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(54) **GAS COCK WITH A SAFETY VALVE FOR A GAS COOKING APPLIANCE, AND GAS COOKING APPLIANCE INCORPORATING SAID GAS COCK**

(57) Gas cock with a safety valve for a gas cooking appliance, comprising a body (10) comprising an inlet conduit (11) communicated with the safety valve (30), and at least one outlet conduit (12); a regulating element for regulating the incoming gas flow in from the safety valve (30) to the outlet conduit (12) depending on the angular position thereof; and a drive shaft (40) with a manually operable main shaft (41) axially movable for acting on a transmission element (70) for opening the safety valve (30), the regulating element rotating integrally with said main shaft (41). The regulating element is a rotating disk (20) with at least one connection opening (21) which is configured for supplying different types of gas depending on the angular positioning of the rotating disk (20) with respect to the main shaft (41).

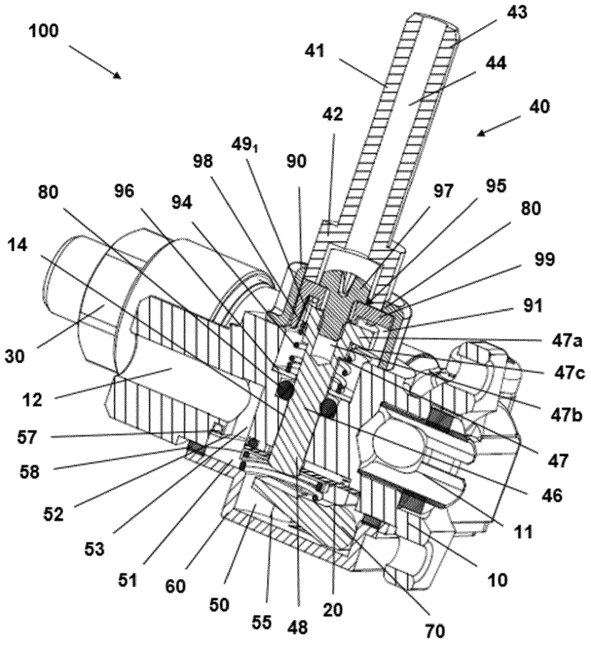

FIG. 2

EP 3 546 831 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to gas cocks with a safety valve for a gas cooking appliance, and to gas cooking appliances incorporating said gas cocks.

PRIOR ART

[0002] Gas cocks with a safety valve for a gas cooking appliance are known.

[0003] Document ES1087355U describes a gas cock with a magnetic safety unit for gas cookers. Said gas cock comprises a body comprising a gas inlet conduit and at least one gas outlet conduit, a regulating element suitable for regulating the incoming gas flow from the safety valve to the outlet conduit depending on the angular position thereof, the regulating element being arranged in a housing of the body fluidically communicated with the safety valve and with the outlet conduit, and a drive shaft comprising a manually operable main shaft, said main shaft being rotatable between an initial rotation position and a final rotation position, and axially movable for acting on a transmission element for opening the safety valve, the regulating element rotating integrally with said main shaft.

DISCLOSURE OF THE INVENTION

[0004] The object of the invention is to provide a gas cock with a safety valve for a gas cooking appliance, and a gas cooking appliance incorporating said gas cock, as defined in the claims.

[0005] The gas cock of the invention comprises a body comprising a gas inlet conduit and at least one gas outlet conduit, a regulating element suitable for regulating the incoming gas flow from the safety valve to the outlet conduit depending on the angular position thereof, the regulating element being arranged in a housing of the body fluidically communicated with the safety valve and with the outlet conduit, and a drive shaft comprising a manually operable main shaft, said main shaft being rotatable between an initial rotation position and a final rotation position, and axially movable for acting on a transmission element for opening the safety valve, the regulating element rotating integrally with said main shaft.

[0006] The regulating element is a rotating disk comprising at least one connection opening for regulating gas flow to the outlet conduit depending on the angular position thereof, said rotating disk being axially retained supported on a contact area of the housing of the body, the contact area comprising at least one outlet hole fluidically communicated with the gas outlet conduit, the rotating disk being configured for supplying different types of combustible gas depending on the angular positioning of said rotating disk with respect to the main shaft, and the drive shaft being configured for fixing the rotating disk in different angular positions with respect to the main shaft according to the type of combustible gas to be supplied.

[0007] In the gas cocks with a safety valve of the prior art, the regulating element for regulating the gas flow rate is a frustoconical part that is form-fitted into a chamber of the body of the gas cock. The regulating element sometimes seizes up when too much force is applied thereon by means of the manual drive shaft, and the gas passage may remain open, causing gas leak. With the element in the form of a rotating disk, the contact surface in the pushing direction of the drive shaft is reduced, and a possible gas leakage is prevented.

[0008] The gas cock of the invention is suitable for supplying different types of gases without replacing or modifying the rotating disk but by simply positioning said rotating disk in different angular positions with respect to the main shaft of the drive shaft, depending on the type of gas to be supplied. To that end, the drive shaft is configured for changing the relative position of the rotating disk with respect to the main shaft of said drive shaft. It is therefore an easy-to-implement solution with very few parts needed to enable changing the supply gas, which allows reducing the costs of the valve.

[0009] These and other advantages and features of the invention will become evident in view of the drawings and detailed description of the invention.

DESCRIPTION OF THE DRAWINGS

[0010]

Figure 1 shows a perspective view of an embodiment of the gas cock with a safety valve of the invention.

Figure 2 shows a sectional perspective view of the gas cock of Figure 1, in which the main shaft and the transmission shaft are coupled.

Figure 3 shows a sectional perspective view of the gas cock of Figure 1, in which the main shaft and the transmission shaft are not coupled.

Figure 4 shows a perspective view of the main shaft of the gas cock of Figure 1.

Figure 5 shows a perspective view of the transmission shaft of the gas cock of Figure 1.

Figure 6 shows a perspective view of the coupling unit of the main shaft of the gas cock of Figure 1.

Figure 7 shows a front view of an embodiment of the rotating disk of the gas cock of Figure 1, with a connection opening comprising a plurality of holes.

Figure 8 shows a bottom perspective view of the cover of the gas cock of Figure 1.

Figures 9a to 9b show a sectional front view of the gas cock of Figure 1, the rotating disk being arranged in gas flow regulation positions for natural gas and liquefied petroleum gas, respectively, when the gas cock is in the OFF position.

Figures 10a to 10b show a sectional front view of the gas cock of Figure 1, the rotating disk being arranged in gas flow regulation positions for natural gas and liquefied petroleum gas, respectively, when the gas cock is in a minimum MIN position.

DETAILED DISCLOSURE OF THE INVENTION

[0011] Figures 1 to 8 show an embodiment of the gas cock 100 with a safety valve 30 according to the invention, comprising a gas outlet conduit 12.

[0012] The gas cock 100 comprises a body 10 comprising a gas inlet conduit 11 which is fluidically communicated with the safety valve 30, and the gas outlet conduit 12 suitable for conducting the incoming gas to a burner (not shown in the drawings). The gas cock 100 further comprises a regulating element suitable for regulating the incoming gas flow from the safety valve 30 to the outlet conduit 12 depending on the angular position thereof, the regulating element being arranged in a housing 51 of the body 10 which is fluidically communicated with the safety valve 30 and with the outlet conduit 12. The gas cock 100 also comprises a drive shaft 40 comprising a manually operable main shaft 41, said main shaft 41 being rotatable along an angular path A between an initial rotation position and a final rotation position, and axially movable for acting on a transmission element 70 for opening the safety valve 30, the regulating element rotating integrally with said main shaft 41.

[0013] In this embodiment, the regulating element is a rotating disk 20 comprising a connection opening 21 for regulating gas flow to the outlet conduit 12 depending on the angular position thereof. Said rotating disk 20 is axially retained supported on a contact area 52 of the housing 51 of the body 10, the contact area 52 comprising an outlet hole 53 which is fluidically communicated with the gas outlet conduit 12. The rotating disk 20 is configured for supplying different types of combustible gas depending on the angular positioning of said rotating disk 20 with respect to the main shaft 41, and the drive shaft 40 is configured for fixing the rotating disk 20 in different angular positions with respect to the main shaft 41 according to the type of combustible gas to be supplied.

[0014] The drive shaft 40 also comprises a transmission shaft 46 which pushes the transmission element 70 when it is moved axially, the rotating disk 20 being coupled to the transmission shaft 46, and said transmission shaft 46 being coupled to the main shaft 41, the drive shaft 40 being configured for positioning the main shaft 41 in different angular positions with respect to the transmission shaft 46 depending on the type of gas to be supplied. The main shaft 41 comprises an end 43 to which there is coupled an outer knob (not depicted) that can be operated by the user, and another end 42 which is coupled with the transmission shaft 46. Said transmission shaft 46 comprises a lower end 48 acting on the transmission element 70, and an upper end 47 which is coupled with the end 42 of the main shaft 41. The lower end 48 of the transmission shaft 46 is arranged in the housing 51 when the drive shaft 40 is not axially pushed, and is coupled to the rotating disk 20 in a coupling hole 24 which is comprised in said rotating disk 20 and has a D shape in this embodiment. Said coupling hole 24 allows the axial movement of the transmission shaft 46 without axially moving the rotating disk 20. The rotating disk 20 is arranged facing the transmission element 70.

[0015] The body 10 of the gas cock 100 comprises a through hole 14 which is communicated through one of its ends 15 with the housing 51, the transmission shaft 46 of the drive shaft 40 going through the through hole 14, said transmission shaft 46 being tightly fitted with possibility of rotation and axial movement in said through hole 14. The other end of the through hole 14 is communicated with a seat of the body 10, a gasket 80 being arranged on said seat surrounding the transmission shaft 46 and tightly fitted against the seat, assuring the leak-tightness between the two ends of the through hole 14 of the body 10.

[0016] One face of the rotating disk 20 is supported on the contact area 52 of the housing 51 of the body 10. The contact area 52 on which the rotating disk 20 is supported comprises a flat support surface comprising a channel surrounding the outlet hole 53, a sealing gasket 57 being housed in said channel pressed against the support face of the rotating disk 20 when the rotating disk 20 is supported on the contact area 52. Gas flow towards the gas outlet conduit 12 is thereby regulated when the rotating disk 20 is rotated and when the connection opening 21 of the rotating disk 20 overlaps with the outlet hole 53.

[0017] The gas cock 100 comprises a cover 60 attached to the body 10 closing, in a leak-tight manner, a chamber 50 formed by the housing 51 of the rotating disk 20 and a second housing 55 arranged in the cover 60. The chamber 50 is leak-tight because a sealing gasket 58 is arranged between the cover 60 and the body 10. The second housing 55 is communicated with the safety valve 30, the transmission element 70 which acts on the safety valve 30 being housed in the second housing 55. Said second housing 55 is separated in a leak-tight manner from the housing 51 by the rotating disk 20, and said second housing 55 is fluidically communicated with the safety valve 30. In this embodiment, the transmission element 70 is a rocker arm, and the safety valve 30 comprises a shutter closing it, such that when the drive shaft 40 is pushed axially, the lower end 48 of the transmission shaft 46 presses the transmission element 70, and this transmission element acts on the shutter, opening the safety valve 30. The incoming gas can therefore go from the inlet conduit 11, through the safety valve 30, and to the second housing 55, the chamber 50 being leak-tight.

[0018] To couple the main shaft 41 and the transmission shaft 46 of the drive shaft 40, the gas cock 100 comprises an attachment element 97 which, in this embodiment of the gas cock 100, is a screw. In this embodiment, the main shaft 41 is hollow, comprising a through hole 98 open at its upper end 43 and lower end 42. In this embodiment of the main shaft 41, the lower end 42widens, generating an inner cavity 42c. On the other hand, in this embodiment of the gas cock 100, the transmission shaft 46 comprises at its upper end 47 a widening, forming a head 47a, said head 47a comprising a threaded hole 47b in its upper portion facing the lower end 42 of the main shaft 41.

[0019] In this embodiment of the gas cock 100, the drive shaft 40 comprises a coupling unit 95 fixed to the lower end 42 of the main shaft 41. In this embodiment, the coupling unit 95 comprises an annular central body comprising axially a central through hole 95a. An axial stud 98 that protrudes towards the transmission shaft 46 and a radial stud 99 that projects laterally project from the central body. The lower end 42 of the main shaft 41 comprises on the lower edge a first groove 42a and a second groove 42b which are arranged opposite one another in this embodiment, the radial stud 99 and the axial stud 98 being coupled, respectively, in said grooves 42a and 42b. The coupling unit 95 is therefore part of the main shaft 41, and they are riveted to assure the integral fixing thereof. To that end, in this embodiment the main shaft 41 is made of brass, and it can also be made of aluminum, and the coupling unit is made of steel.

[0020] To couple the main shaft 41 and the transmission shaft 46, before coupling the coupling unit 95 to the main shaft 41, the head of the attachment element 97 is introduced in the cavity 42c of the main shaft 41, and the coupling unit 95 and the main shaft 41 are then riveted. In other (not depicted) embodiments, the main shaft comprises the stud and the radial stud at its lower end, the through hole of the main shaft being of such dimensions that it allows introduction of the attachment element from the opening of the through hole at the upper end of the main shaft. The head of the attachment element 97 is supported on the upper portion of the central body of the coupling unit 95, and the threaded body of said attachment element 97 goes through the through hole 95a, the attachment element 97 being screwed into the hole 47b of the transmission shaft 46.

[0021] Similarly, to uncouple the main shaft 41 and the transmission shaft 46, the attachment element 97 is acted on whereby it is released, and to that end the user accesses the head of said attachment element 97 with a suitable tool through the opening of the through hole 44 of the main shaft 41 at its upper end 43. Once the attachment element 97 has been released, the transmission shaft 46 is axially moved downwards. The gas cock 100 comprises a spring 94 which is arranged between a washer 96 and an abutment surface 47c of the transmission shaft 46, which is the lower portion of the head 47a. The washer 96 covers the seat on which the gasket 80 is arranged, being coupled in this embodiment to the transmission shaft 46 going therethrough. The spring 94 allows returning the transmission shaft 46, and along with said transmission shaft 46 the drive shaft 40, when the main shaft 41 and the transmission shaft 46 are coupled, to a standby position when it stops pushing said drive shaft 40, by means of the main shaft 41, for pushing the transmission element 70 and opening the safety valve 30.

[0022] The transmission shaft 46 comprises in the head 47a a housing 49 which in this embodiment is a partial perimetral gap at the edge of the head 47a. This housing 49 has two stops 49_1 and 49_2 arranged at the ends defining two angular positions α_1, α_2, respectively. When the main shaft 41 and the transmission shaft 46 are coupled, the axial stud 98 is arranged in the housing 49. Depending on the supply gas which, in this embodiment of the gas cock 100, consists of two gases, i.e., natural gas and liquefied petroleum gas, the gas cock 100 is configured for natural gas by the axial stud 98 being arranged in the stop 49_1, and configured for liquefied petroleum gas by the axial stud 98 being arranged in the stop 49_2, so the main shaft 41 is positioned in different angular positions with respect to the transmission shaft 46, and therefore to the rotating disk 20 to which it is coupled.

[0023] When the main shaft 41 and the transmission shaft 46 are uncoupled, the end of the attachment element 97 is in contact with the hole 47b of the transmission shaft 46, without being fixed, and the axial stud 98 of the coupling unit 95 has a length such that said axial stud 98 is still arranged in the housing 49 of the transmission shaft 46, such that the main shaft 41 and the transmission shaft 46 are not separated from one another. The spring 94 of the gas cock 100 therefore pushes the transmission shaft 46, and the user first rotates the main shaft 41 with the suitable tool until the axial stud 98 abuts with one of the stops 49_1 and 49_2 corresponding with the supply gas, and then acts on the attachment element and fixes the main shaft 41 and the transmission shaft 46 in the defined position with the suitable tool.

[0024] To finish configuring the gas cock 100 to one of the supply gases, the drive shaft 40 must always be arranged in a reference position D1, such that when the main shaft 41 and the transmission shaft 46 are coupled, and the main shaft 41 angularly moved with respect to the transmission shaft 46, when the drive shaft 40 is brought to the reference position D1, the rotating disk 20 will be angularly moved at an angle equivalent to the angular difference between α_1 and α_2 between the two supply gases defined in this embodiment. To that end, the radial stud 99 is arranged in the reference position D1. In this embodiment of the gas cock 100, this reference position D1 corresponds with the initial rotation position of the main shaft 41, although in other embodiments it may correspond with the final rotation position, for example. In this embodiment, this initial rotation position of the main shaft 41 corresponds with the position with minimum gas flow, the final rotation position corresponding

with the position with no gas flow.

[0025] The gas cock 100 comprises a cap 90 which is fixed to the body 10 and with the main shaft 41 going through same, specifically in this embodiment of the gas cock 100 through the lower end 42 where the main shaft 41 widens forming the inner cavity 42c. There is formed between the washer 96 and the cap 90 a second chamber 91 inside which there is arranged the spring 94, the coupling unit 95, and the upper end 47 of the transmission shaft 46. This second chamber 91 is arranged opposite the chamber 50 in reference to the body 10 of the gas cock 100, and in the direction of the drive shaft 40, both chambers 50 and 42 being separated by the through hole 14 of the body 10. The cap 90 comprises therein a sliding surface for the radial stud 99, which is pushed against the cap 90 by means of the spring 94, and two stops 92 and 93 of the angular path A of the main shaft 41 between the initial rotation position and the final rotation position, the position of stop 92 corresponding to the reference position D1. In this embodiment of the gas cock 100, the radial stud 99 is positioned in the stop 92.

[0026] Figure 7 shows a perspective view of an embodiment of the rotating disk 20 with a connection opening 21 comprising ten holes 25_1-25_{10}, the hole of one end 25_{10} having larger dimensions, and in terms of their diameter the holes being arranged such that a series of holes of different diameters are interposed within a series of holes increasing in size, in order to obtain a more regular gas flow in the outlet of the gas cock 100. This row of holes has a radial shape, such that to obtain the gas flow rate required in the gas outlet conduit 12, regulation is performed by overlapping a number of consecutive holes 25_1-25_{10} with the outlet hole 53, and the change in gas flow is performed by means of said overlapping holes 25_1-25_{10} leaving and entering the ends of the outlet hole 53 at the same time.

[0027] Figures 9a to 9b show a sectional front view of the gas cock of Figure 1, the rotating disk 20 being arranged in gas flow regulation positions for natural gas and liquefied petroleum gas, respectively, when the gas cock 100 is in the OFF position in which it does not supply any gas, such that the connection opening 21 of the rotating disk 20 does not overlap with the outlet hole 53 for any of the two gas supplies.

[0028] Figures 10a to 10b show a sectional front view of the gas cock of Figure 1, the rotating disk 20 being arranged in gas flow regulation positions for natural gas and liquefied petroleum gas, respectively, when the gas cock 100 is in the minimum MIN gas flow position, such that holes 25_1-25_3 overlap with the outlet hole 53 when the gas cock 100 is configured for supplying natural gas, and only the hole 25_1 overlaps with the outlet hole 53 when the gas cock 100 is configured for supplying liquefied petroleum gas.

Claims

1. Gas cock with a safety valve for a gas cooking appliance, comprising a body (10) comprising a gas inlet conduit (11) fluidically communicated with the safety valve (30), and at least one gas outlet conduit (12); a regulating element suitable for regulating the incoming gas flow from the safety valve (30) to the outlet conduit (12) from the safety valve (30) depending on the angular position thereof, the regulating element being arranged in a housing (51) of the body (10) fluidically communicated with the safety valve (30) and with the outlet conduit (12); and a drive shaft (40) comprising a manually operable main shaft (41), said main shaft (41) being rotatable between an initial rotation position and a final rotation position, and axially movable for acting on a transmission element (70) for opening the safety valve (30), the regulating element rotating integrally with said main shaft (41), **characterised in that** the regulating element is a rotating disk (20) comprising at least one connection opening (21) for regulating gas flow to the outlet conduit (12) depending on the angular position thereof, said rotating disk (20) being axially retained supported on a contact area (52) of the housing (51) of the body (10), the contact area (52) comprising at least one outlet hole (53) fluidically communicated with the gas outlet conduit (12), the rotating disk (20) being configured for supplying different types of combustible gas depending on the angular positioning of said rotating disk (20) with respect to the main shaft (41), and the drive shaft (40) being configured for fixing the rotating disk (20) in different angular positions with respect to the main shaft (41) according to the type of combustible gas to be supplied.

2. Gas cock according to claim 1, wherein the drive shaft (40) comprises a transmission shaft (46) which pushes the transmission element (70) when it is moved axially, the rotating disk (20) being coupled to the transmission shaft (46), and said transmission shaft (46) being coupled to the main shaft (41), the drive shaft (40) being configured for positioning the main shaft (41) in different angular positions with respect to the transmission shaft (46) depending on the type of gas to be supplied.

3. Gas cock according to claim 2, comprising an attachment element (97) fixing the main shaft (41) and the transmission shaft (46), where the main shaft (41) and the transmission shaft (46) can be uncoupled by acting on the attachment element (97), the transmission shaft (46) being axially moved when it is uncoupled from the main shaft (41), the attachment element (97) preferably being a screw.

4. Gas cock according to claim 3, wherein the main shaft (41) comprises an axial through hole (44) that

opens into a cavity (42c), and the transmission shaft (46) comprises an hole (47b), the attachment element (97) being arranged in the cavity (42c) and fixed in the hole (47b), said attachment element being able to be operated through the through hole (44) of the main shaft (41).

5. Gas cock according to claim 4, wherein an axial stud (98) protrudes from the main shaft (41) towards the transmission shaft (46), the transmission shaft (46) comprising a housing (49) with at least two stops (49_1, 49_2) arranged in different angular positions (α_1, α_2), the stud (98) being coupled in the corresponding angular position (α_1, α_2) depending on the gas to be supplied.

6. Gas cock according to claim 5, wherein the drive shaft (40) comprises a coupling unit (95) fixed to the main shaft (41), said coupling unit (95) comprising the axial stud (98), and said coupling unit (95) together with the cavity (42c) of the main shaft (41) demarcating a housing in which an operable end of the attachment element (97) is arranged, the coupling unit (95) comprising an axial through hole (95a) with the other end of the attachment element (97) going through same, said end being coupled to the transmission shaft (46).

7. Gas cock according to claim 5 or 6, wherein the axial stud (98) has a length such that it is still arranged in the housing (49) when the transmission shaft (46) is uncoupled from the main shaft (41).

8. Gas cock according to any of claims 5 to 7, wherein the coupling unit (95) comprises a radial stud (99) and the main shaft (41) comprises a first groove (42a) and a second groove (42b) in which the radial stud (99) and the axial stud (98) of the coupling unit (95) are coupled, respectively.

9. Gas cock according to any of claims 5 to 9, wherein the rotating disk (20) is arranged in a different angular position depending on the gas to be supplied, when the stud (98) is coupled in the corresponding position (49_1, 49_2), and the radial stud (99) is arranged in a reference position (D1).

10. Gas cock according to claim 9, wherein the reference position (D1) corresponds with the initial rotation position or the final rotation position of the main shaft (41), the initial rotation position of the main shaft (41) preferably corresponding with the position with minimum gas flow, and the final rotation position with the position with no gas flow.

11. Gas cock according to claim 9 or 10, comprising a cover (90) which is fixed to the body (10) and with the main shaft (41) going through same, the cover (90) comprising therein two stops (92, 93) for stopping the main shaft (41) in the rotation thereof between the initial rotation position and the final rotation position, the position of one of said stops (92, 93) corresponding to the reference position (D_1), the radial stud (99) of the main shaft (41) abutting with the stops (92, 93) in the rotation thereof.

12. Gas cock according to any of claims 2 to 12, comprising a spring (94) which is arranged between a washer (96) and an abutment surface (47c) of the transmission shaft (46), said spring (94) returning the drive shaft (40) to a standby position when it stops pushing said drive shaft (40) for opening the safety valve (30).

13. Gas cock according to any of the preceding claims, wherein the body (10) comprises a through hole (14) communicated through one of its ends with the housing (51), the drive shaft (40) going through the through hole (14) in a tightly fitted manner and with possibility of rotation, the other end of the through hole (14) being communicated with a seat comprising a gasket (80) which assures leak-tightness.

14. Gas cooking appliance, **characterised in that** it comprises at least one gas cock according to any of the preceding claims.

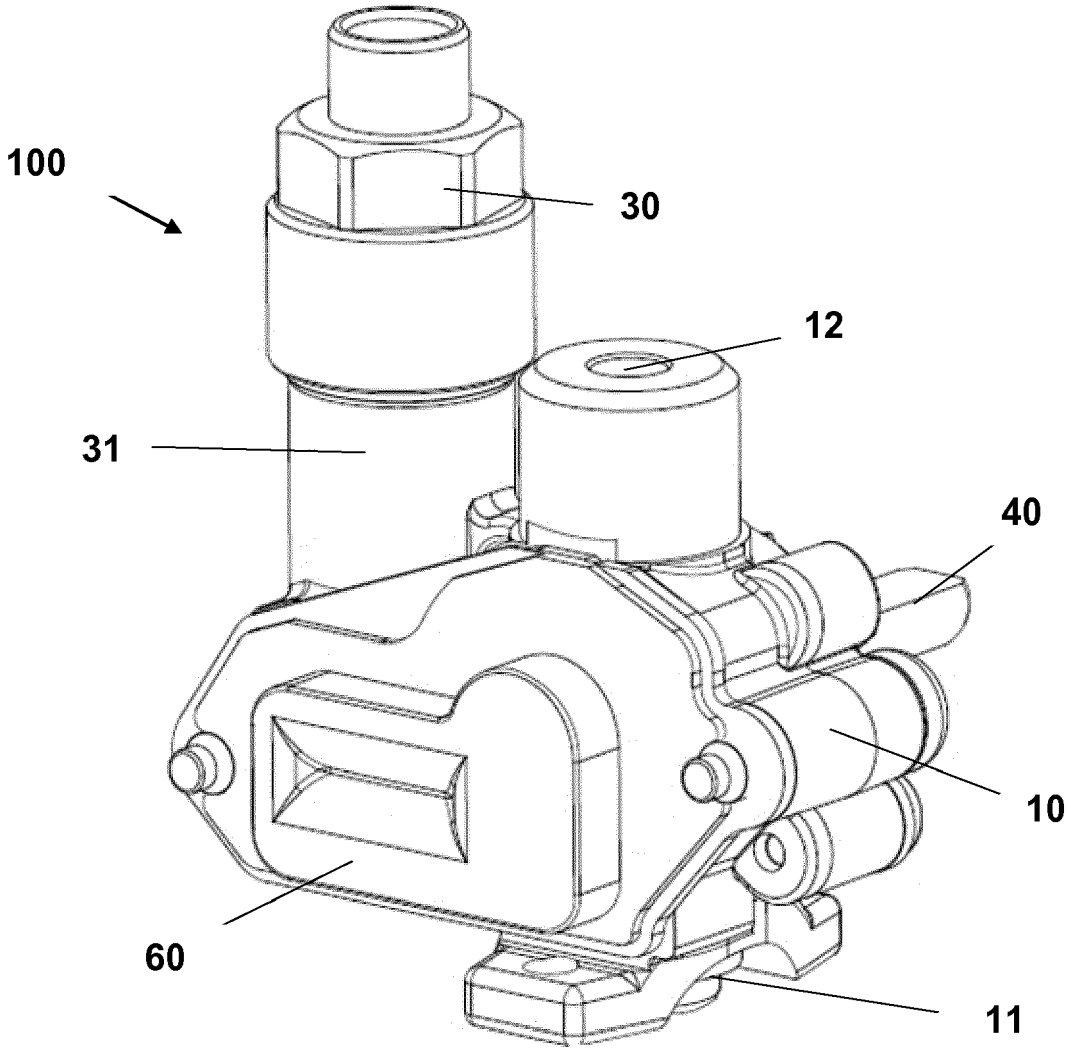

FIG. 1

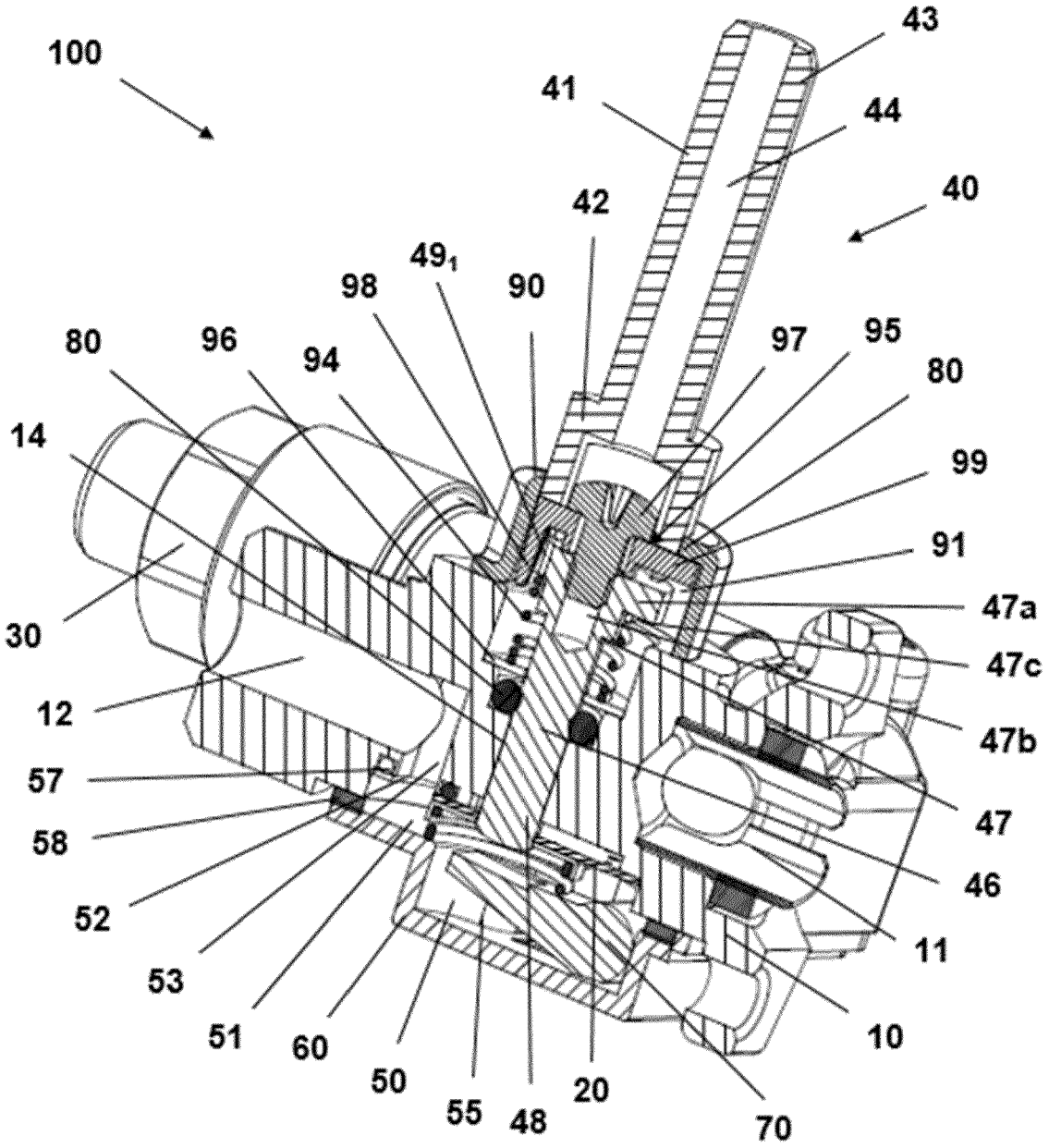
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FIG. 2

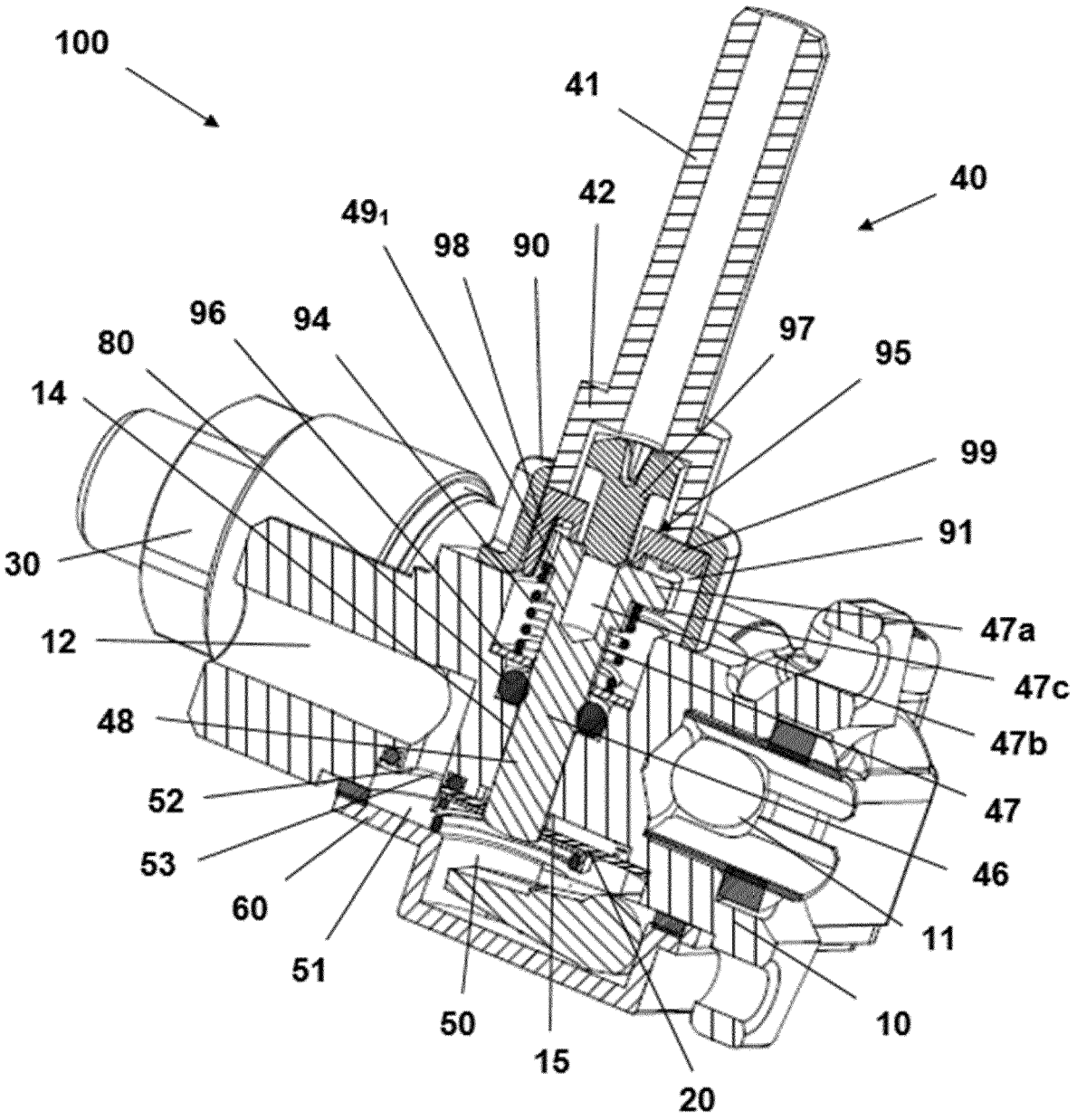
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FIG. 3

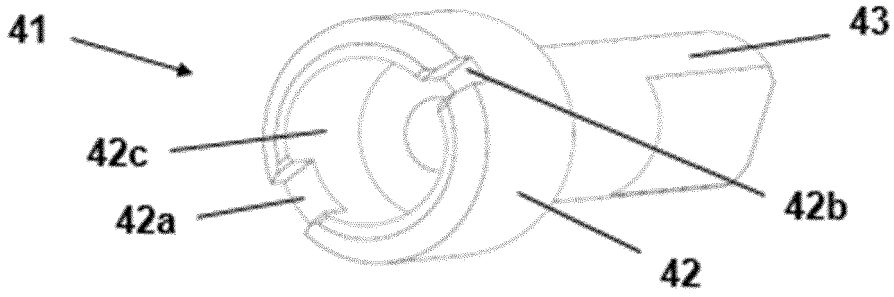

FIG. 4

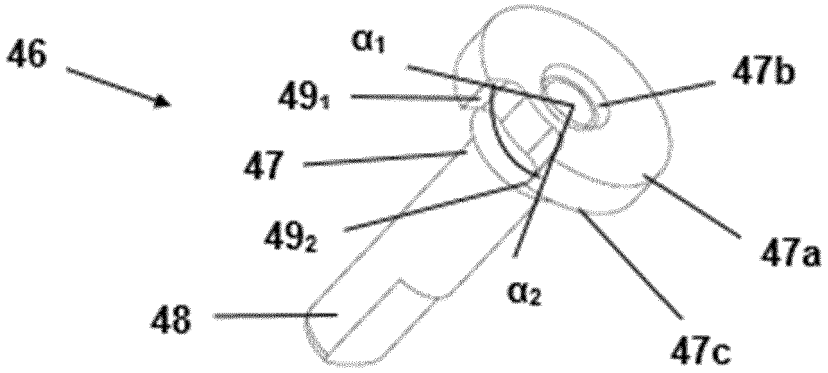

FIG. 5

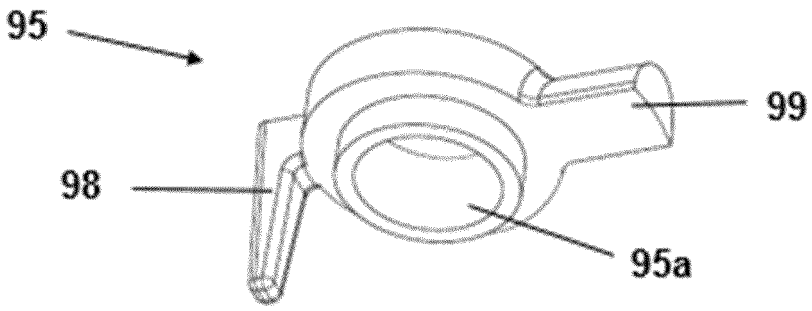

FIG. 6

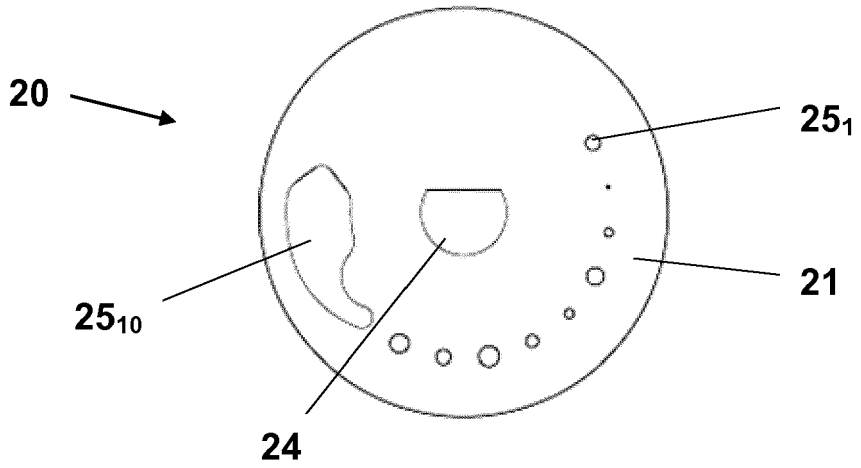

FIG. 7

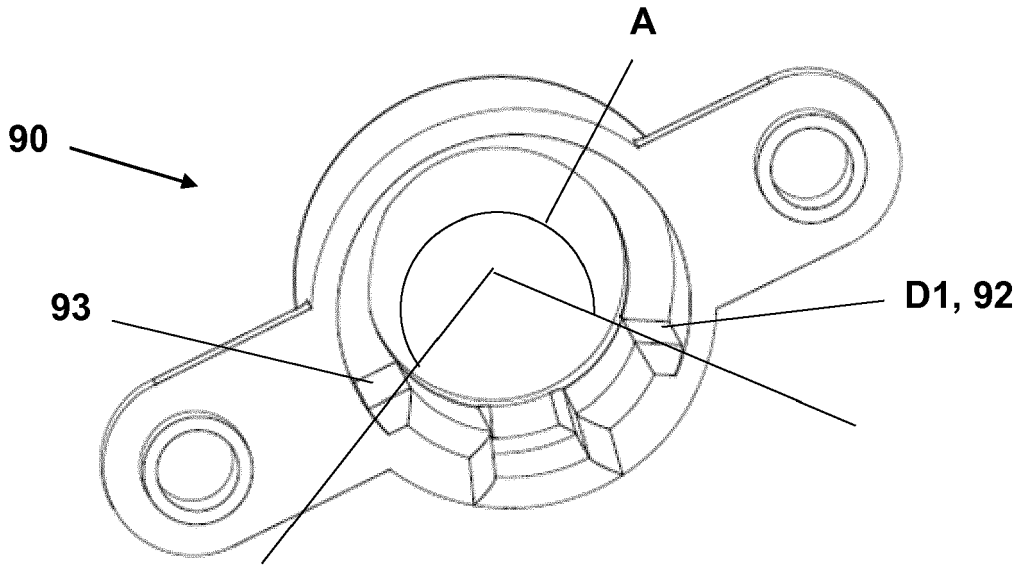

FIG. 8

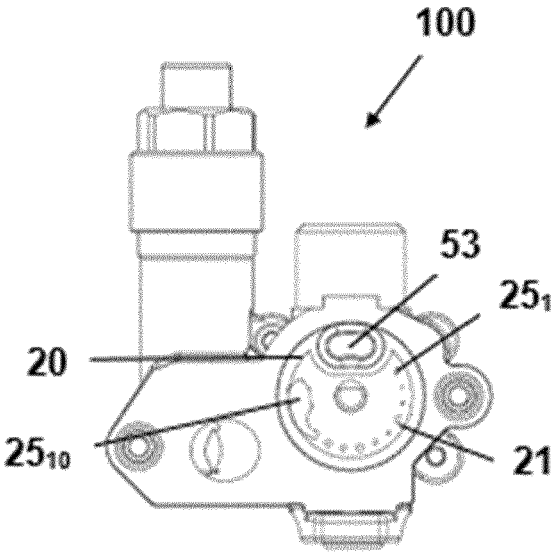

FIG. 9a

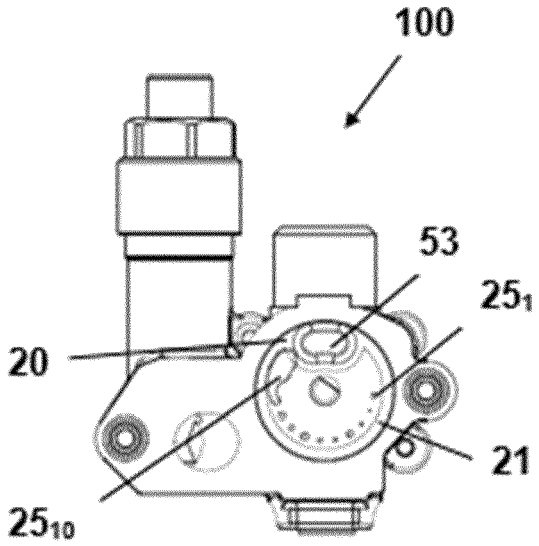

FIG. 9b

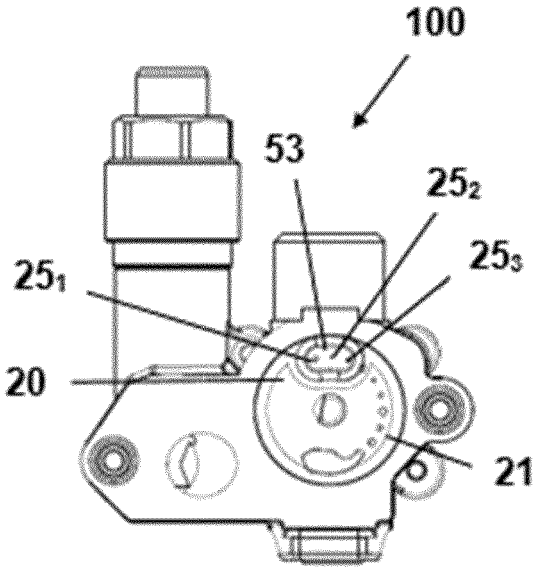

FIG. 10a

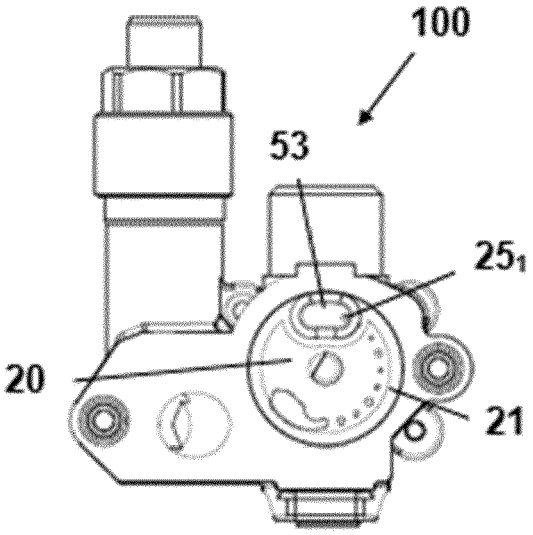

FIG. 10b

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EUROPEAN SEARCH REPORT

Application Number
EP 18 38 2208

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2012/080054 A2 (BSH BOSCH SIEMENS HAUSGERAETE [DE]; NAUMANN JOERN [DE]) 21 June 2012 (2012-06-21) * page 7, line 23 - page 8, line 21 * * page 11, lines 8-22; figures 5, 6, 12 *	1-14	INV. F23N1/00 F23N5/10
A	EP 3 211 309 A1 (COPRECI S COOP) 30 August 2017 (2017-08-30) * abstract; claim 1; figures *	1-14	
A	WO 01/33118 A1 (FISHER & PAYKEL [NZ]; SABA TARAZ U LLAH [NZ]; BRENMUHL MARIA MAY [NZ];) 10 May 2001 (2001-05-10) * the whole document *	1-14	
A	EP 2 908 053 A1 (MIKUNI KOGYO KK [JP]) 19 August 2015 (2015-08-19) * the whole document *	1-14	
A,D	ES 1 087 355 U (COPRECITEC) 13 August 2013 (2013-08-13) * the whole document *	1-14	TECHNICAL FIELDS SEARCHED (IPC) F23N

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	4 September 2018	Coli, Enrico

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04-09-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2012080054 A2	21-06-2012	AU 2011344470 A1	11-07-2013
		CN 103547865 A	29-01-2014
		EP 2652402 A2	23-10-2013
		HK 1194130 A1	16-12-2016
		KR 20130132539 A	04-12-2013
		RU 2013129298 A	20-01-2015
		US 2013248745 A1	26-09-2013
		WO 2012080054 A2	21-06-2012
EP 3211309 A1	30-08-2017	CN 108463670 A	28-08-2018
		EP 3211309 A1	30-08-2017
		WO 2017144526 A1	31-08-2017
WO 0133118 A1	10-05-2001	AU 771667 B2	01-04-2004
		CA 2389850 A1	10-05-2001
		EP 1230502 A1	14-08-2002
		JP 2003513220 A	08-04-2003
		US 6726175 B1	27-04-2004
		WO 0133118 A1	10-05-2001
EP 2908053 A1	19-08-2015	CN 104755840 A	01-07-2015
		EP 2908053 A1	19-08-2015
		JP 5960573 B2	02-08-2016
		JP 2014081108 A	08-05-2014
		KR 20150064082 A	10-06-2015
		TW 201414964 A	16-04-2014
		WO 2014061441 A1	24-04-2014
ES 1087355 U	13-08-2013	CN 203963103 U	26-11-2014
		ES 1087355 U	13-08-2013
		PL 123285 U1	02-02-2015

EPO FORM P0459

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Patent documents cited in the description

- ES 1087355 U **[0003]**