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(54) **CONNECTOR STRUCTURE**

VERBINDERSTRUKTUR

STRUCTURE DE CONNEXION

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Description

Technical Field

[0001] The present invention relates to a connector structure used when extracting a liquid, e.g. a chemical solution, contained in a container.

Background Art

[0002] Generally, liquids like semiconducting high-purity agents and common chemical agents are poured into containers such as glass bottles and tanks at the production site, and the openings formed in these containers are covered with lids before the containers are shipped out. A known method for extracting the liquid contained in such a container is a siphon-tube method in which gas, such as air, is introduced into the container so that the liquid can be forced outward from the container by the pressure of the gas.

[0003] In this method, the lid attached to the opening of the container is first removed, and then a siphon tube serving as a liquid channel and a plug having a gas channel are attached to the opening of the container. Subsequently, a socket joinable to a tube for liquid extraction and to a tube for gas introduction is fitted to the plug, thereby forming a main channel for liquid extraction and a sub channel for gas introduction in the plug and socket attached to the opening of the container.

[0004] With regard to the socket and the plug described above, a joining device (connector structure) that allows for connection of the socket to the plug by a single manual operation is known.

[0005] Furthermore, a joining device that allows for improvement in working efficiency is disclosed (e.g. see Patent Document 1). In this joining device, an annular channel is formed between the socket and the plug when the two are fitted to each other, such that the channel at the socket side and the channel at the plug side are communicable with each other at an arbitrary twist angle through this annular channel; hence, different kinds of fluid channels, such as for liquid and gas, can be readily joined to each other at the opening of the container, thereby achieving an improved working efficiency.

[0006] Patent Document 1: Japanese Unexamined Patent Application, Publication No. 2001-192099

Disclosure of Invention

[0007] In the connector structure of the related art described above, the siphon tube inserted through the opening is substantially aligned with the axis of the container, and the lower end of the siphon tube and the bottom surface of the container have a gap formed therebetween for liquid extraction. Thus, when there is a small amount of liquid remaining in the container and the lower end of the siphon tube becomes exposed, the extraction becomes difficult. This causes a non-extractable amount

of liquid to remain over the entirety of the substantially flat bottom surface inside the container, which is problematic in that the liquid in the container cannot be used without being wasted. Since the effect this has on the cost can be significant especially in the case where the liquid being handled is an expensive agent such as a resist material, it is desirable to use the liquid efficiently by minimizing the amount of liquid remaining in the container.

[0008] US6,027,041 discloses a spray bottle with a ball type swivel joint which terminates in a tube extending first passage over which is slipped a proximal end of a hose. The hose is preferably made of silicone, a highly flexible material. The distal end of the hose is attached to a weight which is sufficiently heavy to urge the hose distal end to the lowest point in the storage chamber.

[0009] In view of the circumstances described above, the object of the present invention is to provide a connector structure that can minimize the amount of liquid remaining in the container.

[0010] US3512676 describes a structure for the end of containers, such as canisters.

[0011] In order to achieve the aforementioned object, the present invention employs the following solutions.

[0012] According to the present invention there is provided a connector structure according to claim 1.

[0013] In the above-described connector structure, the inclination angle is preferably an angle between the axis of the siphon tube set vertically and the axis of the container that is set in an inclined position such that a lower end of the siphon tube is located near a lowest position on a bottom surface of the container. Accordingly, the liquid in the container can collect at the lowest bottom-surface position inside the inclined container, thereby allowing for extraction of substantially the entire amount of liquid.

[0014] In the above-described connector structure, it is preferable that height-adjustment means be provided which adjusts a secured position of the siphon tube in a vertical direction. Accordingly, the amount of insertion (insertion height) of the siphon tube can be adjusted according to individual differences amount container, whereby the lower end of the siphon tube can be secured at a position most proximate to the bottommost surface inside the container.

[0015] In the above-described connector structure, the socket is preferably secured to the opening of the container while an upward-opening recess of the socket has the plug inserted therein. Accordingly, the liquid dripping down from the plug at the time of attachment/detachment process can be collected by the socket.

[0016] In this case, the socket and the plug may have an intermediate connector disposed therebetween. The intermediate connector may be joined to the socket while an upward-opening recess of the intermediate connector has the plug inserted therein.

[0017] According to the present invention described above, the siphon tube is inserted substantially vertically

into the container set in an inclined position to extract the liquid therefrom, so that the amount of non-extractable liquid remaining in the container can be minimized, whereby the liquid in the container can be used efficiently without waste. With the reduction in the remaining amount of liquid, the cost of production can be lowered especially in the case where the liquid being handled is an expensive agent, etc.

Brief Description of Drawings

[0018]

[FIG. 1] Fig. 1 is a cross-sectional view showing a connector structure.

[FIG. 2] Fig. 2 is an enlarged view showing a relevant part of height-adjustment means provided in the connector structure shown in Fig. 1.

[FIG. 3] Fig. 3 is an enlarged cross-sectional view showing a relevant part of a gas channel near a sealing nut in the connector structure shown in Fig. 1.

[FIG. 4] Fig. 4 is a cross-sectional view showing a configuration example of a quick connector.

[FIG. 5] Fig. 5 is a cross-sectional view showing an embodiment of a connector structure according to the present invention.

[FIG. 6A] Fig. 6A shows a configuration example of a quick connector used in the embodiment and is a plan view partly having a cross-sectional view.

[FIG. 6B] Fig. 6B shows the configuration example of the quick connector used in the embodiment and is a cross-sectional view showing the internal structure of a plug.

[FIG. 7] Fig. 7 is a cross-sectional view showing a connector structure.

Explanation of Reference Signs:

[0019]

1:	container
2:	opening
2a:	upper end surface
2b:	external thread
10, 10A, 10B:	connector
11:	siphon tube
12:	gas channel
13:	liquid channel
20, 20A:	socket
21, 21A, 71:	recess
30:	bottle cap
40, 40A, 40B:	plug
43:	height-adjustment groove (height-adjustment means)
50:	adjustment nut
60, 60A, 60B:	quick connector
70:	intermediate connector
θ :	inclination angle

Cs, Cv: axis

Best Modes for Carrying Out the Invention

[0020] According to Figs. 1 to 4, a container (e.g. glass bottle or plastic tank) 1 for holding a liquid, such as an agent, has an inlet/outlet opening 2 at an upper section thereof. To extract the liquid from the container 1, a siphon-tube method is employed, as shown in Fig. 1, as an example in which a siphon tube 11 of a connector 10 attached to the opening 2 is inserted to near the bottom surface of the container 1. This siphon-tube method is designed to extract the liquid in the container 1 through an opening provided at the lower end of the siphon tube 11 by pressing against the liquid surface with the pressure of air or gas introduced into the container 1.

[0021] In addition to the siphon tube 11 mentioned above, the connector 10 includes a socket 20 and a plug 40. The socket 20 attached to the opening 2 of the container 1 and the plug 40 supporting the siphon tube 11 are integrally joined to each other, thereby forming a gas channel 12 for introducing gas into the container 1 and a liquid channel 13 for extracting liquid from the container 1.

[0022] The socket 20 is a substantially columnar member that is detachably attached to the opening 2 of the container 1 and has a shape such that the upper end surface and the lower end surface deviate from a mutually parallel state by an inclination angle θ to be described later.

[0023] A recess 21 for joining the socket 20 to the plug 40 is formed around the axial center on the upper end surface of the socket 20. The recess 21 is a substantially columnar shaped space formed along an axis Cs that is orthogonal to the upper end surface, and in the state where the socket 20 is attached to the opening 2 of the container 1, the axis deviates from an axis Cv of the container 1 by the inclination angle θ . The socket 20 is provided with a through-hole 22 having a circular shape in cross section and extending along the axis Cs from the center of the bottom surface of the recess 21 to the lower end surface. Since the through-hole 22 serves as a passage through which the siphon tube 11 extends into the container 1, the aforementioned axis Cs is a common axis for the recess 21 and the siphon tube 11.

[0024] Furthermore, the socket 20 is provided with an insertion projection 23 projecting from the lower end surface in conformity to the cross-sectional shape of the opening 2, and is also provided with an external threaded portion 24 formed on the upper outer surface for joining and fixing the plug 40 thereto by means of an adjustment nut 50 to be described later.

[0025] The insertion projection 23 is a projected portion having a circular shape in cross section and is inserted into the opening 2 of the container 1. The insertion projection 23 has an axis that is inclined relative to the axis Cs by the angle θ , and has a smaller diameter than the outside diameter of the main body of the socket 20. Con-

sequently, a step surface 25 extending outward in the horizontal direction is formed at the upper end of the insertion projection 23. Reference numeral 26 in the drawing denotes a flange portion projecting outward from the outer peripheral surface of the socket 20, and 27 denotes a gasket attached near the upper end of the insertion projection 23.

[0026] The plug 40 is a substantially L-shaped member in which the gas channel 12 and the liquid channel 13 are formed independently of each other. One end of the plug 40 with the siphon tube 11 attached thereto is joined to the socket 20, whereas the other end is joined to a detachable quick connector 60.

[0027] The siphon tube 11 is securely supported at one end (closer to the socket 20) of the liquid channel 13, and the joint section therebetween is sealed by means of a ring 14 and a sealing nut 15. In other words, this embodiment employs a common joint structure for tubing, such as copper tubing, which involves the use of a plastic tube as the siphon tube 11 and the use of the ring 14 and the sealing nut 15.

[0028] The other end of the plug 40 serves as a projection 41 that fits into, for example, a recess 61 of the quick connector 60, as shown in Fig. 4. The projection 41 is provided with a lock groove 42 that keeps the projection 41 fitted to the quick connector 60.

[0029] The plug 40 is fixed to the socket 20 by means of the adjustment nut 50. The adjustment nut 50 includes an internal threaded portion 51 extending through the central section thereof and screwed onto the external threaded portion 24 of the socket 20, and also includes a flanged lock portion 52 locked to a height-adjustment groove 43 defined by a small-diameter section formed in the plug 40. The lock portion 52 works in cooperation with the height-adjustment groove 43 to function as height-adjustment means to be described later. Reference numeral 53 in the drawings denotes a ferrule serving as a sealing member.

[0030] Regarding the socket 20 combined with the plug 40 in this manner, the flange portion 26 has attached therearound a bottle cap 30 for screwing the connector 10 onto the container 1. The bottle cap 30 is a substantially cylindrical member, and a hollow inner surface 31 thereof has an internal threaded portion 31a formed at the lower end thereof for screwing onto an external thread 2b of the container 1. The upper end of the hollow inner surface 31 serves as a space that can accommodate the socket 20 and the flange portion 26, and the inside diameter of the hollow inner surface 31 at the upper end is set to a value greater than that of the internal threaded portion 31a.

[0031] The socket 20 combined with the siphon tube 11 and the plug 40 is retained by placing a cap ring 32 thereon from above and securing it with a plurality of cap screws 33 in the state where the siphon tube 11 extends through the hollow inner surface 31 of the bottle cap 30. Consequently, the socket 20 is accommodated in the space within the hollow inner surface 31 of the bottle cap

30 and becomes combined therewith in a state where the flange portion 26 is slidable with respect to the cap ring 32 above the internal threaded portion 31a.

[0032] As shown in Fig. 4, for example, the quick connector 60 has a lock lug 62 that fits into the lock groove 42 when the projection 41 of the plug 40 and the recess 61 are in a predetermined fitted state, thereby inhibiting movement in the axial direction. This lock lug 62 is equipped with a coil spring 63 that applies an upward bias force to maintain the locked state. Therefore, by pressing the coil spring 63 downward to compress it against the bias force, the lock lug 62 can be moved downward to release the locked state with respect to the lock groove 42. As a result, the quick connector 60 in the fitted state can be removed from the plug 40, whereby the two can be detached from each other. For fitting the quick connector 60 onto the plug 40, the tip of the lock lug 62 is formed in an inclined shape so that the lock lug 62 can be pushed upward during insertion and thus set to a locked state automatically.

[0033] The quick connector 60 described above has a gas-supply connection port 64 that takes in pressurizing gas from an external supply source and guides the gas towards the gas channel 12. Furthermore, the quick connector 60 has a tube 3 connected thereto by means of a nut 4. This tube 3 is coupled to the liquid channel 13 and guides the liquid extracted from the container 1 to the location of usage. Reference numerals 66 and 67 in the drawing denote sealing O-rings provided for isolating the gas channel 12 from the liquid channel 13.

[0034] With regard to the connector 10 having the above-described configuration, the attaching/detaching operation thereof with respect to the container 1 and the liquid extracting operation will be described together with the advantages.

[0035] First, a lid (not shown) attached to the opening 2 of the container 1 is removed and the connector 10 is attached. In this step, since the socket 20 and the plug 40 are combined by means of the adjustment nut 50, the connector 10 is secured by inserting the siphon tube 11 into the container 1 and screwing the internal threaded portion 31a of the bottle cap 30 onto the external thread 2b of the opening 2. As a result, the insertion projection 23 of the socket 20 is inserted and positioned in the opening 2, and the gasket 27 is pressed by an upper end surface 2a of the opening 2, thereby sealing the interior of the container 1.

[0036] Regarding the connector 10 attached in this manner, the axis Cs of the siphon tube 11 deviates from the axis Cv of the container 1 by an inclination angle θ , which implies that the container 1 is set in an inclined position when the siphon tube 11 is set in a substantially vertical position. Therefore, by holding the container 1 in an inclined position at the inclination angle θ relative to the vertical position using appropriate fixation means (not shown) and subsequently loosening the adjustment nut 50 to adjust the height of the siphon tube 11 within an adjustable range L (see Fig. 2), the lower end of the si-

phon tube 11 can be positioned to have its opening near the lowest position on the bottom surface of the inclined container 1. In other words, with respect to a bottom-surface position that may vary depending on individual differences among containers 1, the amount of insertion of the siphon tube 11 can be adjusted by sliding the plug 40 combined with the siphon tube 11 upward and downward, thereby achieving height-adjustment means that can optimize the amount of insertion.

[0037] After the amount of insertion of the siphon tube 11 is adjusted, the plug 40 is secured by tightening the adjustment nut 50 around the socket 20, which compresses the ferrule 53 and allows it to exhibit a sealing effect.

[0038] Subsequently, the quick connector 60 is joined from a lateral direction to the connector 10 attached to the opening 2 of the container 1. Such a laterally joinable structure is advantageous in a case where the space above the container 1 is limited. Since this joining process of the quick connector 60 completes the preparation process for extracting the liquid from the container 1, a valve of a gas-supply source (not shown) is opened so as to start a gas-supplying process.

[0039] With the start of the gas-supplying process, gas to be used for pressurizing the liquid surface is introduced into the gas channel 12 in the quick connector 60 from the gas-supply connection port 64. This gas travels through the gas channel 12 in the plug 40 joined to the quick connector 60 and is guided to, for example, a recessed channel 16 formed on the upper end surface of the sealing nut 15, as shown in Fig. 3. This recessed channel 16 is formed around the entire circumference of the siphon tube 11 that is plastically deformed due to a joint involving the use of the sealing nut 15.

[0040] The sealing nut 15 is provided with at least one through-hole 17 extending in the up-down direction through an appropriate position thereof. Therefore, as indicated by an arrow g in the drawing, the gas introduced to the recessed channel 16 flows toward the lower surface of the sealing nut 15 through the through-hole 17. By utilizing the space formed between the lower surface of the sealing nut 15 and the recess 21 of the socket 20 and the space formed between the siphon tube 11 and the through-hole 22 as gas channels, the gas can then be guided to the space formed above the liquid surface in the container 1.

[0041] As the pressure in the container 1 rises accordingly, the liquid with its liquid surface in a pressurized state is pushed upward into the siphon tube through the lower end of the siphon tube 11. This causes the liquid to flow upward, as indicated by a white arrow in the drawing, whereby the liquid flows into the liquid channel 13 in the plug 40. The liquid travels further through the liquid channel 13 in the quick connector 60 and through the tube 3, so as to be supplied to the desired location of usage.

[0042] In this liquid extracting operation, when there is a small amount of liquid remaining in the container 1, the

liquid collects at the lowest position on the bottom surface of the container since the container 1 is held in an inclined position at the angle θ . Furthermore, since the lower end of the siphon tube 11 has its opening located near the lowest bottom-surface position inside the container 1, the liquid can be extracted more easily and reliably with the siphon-tube method until the liquid surface reaches a position lower than the opening of the siphon tube 11.

[0043] In other words, in the siphon-tube method that uses the above-described connector 10 to extract liquid from the container 1 through the siphon tube 11, the container 1 is held in an inclined position while the siphon tube 11 is inserted in a substantially vertical direction; hence, the liquid can be extracted while it collects around the lowest bottom-surface position of the inclined container, whereby the amount of liquid remaining in the container 1 can be minimized.

Embodiment

[0044] An embodiment of the present invention will be described next with reference to Figs. 5, 6A, and 6B. Similar components to those described above are given the same reference numerals, and detailed descriptions of those components will be omitted.

[0045] In a connector 10A according to this embodiment, a substantially L-shaped plug 40A is inserted from above into an upward-opening recess 21A of a socket 20A so as to be joined thereto.

[0046] The siphon tube 11 in this case is directly attached to the socket 20A by employing a similar configuration to the first embodiment which uses the ring 14 and the sealing nut 15 to attach the siphon tube 11 to the plug 40. The axis Cs in this case is similar to the first embodiment in that it deviates from the axis Cv of the container 1 by an inclination angle θ .

[0047] The upward-opening recess 21A of the socket 20A has a shape that allows a projection 41A of the plug 40A to be inserted and fitted therein. The inner peripheral surface of the recess 21A has attached thereto O-rings 44 and 45 serving as sealing members for isolating a gas channel from a liquid channel. The socket 20A has a gas channel 12 that allows communication between the recess 21A and the recessed channel 16 formed on the upper end surface of the sealing nut 15. The gas guided from the recessed channel 16 into the container 1 flows along the same path as in the first embodiment described above (see Fig. 3).

[0048] On the other hand, the plug 40A has a gas channel 12 and a liquid channel 13 formed therein, and the other end of the projection 41A extending in the horizontal direction has the tube 3, for sending out the liquid, joined thereto by means of the nut 4. The plug 40A has left and right side surfaces respectively provided with a pair of gas-supply connection ports 46 that take in pressurizing gas from an external supply source and guide the gas towards the gas channel 12. Since the gas-supply connection ports 46 communicate with each other inside,

one of the gas-supply connection ports 46 that can be readily pipe-connected to the supply source may be selected for use, whereas the other may be closed by a blind plug, etc. The plug 40A having this configuration functions as a quick connector substantially similar to that in the first embodiment described above, and therefore, the plug 40A including the tube 3 will be collectively referred to as a quick connector 60A hereinafter.

[0049] With regard to the connector 10A having the above-described configuration, the attaching/detaching operation thereof with respect to the container 1 and the liquid extracting operation will be described together with the advantages.

[0050] In this case, since the socket 20A with the siphon tube 11 attached thereto is combined with the bottle cap 30 by means of the cap ring 32, the siphon tube 11 is first inserted into the container 1 through the opening 2, and the bottle cap 30 is then secured by being screwed onto the external thread 2b of the opening 2. Subsequently, the projection 41A of the plug 40A is inserted and fitted into the recess 21A so as to join the quick connector 60A to the socket 20A.

[0051] Consequently, since this forms the gas channel 12 and the liquid channel 13 extending from the plug 40A to the socket 20A, gas can be supplied into the container 1, whereby the liquid inside can be pushed out into the liquid channel 13 through the siphon tube 11.

[0052] After the completion of the liquid extracting operation, if the quick connector 60A is removed for the purpose of, for example, replacing the container 1, there is concern that the liquid remaining in the liquid channel 13 may drip down from the lower end of the projection 41A. However, because the plug 40A is detached by being pulled upward from the socket 20A, the liquid dripping down from the plug 40A can be collected by the recess 21A, thereby preventing the liquid from flowing to the outside.

[0053] A connector will be described next with reference to Fig. 7. Similar components to those described above are given the same reference numerals, and detailed descriptions of those components will be omitted.

[0054] In a connector 10B according to this embodiment, the socket 20 and a plug 40B of a quick connector 60B have disposed therebetween an intermediate connector 70 that supports the siphon tube 11. This intermediate connector 70 includes a gas channel 12 for introducing gas into the container 1 and a liquid channel 13 for extracting liquid from the container 1. Moreover, the upper end of the intermediate connector 70 has an upward-opening recess 71 to which the plug 40B is inserted and joined, and the lower end is joinable to the socket 20 by being inserted therein.

[0055] Specifically, the lower end of the intermediate connector 70 to be joined to the socket 20 has a similar configuration to that of the plug 40 shown in Fig. 1. On the other hand, the upper end of the intermediate connector 70 into which the plug 40B of the quick connector 60B is inserted is similar to the socket 20A shown in Fig.

5 in having an upward-opening recess 71.

[0056] Where necessary, the intermediate connector 70 is provided with a lock lug 72 near the recess 71. The lock lug 72 fits into a lock groove 42B of the plug 40B in a predetermined fitted state so as to maintain the state where the plug 40B is fitted in the recess 71. The lock lug 72 has substantially the same configuration as the lock lug 62 shown in Fig. 4, and thus has a coil spring 73 that applies a bias force towards the axial center to maintain the locked state. Reference numerals 74 and 75 in the drawing denote O-rings for isolating the gas channel from the liquid channel.

[0057] With regard to the connector 10B having the above-described configuration, the attaching/detaching operation thereof with respect to the container 1 and the liquid extracting operation will be described together with the advantages.

[0058] First, a lid (not shown) attached to the opening 2 of the container 1 is removed and the connector 10B is attached. In this step, since the socket 20 and the intermediate connector 70 are combined by means of the adjustment nut 50, the connector 10B is secured by inserting the siphon tube 11 into the container 1 and screwing the internal threaded portion 31a of the bottle cap 30 onto the external thread 2b of the opening 2. As a result, the insertion projection 23 of the socket 20 is inserted and positioned in the opening 2, and the gasket 27 is pressed by the upper end surface 2a of the opening 2, thereby sealing the interior of the container 1.

[0059] Regarding the connector 10B attached in this manner, the axis Cs of the siphon tube 11 deviates from the axis Cv of the container 1 by an inclination angle θ , which implies that the container 1 is set in an inclined position when the siphon tube 11 is set in a substantially vertical position. Subsequently, the container 1 is held in an inclined position at the inclination angle θ relative to the vertical position, and the height of the siphon tube 11 is adjusted by loosening the adjustment nut 50, whereby the lower end of the siphon tube 11 can be positioned to have its opening near the lowest bottom-surface position of the inclined container 1. After the amount of insertion of the siphon tube 11 is adjusted, the intermediate connector 70 is secured by tightening the adjustment nut 50 around the socket 20, which compresses the ferrule 53 and allows it to exhibit a sealing effect.

[0060] Subsequently, the quick connector 60B is joined from above to the connector 10B attached to the opening 2 of the container 1. In this case, the lock lug 72 fits into the lock groove 42B in the plug 40B so as to securely hold the joint of the quick connector 60B, thereby completing the preparation process for extracting the liquid from the container 1.

[0061] Consequently, since this forms the gas channel 12 and the liquid channel 13 extending from the plug 40B of the quick connector 60B to the socket 20 via the intermediate connector 70, gas can be supplied into the container 1 by being guided along a path similar to that in the first embodiment described above, whereby the liquid

inside the container can be pushed out into the liquid channel 13 through the siphon tube 11.

[0062] After the completion of the liquid extracting operation, if the quick connector 60B is removed for the purpose of, for example, replacing the container 1, there is concern that the liquid remaining in the liquid channel 13 of the quick connector 60B may drip down from the lower end of the plug 40B. However, because the plug 40B is detached by being pulled upward from the recess 71 in the intermediate connector 70, the liquid dripping down from the plug 40B can be collected by the recess 71, thereby preventing the liquid from flowing to the outside.

[0063] According to the connector structure of the present invention, the siphon tube 11 is inserted substantially vertically into the container 1 set in an inclined position to extract the liquid therefrom, so that the amount of non-extractable liquid remaining in the container 1 can be minimized, whereby the liquid in the container can be used efficiently without waste. With the reduction in the remaining amount of liquid, the cost of production can be lowered especially in the case where the liquid being handled is an expensive agent, etc.

[0064] The present invention is not limited to the above-described embodiments, and modifications are permissible to an extent that they do not depart from the scope of the invention as defined in the appended claims.

Claims

1. A connector structure (10A) for a container (1), the connector structure (10A) comprising:

a socket (20A) said socket (20A) being a substantially columnar member having an upper end surface and a lower end surface, whereby the socket (20A) is attachable to an opening (2) of the container (1) and has a shape such that the upper end surface and the lower end surface deviate from a mutually parallel state by an inclination angle (θ), the socket (20A) further having a substantially columnar shaped upward-opening recess (21A) formed around the axial centre on the upper end surface of the socket (20A) and formed along an axis (Cs) that is orthogonal to the upper end surface;

a straight siphon tube (11) directly attached to the socket (20A) by being inserted into a through-hole (22) which penetrates the socket (20A), said through-hole (22) having a circular shape in cross section and extending along the axis (Cs) from the centre of the bottom surface of the recess (21A) to the lower end surface; and a substantially L-shaped plug (40A) having a downward-protruding projection (41A), wherein the plug (40A) has a gas channel (12) and a liquid channel (13),

wherein the socket (20A) has a gas channel (12),

wherein the plug (40A) is joined to the socket (20A) by inserting and fitting the projection (41A) in the upward-opening recess (21A), thereby forming a gas channel (12) for introducing gas into the container (1) and a liquid channel (13) for extracting liquid from the container (1), the connector structure (10A) further comprising a bottle cap (30) for securing the socket (20A) to the opening (2) of the container (1) by screwing an internal threaded portion (31a) of the bottle cap (30) onto an external thread (2b) of the opening (2),

wherein the through-hole (22) of the socket (20A) is inclined relative to an axis of the bottle cap (30) so that, in the state where the connector (10A) is secured to the opening (2) of the container (1), the axis (Cs) of the siphon tube (11) and the axis of the bottle cap (30) have a predetermined inclination angle (θ) therebetween and the through-hole (22) serves as a passage through which the siphon tube (11) extends into the container (1).

2. The connector structure (10A) according to claim 1, wherein height-adjustment means (43) is provided which adjusts a secured position of the siphon tube (11) in a vertical direction.
3. The connector structure (10A) according to claim 1 or 2, wherein the socket (20A) is secured to the opening (2) of the container (1) while the upward-opening recess (21A) of the socket has the plug (40A) inserted therein.
4. A use of the connector structure (10A) according to any one of claims 1 to 3, wherein the inclination angle (θ) is an angle between the axis (Cs) of the siphon tube (11) set vertically and the axis (Cv) of the container (1) that is set in an inclined position such that a lower end of the siphon tube (11) is located near a lowest position on a bottom surface of the container (1).

Patentansprüche

1. Verbinder-Struktur (10A) für einen Behälter (1), die Verbinder-Struktur (10A) umfassend:

eine Buchse (20A), wobei die Buchse (20A) ein im Wesentlichen säulenförmiges Element mit einer oberen Endfläche und einer unteren Endfläche ist, wodurch die Buchse (20A) auf einer Öffnung (2) des Behälters (1) anbringbar ist und eine solche Form aufweist, dass die obere Endfläche und die untere Endfläche von einem

wechselseitig parallelen Zustand um einen Winkel

(θ) abweichen, wobei die Buchse (20A) ferner eine säulenartig geformte, sich aufwärts öffnende Aushöhlung (21A) aufweist, die um die axiale Mitte an der oberen Endfläche der Buchse (20A) ausgebildet und entlang einer Achse (Cs) ausgebildet ist, die zur oberen Endfläche orthogonal ist,

ein gerades Siphonrohr (11), das dadurch direkt an der Buchse (20A) angebracht ist, dass es in ein Durchgangsloch (22) eingesetzt ist, das die Buchse (20A) durchdringt, wobei das Durchgangsloch (22) eine kreisrunde Querschnittsform aufweist und sich entlang der Achse (Cs) von der Mitte der Bodenfläche der Aushöhlung (21A) zur unteren Endfläche erstreckt, und einen im Wesentlichen L-förmigen Stopfen (40A) mit einem nach unten abstehenden Vorsprung (41A),

wobei der Stopfen (40A) einen Gaskanal (12) und einen Flüssigkeitskanal (13) aufweist, wobei die Buchse (20A) einen Gaskanal (12) aufweist,

wobei der Stopfen (40A) mit der Buchse (20A) durch Einsetzen und Einpassen des Vorsprungs (41A) in die sich aufwärts öffnende Aushöhlung (21A) verbunden ist, wodurch ein Gaskanal (12) zum Einleiten von Gas in den Behälter (1) und ein Flüssigkeitskanal (13) zum Entnehmen von Flüssigkeit aus dem Behälter (1) gebildet werden,

wobei die Verbinder-Struktur (10A) ferner eine Flaschenkappe (30) zum Befestigen der Buchse (20A) auf der Öffnung (2) des Behälters (1) durch Schrauben eines Innengewindeteils (31a) der Flaschenkappe (30) auf ein Außengewinde (2b) der Öffnung (2),

wobei das Durchgangsloch (22) der Buchse (20A) relativ zu einer Achse der Flaschenkappe (30) so geneigt ist, dass im Zustand, bei dem der Verbinder (10A) auf der Öffnung (2) des Behälters (1) befestigt ist, die Achse (Cs) des Siphonrohrs (11) und die Achse der Flaschenkappe (30) einen vorgegebenen Neigungswinkel (θ) dazwischen aufweisen, und das Durchgangsloch (22) als Durchgang dient, durch den sich das Siphonrohr (11) in den Behälter hinein (1) erstreckt.

2. Verbinder-Struktur (10A) nach Anspruch 1, wobei ein Höheneinstellmittel (43) vorgesehen ist, welches eine gesicherte Position des Siphonrohrs (11) in einer vertikalen Richtung einstellt.
3. Verbinder-Struktur (10A) nach Anspruch 1 oder 2, wobei die Buchse (20A) auf der Öffnung (2) des Behälters (1) befestigt ist, während in die aufwärts öff-

nende Aushöhlung (21A) der Buchse der Stopfen (40A) eingesetzt ist.

4. Verbinder-Struktur (10A) nach einem der Ansprüche 1 bis 3, wobei der Neigungswinkel (θ) ein Winkel zwischen der Achse (Cs) des Siphonrohrs (11), das vertikal eingestellt ist, und der Achse (Cv) des Behälters (1) ist, der derart in einer Neigungsposition eingestellt ist, dass ein unteres Ende des Siphonrohrs (11) nahe einer untersten Position auf einer Bodenfläche des Behälters (1) angeordnet ist.

Revendications

1. Structure de connexion (10A) pour un récipient (1), la structure de connexion (10A) comprenant :

un connecteur (20A), ledit connecteur (20A) étant un élément sensiblement en colonnes ayant une surface d'extrémité supérieure et une surface d'extrémité inférieure, dans laquelle le connecteur (20A) peut être fixé à une ouverture (2) du récipient (1) et a une forme telle que la surface d'extrémité supérieure et la surface d'extrémité inférieure dévient d'un état mutuellement parallèle selon un angle d'inclinaison (θ), le connecteur (20A) ayant en outre un évidement (21A) s'ouvrant vers le haut de forme sensiblement en colonnes formé autour du centre axial sur la surface d'extrémité supérieure du connecteur (20A) et formé le long d'un axe (Cs) perpendiculaire à la surface d'extrémité supérieure ;

un tube de siphon droit (11) directement fixé au connecteur (20A) en étant inséré dans un orifice traversant (22) qui pénètre dans le connecteur (20A), ledit orifice traversant (22) ayant une forme circulaire en coupe transversale et s'étendant le long de l'axe (Cs) depuis le centre de la surface de fond de l'évidement (21A) jusqu'à la surface d'extrémité inférieure ; et

un bouchon (40A) sensiblement en forme de L ayant une projection dépassant vers le bas (41A),

dans laquelle le bouchon (40A) a un conduit de gaz (12) et un conduit de liquide (13),

dans laquelle le connecteur (20A) a un conduit de gaz (12),

dans laquelle le bouchon (40A) est joint au connecteur (20A) en insérant et en fixant la projection (41A) dans l'évidement (21A) s'ouvrant vers le haut, formant ainsi un conduit de gaz (12) pour introduire un gaz dans le récipient (1) et un conduit de liquide (13) pour extraire du liquide du récipient (1).

la structure de connexion (10A) comprenant en outre un capuchon de bouteille (30) pour fixer

le connecteur (20A) sur l'ouverture (2) du récipient (1) en vissant une partie interne filetée (31a) du capuchon de bouteille (30) sur le filetage externe (2b) de l'ouverture (2),
 dans laquelle l'orifice traversant (22) du connecteur (20A) est incliné par rapport à un axe du capuchon de bouteille (30) de telle sorte que, dans l'état où le connecteur (10A) est fixé à l'ouverture (2) du récipient (1), l'axe (Cs) du tube de siphon (11) et l'axe du capuchon de bouteille (30) aient un angle d'inclinaison (θ) prédéterminé entre eux et que l'orifice traversant (22) serve de passage par lequel le tube de siphon (11) s'étend dans le récipient (1).

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2. Structure de connexion (10A) selon la revendication 1, dans laquelle des moyens de réglage de hauteur (43) sont prévus, permettant de régler une position de blocage du tube de siphon (11) dans une direction verticale.
3. Structure de connexion (10A) selon la revendication 1 ou 2, dans laquelle le connecteur (20A) est fixé à l'ouverture (2) du récipient (1) lorsque le bouchon (40A) est inséré dans l'évidement s'ouvrant vers le haut (21A) du connecteur.
4. Utilisation de la structure de connexion (10A) selon l'une quelconque des revendications 1 à 3, dans laquelle l'angle d'inclinaison (θ) est un angle entre l'axe (Cs) du tube de siphon (11) défini verticalement et l'axe (Cv) du récipient (1) qui est défini dans une position inclinée, de telle sorte que l'extrémité inférieure du tube de siphon (11) soit située à proximité d'une position la plus basse d'une surface de fond du récipient (1).

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FIG. 1

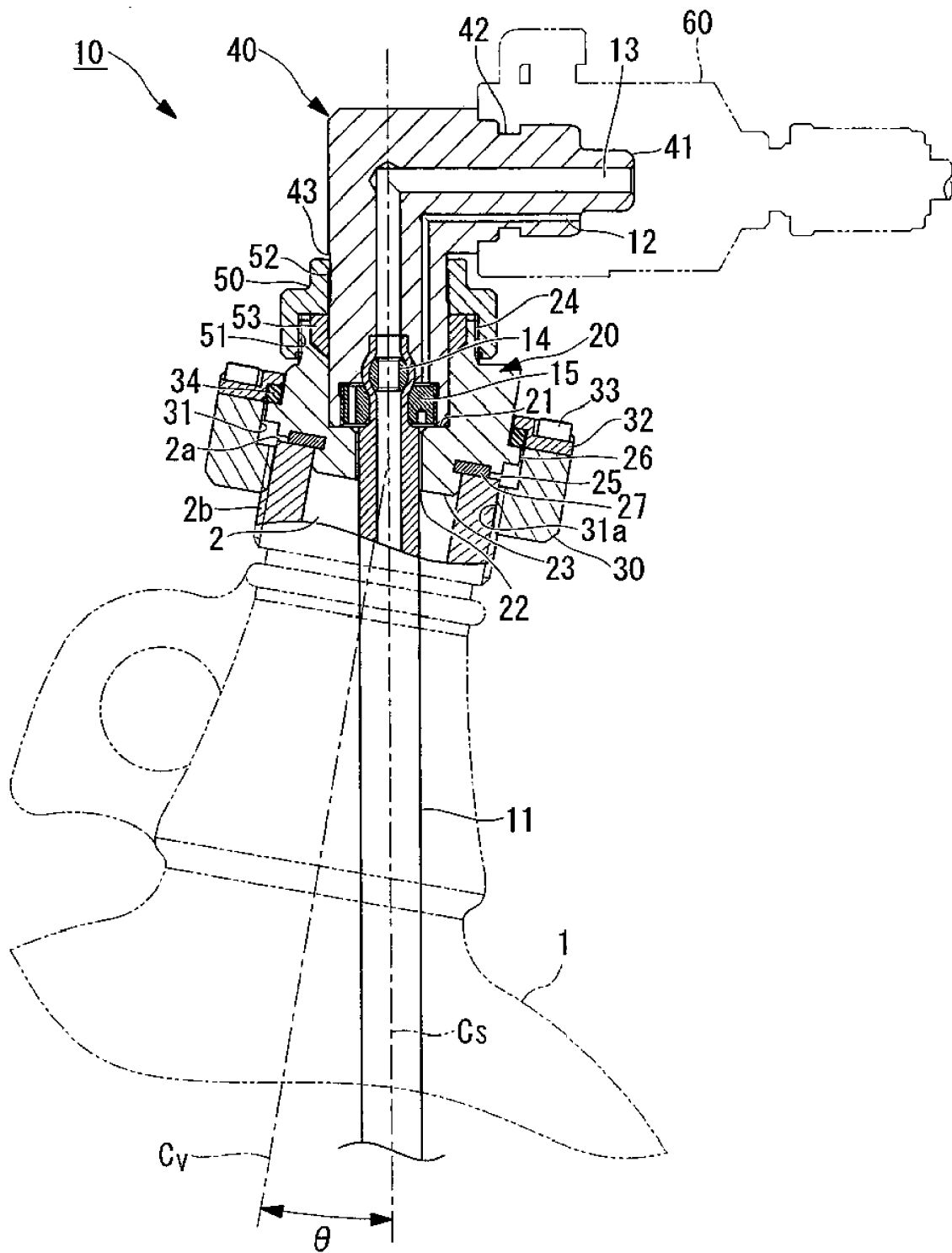


FIG. 2

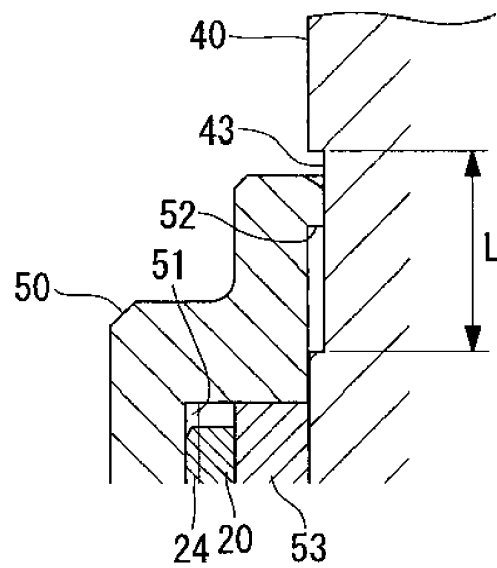


FIG. 3

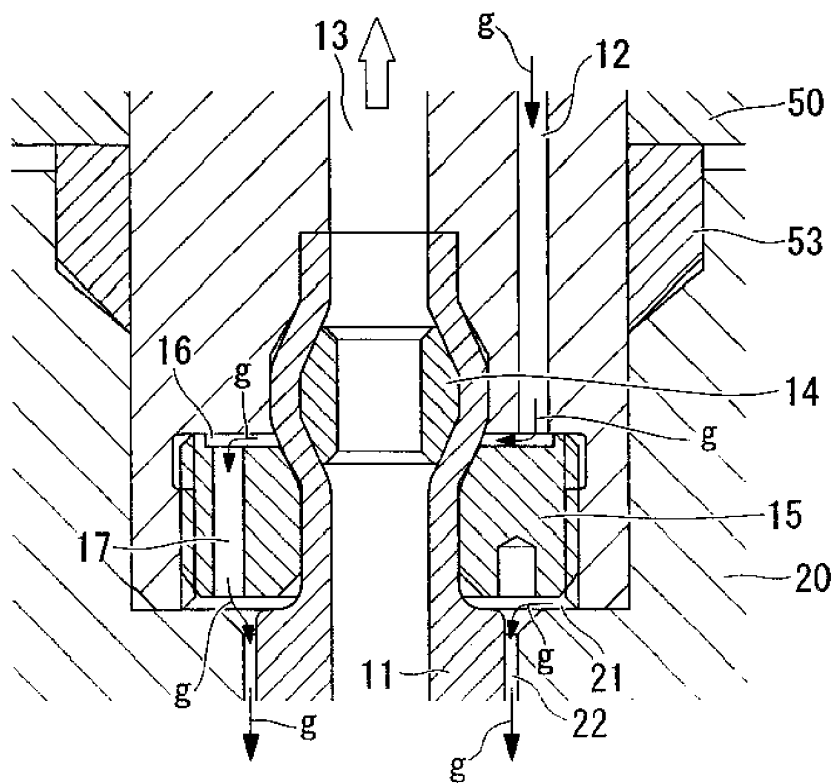


FIG. 4

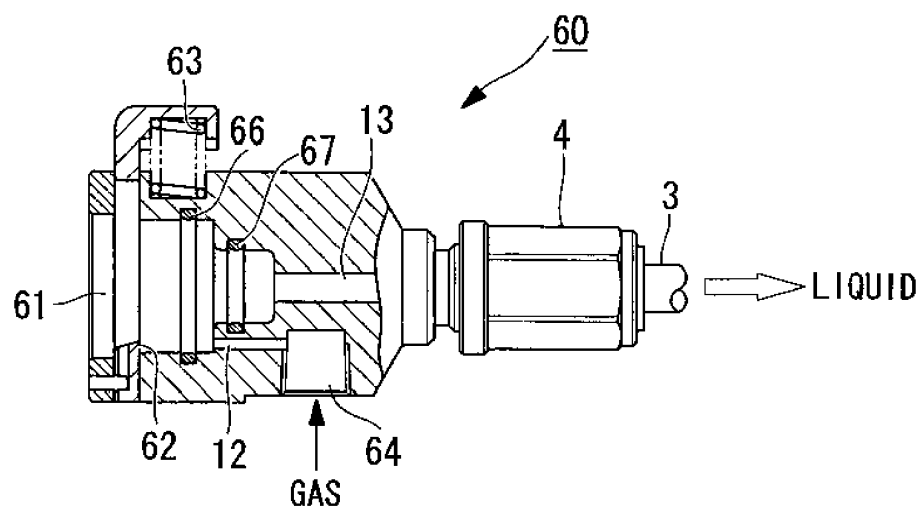


FIG. 5

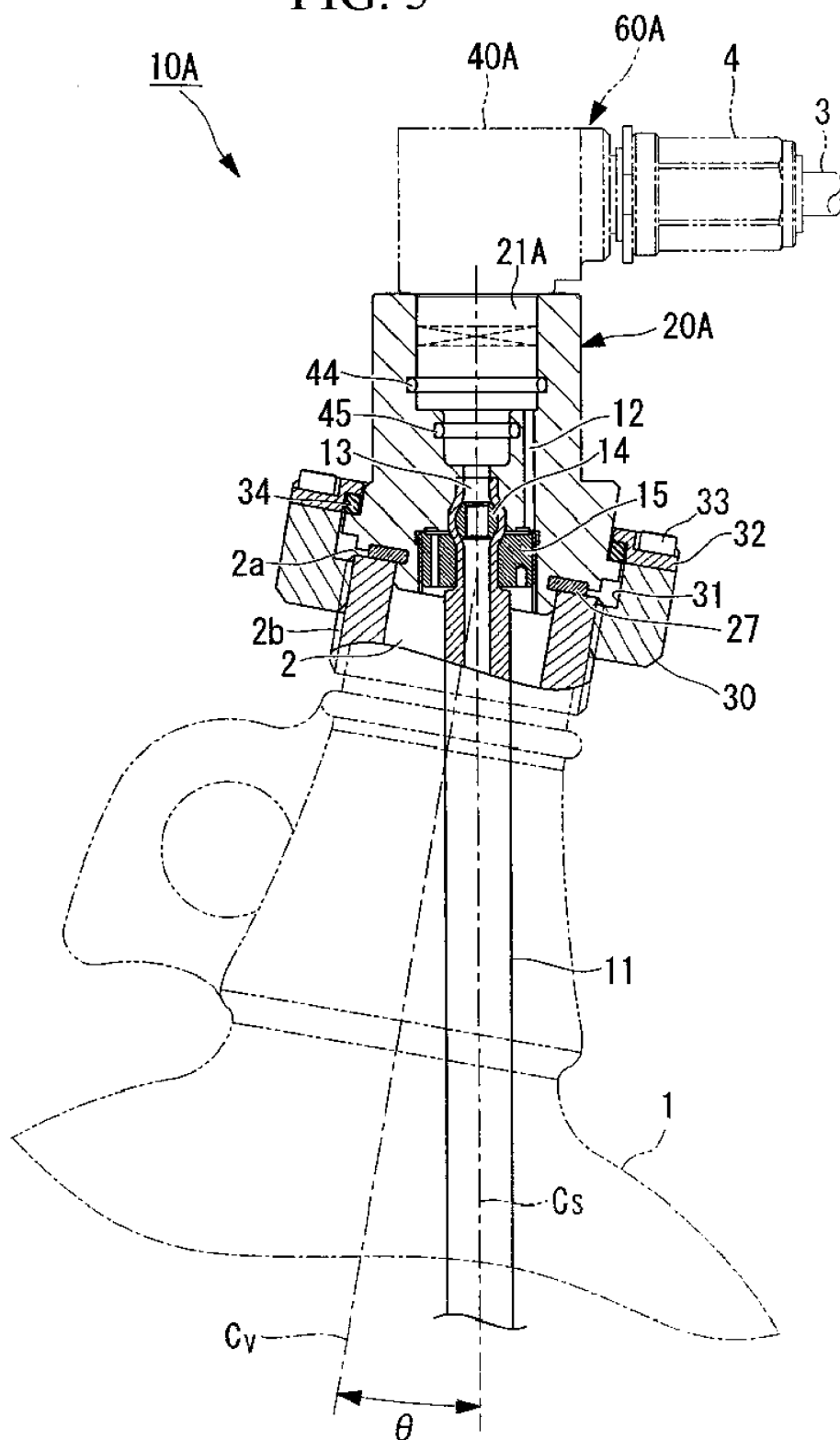


FIG. 6A

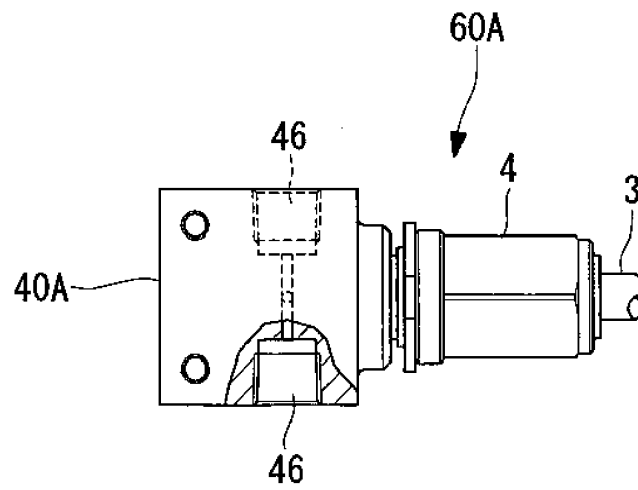


FIG. 6B

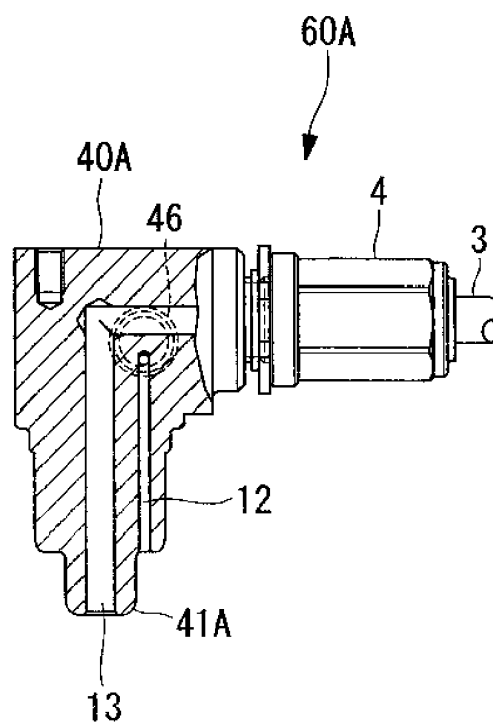
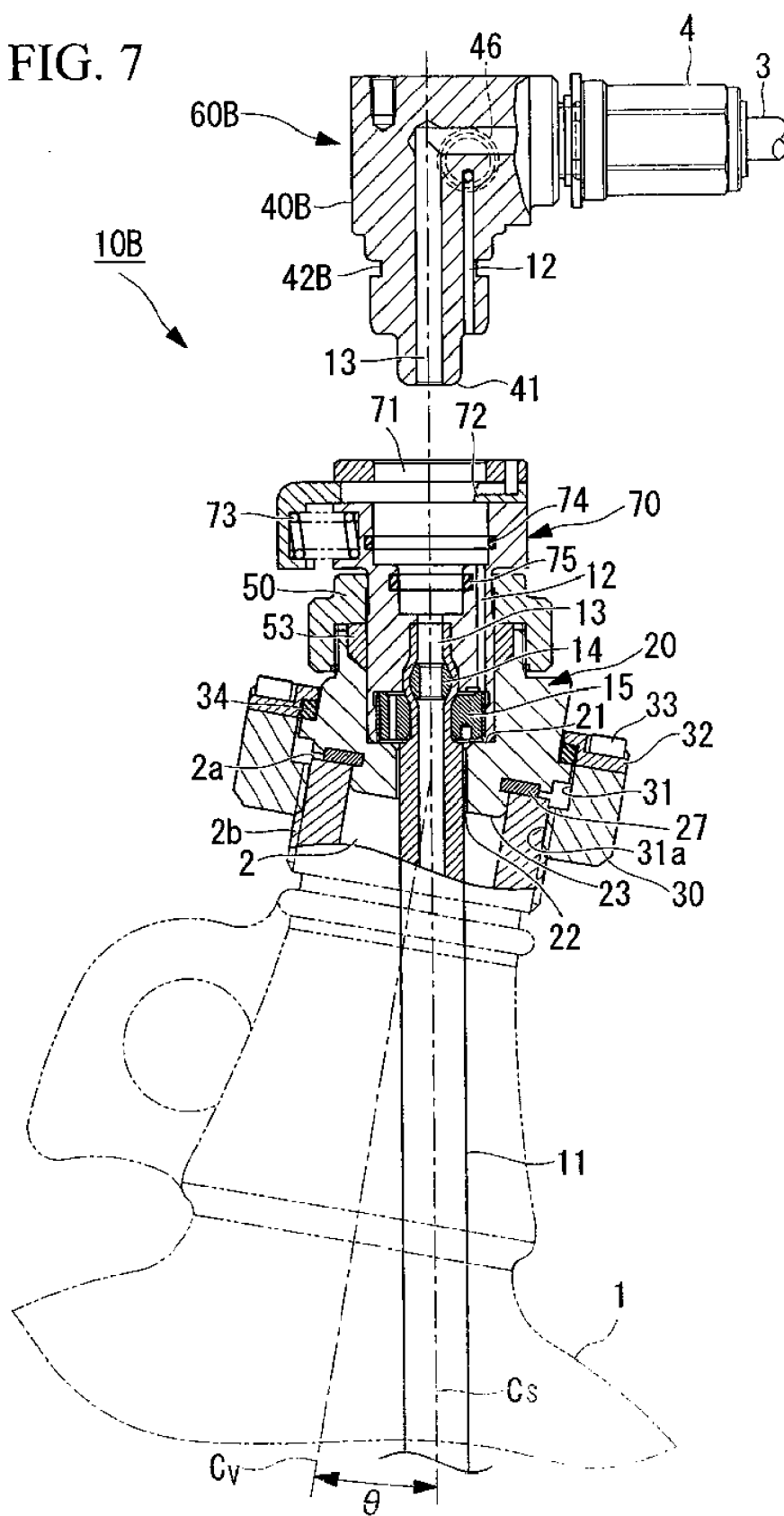


FIG. 7



REFERENCES CITED IN THE DESCRIPTION

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