the inlet well are integrally connected this is in particular desirable.

Further advantageous is a gate, wherein the barrier is hinged to the weir. A gate of this kind is easily mountable and can be reused after a huge flood by simply rotating it back from its second position to its first position.

Particularly advantageous is a gate, wherein a drain is formed by the barrier and the weir. A drain allows water drainage from the chamber in case of leakage through the bottom structure or rain entering the chamber through the inlet well. In this case the drain is not only easy to integrate, but ensures a maximum of water drainage.

Additionally advantageous is a gate, wherein the bottom structure is an integral cover part that is hinged to the barrier which comprises a stop that allows a limited unfolding angle of the cover part with respect to the barrier. This integral cover part can be rotated to abut the barrier completely when the barrier is in its second position and represents an even lesser obstacle in the water flow.

Further features and advantages of the present invention will become apparent from the following description of exemplary embodiments with reference to the attached drawings.

Brief Description of the Drawings

Figs. 1A to 1C show the gate in a full section side-view through its center.

Fig. 1A shows the gate in its first, water retaining position.

Fig. 1B shows the gate in an intermediate position shortly after water has flooded the chamber. The barrier is being tilted by the hydrostatic pressure causing the bottom structure to be lifted from the weir.

Fig. 1C shows the gate in its second, flood releasing position.

Fig. 2 shows the gate from the top without the weir.

Description of Embodiments

As shown in Figures 1A and 2 a gate 1 for a free spillway weir 2 comprises as a main component a barrier 3 having an U-shape and formed by one central wall 4 and two side walls 5 and 6. An inlet well 7 is formed as an integral part of the central wall 4. By means of its central wall 4 the barrier 3 is supported by a hinge 8 having a first horizontal axis 9 to the substantially flat free spillway weir 2 and thereby the barrier 3 is tiltably supported on the weir 2. A first element formed as a frame 10 extending along the weir 2 in Fig. 1A is integrally formed with the central wall 4 and the side walls 5 and 6 of the barrier 3, while a water pressure receiving part of the gate 1 formed as a slab 11 is hinged on the frame 10 around a second horizontal axis 12 so as to be foldable in respect to the frame 10. Both, the frame 10 provided with a seal 13 and the slab 11 abutting against the seal 13 form a bottom structure 14 delimiting with the weir 2 in the position shown in Fig. 1A an air chamber 15. In this first position the air chamber 15 is connected through a first opening 16 of the inlet well 7 leading through the inlet well 7 to a second opening 17 beyond the upper end of the barrier 3. The chamber is also connected to a drain 18, which is delimited by the central wall of the barrier and the weir 2.

The operation of the gate illustrated by Figures 1A to 1C and 2 is as follows:

In the water retaining position shown in Fig. 1A the normal water level RL is below the second opening 17 of the inlet well 7 which connects the ambient air with the chamber 15. In this position the water at the water retaining side of the barrier 3 presses the slab 11 via the seal 13 against the frame 10 and the weir 2, thus holding the chamber 15 watertight and the barrier 3 in its upright water retaining position. As soon as a predetermined flood level FL is achieved and the water reaches the second opening 17 of the inlet well 7, the chamber 15 is then flooded thereby removing the holding pressure from the slab 11 of the pressure receiving part, so that the whole bottom structure 14 including the slab 11 and the frame 10 is lifted by means of the hydrostatic pressure applied on the central wall 4 of the barrier 3 as shown in Fig. 1B. What follows subsequently is that the water pressure receiving slab 11 is tilted by means of the water flow in flow direction so as to abut against the central wall 4 of the barrier 3 and then both the slab 11 and the whole barrier 3 are tilted together in flow direction until coming

to rest on a downward slope of the weir 2 as shown in Fig. 1C. In this second, flood releasing position of the gate 1 the first opening 16 of the inlet well 7 originally merging into the chamber 15 serves as an inlet for a part of the water flow, while the second opening 17 of the inlet well 7 originally serving as inlet for flooding the chamber serves as an outlet.

According to another non-illustrated embodiment of the gate according to the invention, the bottom structure is constructed as a complete integral cover part able to form a watertight chamber together with the weir. Such an integral cover part is hinged to the barrier. In this embodiment the barrier part comprises a stop allowing a limited unfolding angle of the cover part with respect to the barrier. The advantage of such a construction is that there is no element of the gate, like the frame, left in the water flow.

Claims

1. A gate (1) for free spillway weirs (2), comprising:

a barrier (3) being tiltably supported on a weir (2) and movable between a first, water retaining position and a second, flood releasing position;

a bottom structure (14) delimiting with the weir (2) in said first position of the barrier (3) a chamber (15) on the water retaining side of the barrier (3) filled with air and being pressed against the weir (2) by water pressure and thereby holding the barrier (3) in its water retaining position; and

an inlet well (7) leading on its one end to an opening (17) set under a predetermined flood level (FL) and in said first position of the barrier (3) on its other end to an opening (16) connecting to the chamber (15);

wherein when the chamber (15) is flooded through the inlet well (7) the barrier (3) is movable by means of the hydrostatic pressure to its flood releasing position thereby lifting the bottom structure (14);

characterized in that

the bottom structure (14) comprises at least one foldable water pressure receiving part (11) delimiting the chamber (15), capable of being folded in a flow direction by the water flow after the bottom structure (14) has been lifted.

2. A gate (1) according to claim 1, wherein the water pressure receiving part (11) is tiltable by means of the water flow.

3. A gate (1) according to claim 1 or 2, wherein the bottom structure (14) is foldable in itself.

4. A gate (1) according to any one of the preceding claims, wherein the water pressure receiving part (11) is tiltable by means of the water flow to abut the barrier (3) or the inlet well (7).

5. A gate (1) according to any one of the preceding claims, wherein the water pressure receiving part (11) abuts on a stop at a maximal angle with respect to the barrier (3) before folding when the barrier (3) is in its water retaining position.

6. A gate (1) according to any one of the preceding claims, wherein at least one first element (10) of the bottom structure (14) is integrally formed with the barrier (3).

7. A gate (1) according to claim 6, wherein the at least one water pressure receiving part (11) of the bottom structure (14) is tiltably hinged to said first element (10).

8. A gate (1) according to claim 7, wherein:
said first element (10) is a frame (10); and
said at least one water pressure receiving part (11) is a slab (11);
wherein in said first position of the barrier (3) the frame (10) is supported on the weir (2) and the slab (11) is supported on the frame (10) in a watertight manner such that the chamber (15) is formed.

9. A gate (1) according to any one of the preceding claims, wherein when viewed from above the barrier (3) has a U-shape with two side walls (5, 6) and one central wall (4) and the opening towards a body of water.

10. A gate (1) according to claim 9, wherein both side walls of the barrier (3) in its water retaining position substantially extend to the weir (2) and define the chamber (15) together with the bottom structure (14) and the weir (2).

11. A gate (1) according to any one of the preceding claims, wherein the bottom structure (14) extends along a substantially flat free spillway weir (2).

12. A gate (1) according to any one of the preceding claims, wherein the inlet well (7) is formed as an integral part of the barrier (3) and extends along a cen-

tral wall of the barrier (3), the inlet well (7) having said two openings on opposite sides of the barrier (3).

13. A gate (1) according to any one of the preceding claims, wherein the inlet well (7) in the flood releasing position of the barrier (3) serves as an outlet.

14. A gate (1) according to any one of the preceding claims, wherein the barrier (3) is hinged to the weir (2).

15. A gate (1) according to any one of the preceding claims, wherein a drain (18) is formed by the barrier (3) and the weir (2).

AMENDED CLAIMS
received by the International Bureau on 28 August 2013 (28.08.2013)

1. A gate (1) for free spillway weirs (2), comprising:

a barrier (3) being tiltably supported on a weir (2) and movable between a first, water retaining position and a second, flood releasing position;

a bottom structure (14) delimiting with the weir (2) in said first position of the barrier (3) a chamber (15) on the water retaining side of the barrier (3) filled with air and being pressed against the weir (2) by water pressure and thereby holding the barrier (3) in its water retaining position; and

an inlet well (7) leading on its one end to an opening (17) set under a predetermined flood level (FL) and in said first position of the barrier (3) on its other end to an opening (16) connecting to the chamber (15);

wherein when the chamber (15) is flooded through the inlet well (7) the barrier (3) is movable by means of the hydrostatic pressure to its flood releasing position thereby lifting the bottom structure (14); wherein

the bottom structure (14) comprises at least one foldable water pressure receiving part (11) delimiting the chamber (15), capable of being folded in a flow direction by the water flow after the bottom structure (14) has been lifted;

characterized in that

the bottom structure (14) is foldable in itself.

2. A gate (1) according to claim 1, wherein the water pressure receiving part (11) is tiltable by means of the water flow.

3. A gate (1) according to any one of the preceding claims, wherein the water pressure receiving part (11) is tiltable by means of the water flow to abut the barrier (3) or the inlet well (7).

4. A gate (1) according to any one of the preceding claims, wherein the water pressure receiving part (11) abuts on a stop at a maximal angle with respect to the barrier (3) before folding when the barrier (3) is in its water retaining position.

5. A gate (1) according to any one of the preceding claims, wherein at least one first element (10) of the bottom structure (14) is integrally formed with the barrier (3).

6. A gate (1) according to claim 5, wherein the at least one water pressure receiving part (11) of the bottom structure (14) is tiltably hinged to said first element (10).

7. A gate (1) according to claim 6, wherein:
said first element (10) is a frame (10); and
said at least one water pressure receiving part (11) is a slab (11);
wherein in said first position of the barrier (3) the frame (10) is supported on the weir (2) and the slab (11) is supported on the frame (10) in a watertight manner such that the chamber (15) is formed.

8. A gate (1) according to any one of the preceding claims, wherein when viewed from above the barrier (3) has a U-shape with two side walls (5, 6) and one central wall (4) and the opening towards a body of water.

9. A gate (1) according to claim 8, wherein both side walls of the barrier (3) in its water retaining position substantially extend to the weir (2) and define the chamber (15) together with the bottom structure (14) and the weir (2).

10. A gate (1) according to any one of the preceding claims, wherein the bottom structure (14) extends along a substantially flat free spillway weir (2).

11. A gate (1) according to any one of the preceding claims, wherein the inlet well (7) is formed as an integral part of the barrier (3) and extends along a central wall of the barrier (3), the inlet well (7) having said two openings on opposite sides of the barrier (3).

12. A gate (1) according to any one of the preceding claims, wherein the inlet well (7) in the flood releasing position of the barrier (3) serves as an outlet.

13. A gate (1) according to any one of the preceding claims, wherein the barrier (3) is hinged to the weir (2).

14. A gate (1) according to any one of the preceding claims, wherein a drain (18) is formed by the barrier (3) and the weir (2).

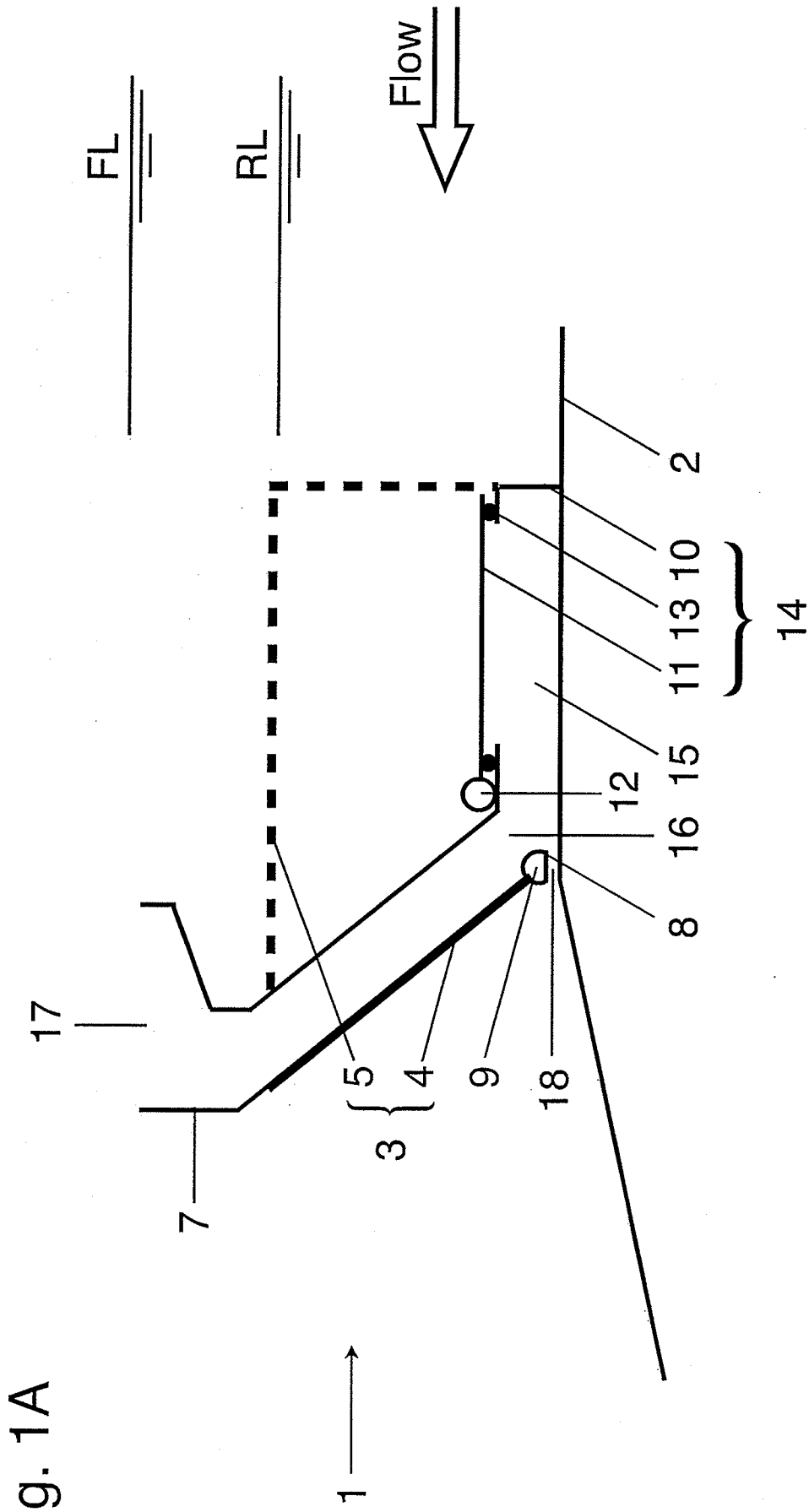


Fig. 1A

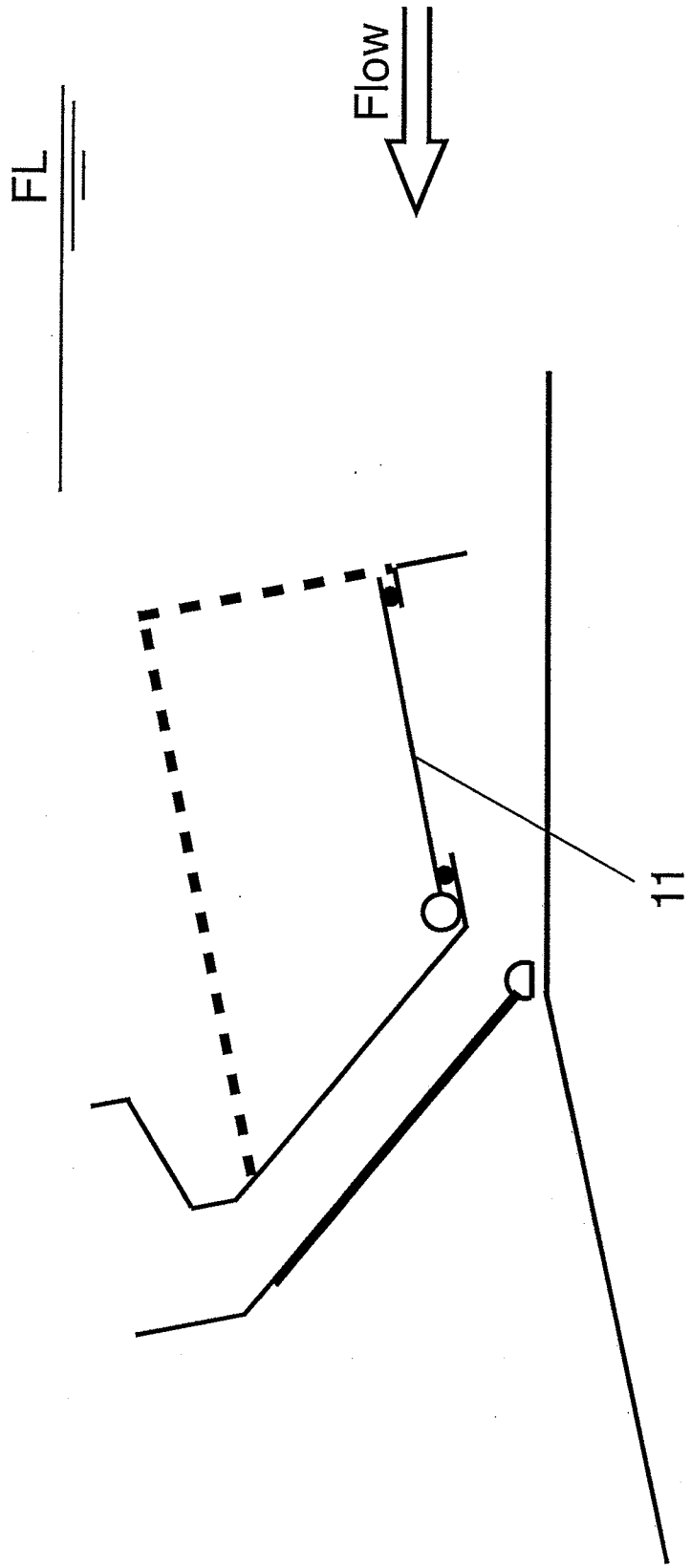


Fig. 1B

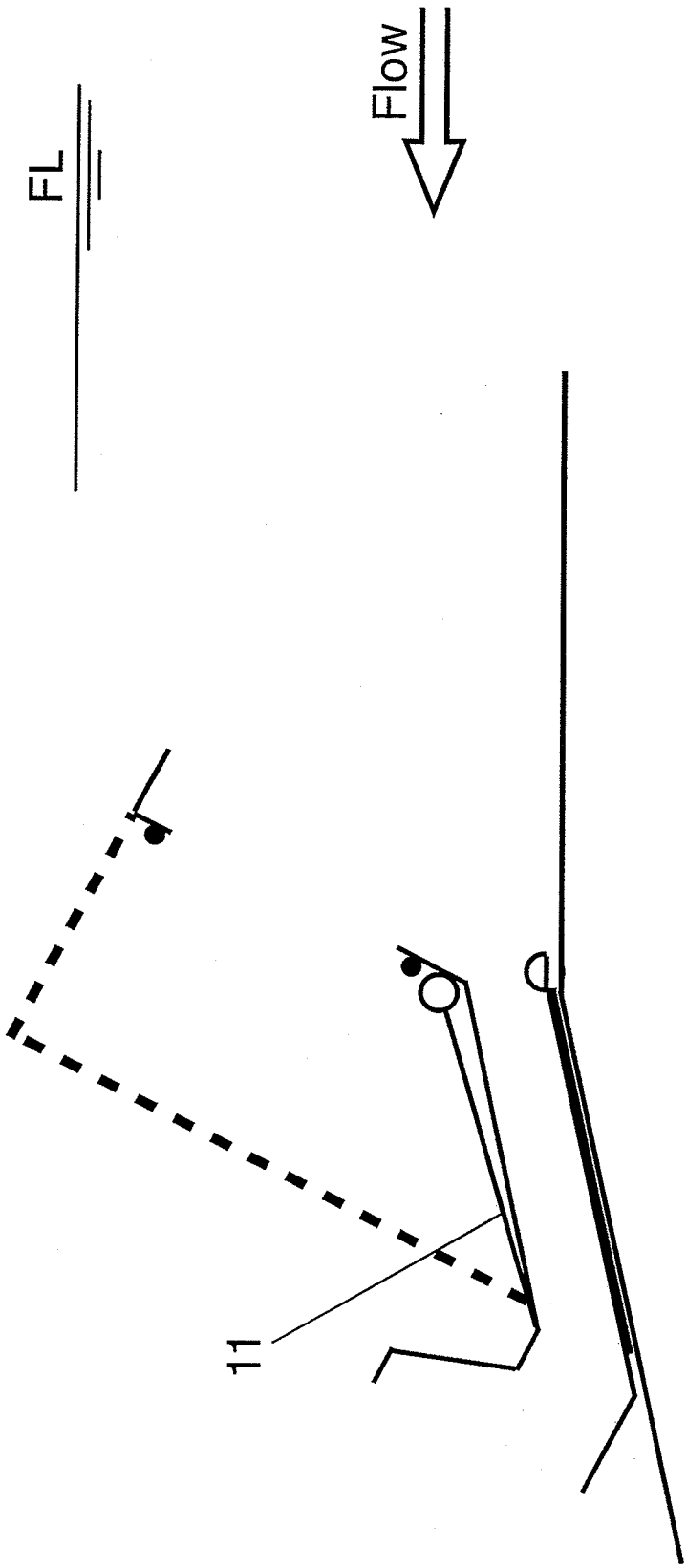


Fig. 1C

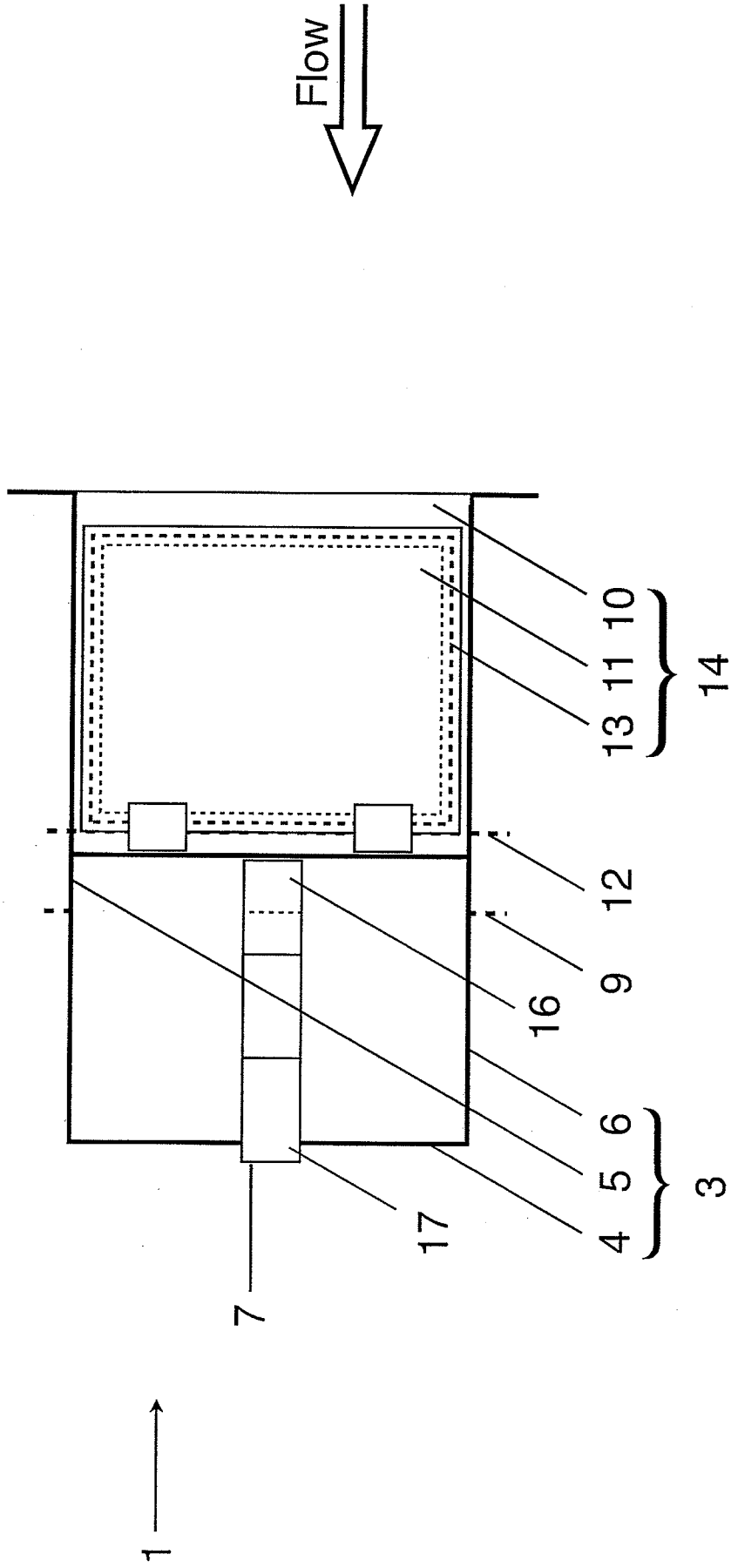


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/074447

A. CLASSIFICATION OF SUBJECT MATTER
INV. E02B8/06 E02B7/16
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)
E02B

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.
X	US 5 195 846 A (LEMPERIERE FRANCOIS [FR]) 23 March 1993 (1993-03-23) column 5, paragraph 3 column 11, line 42 - column 13, line 19 figures 12-15 -----	1-15
A	US 6 196 764 B1 (RAYSSIGUIER JULIEN [FR]) 6 March 2001 (2001-03-06) cited in the application column 3, line 42 - column 9, line 5; figures 3, 3a, 5, 5b, 7, 8 -----	1-15
A	US 5 032 038 A (LEMPERIERE FRANCOIS [FR]) 16 July 1991 (1991-07-16) cited in the application column 12, line 40 - line 68 column 13, line 30 - column 15, line 60; figures 12,16-20 -----	1-15

☐ 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	Date of mailing of the international search report
26 June 2013	02/07/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Lieber, Gabor

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2012/074447

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5195846 A	23-03-1993	AT 102273 T	15-03-1994
		AU 646997 B2	10-03-1994
		BR 9105627 A	01-09-1992
		CA 2057772 A1	29-06-1992
		CN 1062942 A	22-07-1992
		DE 69101309 D1	07-04-1994
		DE 69101309 T2	09-06-1994
		DK 0493183 T3	28-03-1994
		DZ 1547 A1	17-02-2002
		EP 0493183 A1	01-07-1992
		ES 2052347 T3	01-07-1994
		FR 2671116 A1	03-07-1992
		JP H0774497 B2	09-08-1995
		JP H04293811 A	19-10-1992
		MA 22374 A1	01-07-1992
		OA 9414 A	15-09-1992
		PT 99946 A	31-01-1994
		RO 112372 B1	29-08-1997
		RU 2080433 C1	27-05-1997
		TR 26482 A	15-03-1995
		US 5195846 A	23-03-1993
		ZA 9110024 A	28-10-1992
		ZW 18691 A1	09-12-1992
US 6196764 B1	06-03-2001	AT 203073 T	15-07-2001
		AU 713094 B2	25-11-1999
		AU 1313697 A	11-08-1997
		BR 9707021 A	28-12-1999
		DE 69705602 D1	16-08-2001
		EP 0874941 A1	04-11-1998
		FR 2743829 A1	25-07-1997
		MA 24067 A1	01-10-1997
		TR 9801381 T2	21-10-1998
		US 6196764 B1	06-03-2001
		WO 9726412 A1	24-07-1997
		ZA 9700372 A	18-07-1997
US 5032038 A	16-07-1991	AT 95257 T	15-10-1993
		AU 623839 B2	21-05-1992
		AU 6805490 A	27-06-1991
		BR 9006526 A	01-10-1991
		CA 2032275 A1	22-06-1991
		CN 1052914 A	10-07-1991
		CS 9006376 A3	14-10-1992
		CY 1961 A	04-07-1997
		DE 69003661 D1	04-11-1993
		DE 69003661 T2	27-01-1994
		DK 0434521 T3	21-02-1994
		DZ 1464 A1	13-09-2004
		EP 0434521 A1	26-06-1991
		ES 2046747 T3	01-02-1994
		FR 2656354 A1	28-06-1991
		JP H0520527 B2	19-03-1993
		JP H03290519 A	20-12-1991
		MA 22017 A1	01-07-1991
		NO 905383 A	24-06-1991
		OA 9279 A	31-08-1992
		PT 96136 A	30-09-1991

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2012/074447

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		RO 111118 B1	28-06-1996
		RU 2049195 C1	27-11-1995
		TR 25445 A	01-05-1993
		US 5032038 A	16-07-1991
		YU 240090 A	24-06-1994
		ZA 9010189 A	30-10-1991
		ZW 20290 A1	19-06-1991