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A PRESSURE CONTROLLED CONNECTION

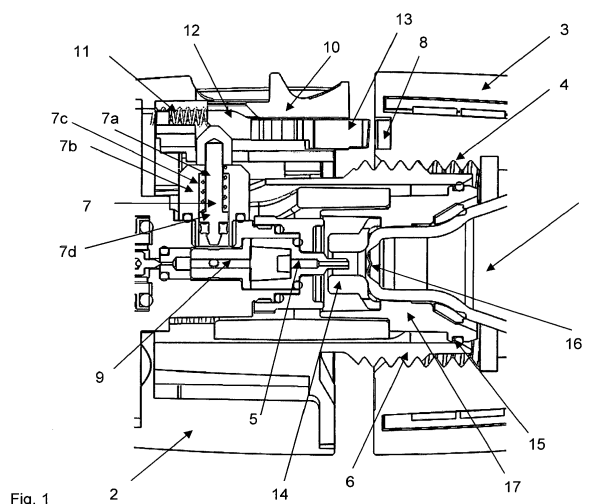
(57) A connecting device comprises:

- a gas cylinder for storing pressurized gas which has a piecerable gas outlet
- a container adapted to hold the gas cylinder inside which has a female threading portion
- a diffusion member to release the pressurized gas from the gas cylinder in a controlled manner, the diffusion member comprising,
- a piercing member to pierce the gas outlet of the gas cylinder and lead the pressurized gas from the gas cylinder to the diffusion member,
- a gas outlet to deliver the gas from the diffusion member to at least one consumer,
- a male threading portion which corresponds to the female threading portion of the container,
- wherein the container comprises a ratchet gear and the diffusion member further comprises:
- an indicator pin which comprises a shaft, a housing and a spring, wherein the shaft is positioned inside the hous-

ing and the spring is fitted around the shaft, a gas communication between the piercing member and the valve, a slider provided with a slider spring which is slideable and possesses a chamber which is sized to accommodate the shaft of the valve,

a pawl provided with a pawl spring which is attached with the slider to be moveable as the slider, wherein the pawl matches the ratchet gear of the container, and after the pawl has engaged the ratchet gear by screwing the container onto the diffusion member, no turn back is possible, wherein the slider has at least one lock position and one unlock position,

wherein the lock position is achieved when the shaft of the indicator pin is pushed into the chamber of the slider by the pressure inside the diffusion member, and at the unlock position the slider disengages the pawl from the ratchet gear to be able to unscrew the container from the diffusion member.



Description

A pressure controlled connection

[0001] The present invention relates to a connecting device comprising a gas cylinder for storing pressurized gas which has a pieceable gas outlet, and a diffusion member to release the pressurized gas from the gas cylinder in a controlled manner. The diffusion member comprises a piercing member to pierce the gas outlet of the gas cylinder, and a gas outlet to deliver the gas from the diffusion member to at least one consumer.

[0002] This device is widely used for connecting gas cylinder with a diffusion member, which is constructed to deliver the high pressurized gas from the gas cylinder to consumers in a safe, reliable and controllable way. The diffusion member here means a part which is positioned downstream of the gas cylinder and comprises a plurality of functional bodies to treat the gas in a proper way and then release it to the consumer with desirable pressure, speed, flow rate and so on. These functional bodies could be pressure reducer, piercing member, filter, vent, valve, screw thread and so on. Those bodies could be configured inside one shell in a compact way or equipped separately.

[0003] Gases are frequently supplied in gas cylinders where the gas is held within a cavity defined by the cylinder walls being enclosed at one end by a pierceable diaphragm. The gas is able to be delivered from the gas cylinder by attaching a piercing member to the cylinder which causes its diaphragm to be pierced and the gas to be released from the cylinder. The gas cylinder for storing gases is necessarily high pressurized and has relatively low volume. Any loss of the gas in the process of connecting the gas cylinder to the diffusion member or during delivery mechanism or after such connection is undesirable. Gas cylinders could reserve different types of gas such as carbon dioxide, oxygen, helium, nitrogen or a mixture thereof for different applications.

[0004] The conventional connecting device uses a container which is sized to receive the gas cylinder and which has a female threading portion on its opening to connect with the diffusion member. The gas cylinder is fixed within the container and brought onto the piercing member to get pierced by screwing the container onto the diffusion member. After the gas in the gas cylinder is used up, the gas cylinder needs to be removed from the piercing member by unscrewing the container from the diffusion member.

[0005] As disclosed in US6843388 the Patent teaches a method of connecting the gas cylinder accommodated in a container with the diffusion member including a piercing member. In using, the gas cylinder is pushed onto the piercing member by screwing the container onto the diffusion member which includes at least the piercing member, and gets pierced by the piercing element. The pressurized gas flows from the gas cylinder via the piercing member to the further function body. After the gas is

used up in the gas cylinder, the gas cylinder is removed from the piercing member by screwing the container off the diffusion member.

[0006] However, for a user, who wants to remove the gas cylinder, it is dangerous to screw the container off the diffusion member without knowing beforehand whether the high pressure still exists inside. In the case of the presence of the high pressure, the unscrewing releases the high velocity gas which could cause injury, damage or other dangerous consequences.

[0007] Therefore, it is an object of the present invention to provide a connecting device to prevent the gas cylinder from being disconnected to the diffusion member as long as the diffusion member under pressure.

[0008] In accordance with the present invention, there is provided a connecting device comprises a gas cylinder for storing pressurized gas which has a pierceable gas outlet, and a container adapted to hold the gas cylinder inside which has a female threading portion, and a diffusion member to release the pressurized gas from the gas cylinder in a controlled manner. The diffusion member comprises,

- a piercing member to pierce the gas outlet of the gas cylinder and lead the pressurized gas from the gas cylinder to the diffusion member,
- a gas outlet to deliver the gas from the diffusion member to at least one consumer,
- a male threading portion which corresponds to the female threading portion of the container. Furthermore, the container comprises a ratchet gear and the diffusion member further comprises:
 - an indicator pin which comprises a shaft, a housing and a spring, wherein the shaft is positioned inside the housing and the spring is fitted around the shaft,
 - a gas communication between the piercing member and the indicator pin,
 - a slider provided with a slider spring which is slideable and possesses a chamber which is sized to allow the shaft of the indicator pin to be pushed into,
 - a pawl provided with a pawl spring which is attached with the slider to be slideable as the slider, wherein the pawl matches the ratchet gear of the container, and after the pawl has engaged to the ratchet gear by screwing the container onto the diffusion member, no turn back is possible, wherein the slider has at least one lock position and one unlock position, wherein the lock position is achieved when the shaft of the indicator pin is pushed into the chamber of the slider by the pressure within the diffusion member, and at the unlock position the slider disengages the pawl from the ratchet gear to be able to unscrew the container from the diffusion member.

[0009] The gas cylinder is provided with a preferred small size and designed to be easily portable and disposable e.g. having an overall length of about 6.5 cm to 7.5 cm and a diameter of about 1.5 cm to 2 cm. The gas

cylinder herein refers generically to a container which is arranged for storing gas under pressure. The gas cylinder has a neck portion which includes the pierceable gas outlet, a top surface and a side surface extending downwardly from the top surface. The outlet of the gas cylinder preferably is enclosed by a pierceable diaphragm which can be opened by a piercing member such as a sharpened or blunt lance. The neck of the gas cylinder has a preferred diameter of about 0.8 cm and a length of about 1.5 cm to 2 cm. Other sizes are also possible.

[0010] The container for retaining the gas cylinder has a chamber which is cylinder-shaped and adapted to retain the gas cylinder. The female threading opening of the container corresponds to the male threading portion of the diffusion member, so that the gas cylinder retained in the container can be fixed in the inner space, which is defined by the diffusion member and the container. The container may have any size as long as needed for retaining the gas cylinder. Especially, the container is sized portable as the gas cylinder, which can be held easily by hands.

[0011] The piercing member is formed as a shaft with a piercing tip in which a channel is provided for leading the gas from the gas cylinder into the diffusion member after the piercing of the outlet of the gas cylinder. The piercing member is performed as a gas inlet of the diffusion member.

[0012] The pressurized gas in the gas cylinder may be oxygen, carbon dioxide, air, inert gas or mixtures thereof. Such a gas cylinder could be connected with a delivering system which supplies the pressurized gas to liquid as like beverage, wine or water for storage, aeration or carbonization purpose. The pressure within such gas cylinders ranges from around 50 bar to 250 bar. The pressure of the most commercial gas cylinder having the aforementioned size and shape ranges from around 100 to 200 bar.

[0013] The diffusion member in the present invention means a part or parts positioned downstream of the gas cylinder which is used to deliver the pressurized gas from the gas cylinder to further consumers in a controllable manner. The diffusion member could comprise a plurality of functional bodies as like piercing member, valve, pressure reducer, pressure indicator pin, filter, vent and so on. The functional bodies are used to treat the pressurized gas to obtain a proper speed, pressure or flow rate for downstream consumers. These bodies could be configured within one shell or installed separately. The diffusion member further comprises at least one gas outlet to deliver the treated gas to consumer, and a male threading portion which corresponds to the female threading portion of the container.

[0014] According to the present invention, the container has a ratchet gear which correspond a pawl on the diffusion member side. The ratchet gear is provided on the surface of the container which faces the piercing member when the container is screwing onto the diffusion member. The ratchet gear is circularly formed and finds

itself in a groove of the said surface. The pawl is provided with a pawl spring on the diffusion member side which extends vertically to the said surface, where the ratchet gear is situated, to allow the ratchet gear to turn only in one direction while prevents the opposite rotary direction. After the ratchet gear engaging the pawl, the container can be therefore screwed only forward onto the diffusion member.

[0015] In addition to the spring-loaded pawl, the diffusion member further comprises an indicator pin, a gas communication between the piercing member and the indicator pin, and a slider to provide a safe and reliable connecting arrangement to overcome the disadvantages mentioned in the prior art.

[0016] The indicator pin is provided with a shaft, a housing and a spring, wherein the shaft is positioned at least partially within the housing and the spring is fitted around the shaft, so that the shaft can be pushed against the spring to protrude out of the housing. The shaft has an upper portion which is outside the housing when being pushed, and a lower portion which comprises a radial plane to divide the housing into two spaces and which stays within the housing when being pushed. There are also proper sealing members provided around the radial plane to ensure that there is no gas communication between the said two spaces. Preferably, the indicator pin is so positioned within the diffusion member that the pushing direction of the shaft is vertical to the gas flow direction of flowing into the diffusion member.

[0017] The gas communication is formed between the indicator pin and the piercing member, especially between the lower space of the indicator pin, which is defined by the radial plane, and the channel of the piercing member. It enables the indicator pin to indicate the pressure within the diffusion member when the gas flows into the diffusion member.

[0018] The slider is provided with a slider spring which is axial manually slidable. The slider further possesses a chamber which is sized to accommodate the shaft of the indicator pin, especially the upper portion of the shaft, so when the shaft is being pushed, the upper portion is pushed into the chamber to lock the slider, which means to prevent the slider being slide manually or accidentally. Moreover, the slider is attached with the pawl to slider the pawl to engage the ratchet gear or disengage from the ratchet gear.

[0019] The slider has at least one lock position and one unlock position. The lock position is reached when the shaft is pushed into the chamber of the slider by the pressure within the diffusion member, which prevents the slider being slid to disengage the pawl from the ratchet gear situated on the container. The unlock position is reached when the shaft falls out of the chamber and the slider is thereby free to slide to disengage the pawl from the ratchet gear to enable the container to be unscrewed from the diffusion member.

[0020] The connecting device in accordance with the invention ensures that the gas cylinder can be replaced

or removed from the piercing member only when the diffusion member is not under pressure. The connecting device is thus able to prevent improper or unfinished piercing and sealing actions with gas cylinder and reduce the risk within a drop test or accidentally dropping as well.

[0021] Preferably, a collar is arranged on the neck portion of the gas cylinder. The collar is formed as an annular side wall engaged with the neck portion of the cylinder with a variety of connecting means such as threaded, unthreaded, gluing, shrinking fitting and so on. The collar is not threaded and possesses an exclusive connecting construction to make the collar do not rotate together with the container but moves axially forward onto the piercing member. This exclusive connecting construction of the collar converts the rotary force provided by the container into an axial linear force which pushes the gas cylinder forward. The combination of such an exclusive connecting construction with the locking mechanism between the outside container and the diffusion member reduces the risk of a misuse and enhances the safety and reliability of the device. Forward refers the direction from the gas cylinder to the diffusion member and the axial is in terms of the axis of the gas cylinder when it is connected with the diffusion member.

[0022] In addition, the collar comprises at least one first gasket which creates an axial seal with the piercing member and/or at least one second gasket which creates a radial seal with the diffusion member.

[0023] The first gasket is preferably arranged on the top surface of the gas cylinder. The seal created by the first gasket avoids the leak between the top surface of the gas cylinder and the surface which it meets when the gas cylinder is inserted into the diffusion member. The first gasket is desired for resisting the loss of the gas after the gas cylinder is opened. It prevents gas escaping axially and radially outwards from the gap between the top surface and the contacting surface.

[0024] The first gasket is designed preferable as a High Pressure Seal (HP Seal) on the top surface of the gas cylinder. The first gasket is used to form a proper seal which can be subjected under high pressure between the contacting surface and the top surface of the gas cylinder. The pierced hole represents an opening, which must be sealed to guarantee that pressures are kept inside and thereby avoid leaking, which might cause accidents, gas losses, among other negative factors. Indeed, the first gasket is used to create a seal for the area which surrounds the pierced hole.

[0025] The second gasket creates a seal between the diffusion member and the side wall of the collar. The second gasket is designed preferable as an O-ring sitting in a groove of the collar, so that a new sealing may be provided each time a new cylinder is installed, so that any chance of wear due to repeated use can be reduced. The O-ring is necessary during the axial movement between the diffusion member and the gas cylinder. The sealing is performed by deformation of the O-ring by engagement with the diffusion member. This second gasket helps in

case the first gasket is not fully effective while the outlet of the gas cylinder is pierced and the gas begins to release into the channel of the piercing member. Therefore, the second gasket is advantageously arranged upstream of the first gasket in the fluid communication. During this period, which is after the piercing and before the first gasket becoming fully effective, the second gasket is therefore necessary for preventing the gas releasing via the gap between the diffusion member and the gas cylinder and resisting the loss of the gas thereby. In addition, the second gasket provides a double protection of the seal of the gas if the first gasket is not effective enough.

[0026] The pressurized gas contains more than 21 % vol. oxygen when measured at atmospheric pressure. It contains preferably more than 50% oxygen, more preferred more than 80% vol., particular preferred more than 90% vol. more particular preferred more than 99% vol. The pressurized gas could be also technical pure oxygen.

[0027] According to an embodiment of the present invention, the lock position and the unlock position of the slider can be distinguished by a person from outside of the diffusion member. The diffusion member has an outside shell which is at least partially transparent provides an visual window, so that at the lock position the pushed shaft can be seen by a person from outside of the diffusion member while at the unlock position the falling shaft cannot or hardly be seen. By using, the user can easily recognize whether the device is under pressure or not and can be thereby guided to realize a proper piercing and sealing action.

[0028] Preferably, the pressurized gas in the gas cylinder is delivered into a bottle of wine through a tube and a membrane which has a fluid communication with the piercing member and the gas cylinder. The tube, the membrane, the gas outlet of the diffusion member, the piercing member and the gas cylinder have preferably a same direction, especially preferably in one axis or line, and this direction is preferably vertical to the indicator pin.

[0029] Preferably, the device in accordance with the present invention is used to aerate wine with technical pure oxygen containing in the gas cylinder.

[0030] It will be appreciated that any form of pressurized gas source may be used. Indeed, the gas cylinder described above may be single use with the preferred features described above and it can be also replaceable or refillable.

[0031] A connecting process carried out by the connecting device is provided which comprises:

- a pressurized gas provided in a gas cylinder which is held in a container
- a piercing member to pierce the gas cylinder
- a diffusion member to release the pressurized gas from the gas cylinder in a controlled manner,
- a screwing means between the container and the diffusion member to screw the container onto the diffusion member,

wherein the screwing means is locked when the diffusion member is under pressure, and the screwing means is unlocked when the pressure in the diffusion member relieves.

[0032] There is a locking means provided with an indicator pin positioned within the diffusion member. The indicator pin locks the screwing means when the diffusion member is under pressure, and the indicator pin unlocks the screwing means when the pressure in the diffusion member relieves.

[0033] The connecting process ensures a safe usage of the connecting device that the connecting device cannot be unscrewed when the diffusion member is under pressure, when the gas in the gas cylinder is not yet used up or the gas left within the diffusion member is still too much. The user can be thereby easily guided to a safe and proper operation of the connecting device.

[0034] According to an embodiment of the present invention, the screwing means is locked before the gas cylinder getting pierced to prevent a misuse which could cause the high velocity gas to exit.

[0035] Preferably, the screwing means comprises a ratchet means which allows the rotary motion only in one direction while preventing the motion in opposite direction. The screwing means is thereby locked by the ratchet means.

[0036] It should be noted that the previously mentioned features and the features to be further described in the following are usable not only in the respectively indicated combination, but also in further combinations or taken alone, without departing from the scope of the present invention.

[0037] The present invention will now be described with reference to the following non-limiting examples and the accompanying schematic figures in which:

- Fig. 1: a sectional view of the connecting device in which the container is starting to connect to the diffusion member
- Fig. 2: a sectional view of the connecting device in which the container is screwing onto the diffusion member
- Fig. 3: a sectional view of the connecting device in which the slider is at lock position
- Fig. 4: a sectional view of the connecting device in which the pressurized gas is used up
- Fig. 5: a sectional view of the connecting device in which the container is unlocked to the diffusion member

[0038] Fig. 1 shows a sectional view of the connecting device in accordance with the present invention. This connecting device is a part of a wine aerating device which is used to deliver technical pure oxygen from a portable gas cylinder to the wine to improve its taste efficiently.

[0039] The gas cylinder 1 for storing pressurized oxygen has an overall length of 6.5 cm and a diameter of

1.7 cm. This gas cylinder 1 has a neck which has a length of 1.5 cm and diameter of 0.8 cm. The pressure within the gas cylinder, when it is full filled, ranges from 100 bars to 200 bars. There is a collar 17 provided on the neck of the gas cylinder which is formed as an annular side wall and is pressed on the neck of the gas cylinder 1 in a permanent way. A container 3 is adapted to receive the gas cylinder inside and has a female threading portion 4 on its opening to connect with a diffusion member 2. The container 2 further comprises a ratchet gear 8 which is positioned on the surface facing the diffusion member 2. The ratchet gear 9 is circularly formed around the opening of the container 3 and sits in a groove of the said surface.

[0040] The diffusion member 2 is designed to deliver and treat the pressurized gas from the gas cylinder 1 to the wine. The diffusion member 2 comprises a piercing member 5, an indicator pin 7, a gas communication 9 between the indicator pin and the piercing member, a slider 10, a slider spring 11, a male threading portion 6 and a spring-loaded pawl 13. It could further comprise a pressure reducer, a valve, a filter, a vent which is not illustrated herewith. In this embodiment, the diffusion member 2 integrates all these mentioned functional bodies within one shell. However, the diffusion member should not be only considered as one single body but should also be understood as a general designation in which the functional bodies are separately installed. The device shown in the figures should be considered only schematic but not restrictive. All the features and methods should be considered as falling within the scope of the invention as long as they are not apart from the spirit and the substance of the invention.

[0041] The piercing member 5 is formed as a shaft with a piercing tip in which a channel is provided for leading the gas from the gas cylinder 1 into the diffusion member 2 after the piercing of the outlet 16 of the gas cylinder 1. The piercing member 5 performs as a gas inlet of the diffusion member 2.

[0042] The indicator pin 7 comprises a shaft 7a, a housing 7b and a spring 7c fitted around the shaft 7a. As shown the upper portion of the shaft 7a protrudes out of the housing 7b and the lower portion stays within the housing 7b. The lower portion further comprises a radial plane 7d which divides the housing 7b into two spaces. There are several sealing members provided around the radial plane as well to ensure that there is no gas communication between the said two spaces. So when the lower space is under pressure, the shaft will be pushed up and press the spring 7c at the meantime.

[0043] The gas communication 9 is provided between the piercing member 5 and the indicator pin, especially between the channel of the piercing member and the lower space of the indicator pin, so that the indicator pin 7 can indicate the pressure within the diffusion member 2 by pushing the shaft 7a up when the gas flows into the diffusion member 2 via the channel.

[0044] The slider 10 is provided with the slider spring

11 which can be slid manually. The slider 10 is attached with the spring-loaded pawl 13. The slider 10 has a chamber 12 which is sized to accommodate the upper portion of the shaft 7a, so that the shaft will be pushed up to insert into the chamber 12 to lock the slider 10 when the diffusion member 2 is under pressure. The pawl 13 matches the ratchet gear 8 on the container 3 to lock the screwing means between the diffusion member 2 and the container 3. The 'lock' here means the container 3 can be screwed only forward onto the diffusion member 2 but not in opposite direction, namely backward off the diffusion member 2.

[0045] As shown in the figure 1, the indicator pin 7 is positioned vertical to the piercing member 5 and the slider 10, and the gas cylinder 1 is inserted into the diffusion member 2 in an axial direction in terms of the axis of the gas cylinder.

[0046] The male threading portion 6 of the diffusion member protrudes out of the diffusion member 2 and surrounds a piercing housing into which the gas cylinder 1 should be inserted to get pierced. The collar 17 sitting on the neck of the gas cylinder is non-threaded and possesses an exclusive connecting construction to prevent the gas cylinder 1 rotating together with the container 3 after it meeting with a corresponding connecting construction provided on the diffusion member, especially on the piercing housing within which the piercing member is situated. This exclusive connecting construction of the collar 17 converts the rotary force provided by the container 3 into an axial linear force which pushes the gas cylinder 1 forward.

[0047] There is at least one first gasket 14 and, if needed by the hazard analysis taking the gas type and gas pressure into account, at least one second gasket 15 provided on the collar 17. The first gasket 14 is arranged on the top surface of the gas cylinder 1. The first gasket 14 is desired for resisting the loss of the gas after the gas cylinder is opened. It prevents gas escaping axially and radially outwards from the gap between the top surfaces of the gas cylinder 1 and the surface it contacts when the gas cylinder is pierced. The first gasket 14 is designed as a High Pressure Seal (HP Seal) and is used to form a proper seal which can be subjected under high pressure. The pierced hole represents an opening, which must be sealed to guarantee that pressures are kept inside and thereby avoid the high speed gas existing. Indeed, the first gasket 14 is used to create a seal for the area which surrounds the pierced hole.

[0048] The second gasket 15 creates a seal between the diffusion member 2 and the collar 17. The second gasket 15 is designed as an O-ring sitting in a groove of the collar 17, so that a new sealing may be provided each time a new cylinder is installed, so that any chance of wear due to repeated use can be reduced. The O-ring is necessary during the axial movement between the diffusion member 2 and the gas cylinder 1. The sealing is performed by deformation of the O-ring by engagement with the diffusion member 2. The second gasket 15 is

advantageously arranged upstream of the first gasket 14 in the fluid communication and it provides a double protection of the gas releasing in addition to the first gasket 14.

[0049] In figure 1, the container 3, in which the gas cylinder 1 is held, is screwing onto the diffusion member 2. The female threading portion of the container 4 and the male threading portion of the diffusion member 6 are connected to bring the gas cylinder 1 onto the piercing member 5. The piercing member 5 approaches the gas outlet 16 of the gas cylinder via the first gasket 14. The ratchet gear 8 and the pawl 13 have not engaged yet to lock the screwing means between the container 3 and the diffusion member 2. At this position, the gas is not released and the user is free to unscrew the container 3 from the diffusion member 2.

[0050] At the position shown in figure 2, the container 3 moves forward to the diffusion member 2 by screwing. The piercing member 5 has still not reached the gas outlet 16 of the gas cylinder. The second gasket 15 creates a seal between the collar 17 and the diffusion member, especially the male threading portion 6 of the diffusion member. The ratchet gear 8 engages the pawl 13 of the diffusion member to allow the container 3 to be screwed only in forward direction while prevents the opposite direction, which means that at this position the container 3 and diffusion member 2 can be only unscrewed by sliding the slider 10 to pull the pawl 13 out of the ratchet gear 8.

[0051] The container 3 keeps screwing onto the diffusion member 2 and reaches the position shown in figure 3. At this position, the piercing member 5 pierces the gas outlet 16 of the gas cylinder and the first gasket 14 creates a seal around the pierced hole to prevent the gas loss through the gap. The pressurized gas releases from the gas cylinder 1 via the channel of the piercing member into the diffusion member 2. The resulting pressure presses the radial plane 7d to lift the shaft 7a against the spring 7c and the shaft 7a inserts thereby into the chamber 12 of the slider 10 to prevent the sliding motion of the slider 10. The ratchet gear 8 and the pawl 13 can therefore not be disengaged, which also means the unscrewing of the container 3 and the diffusion member 2 is at this position not possible any more. At this lock position, the pushed shaft 7a can be seen by a user through a transparent area of the shell of the diffusion member while at the position of figure 1 and 2 the shaft 7a cannot be seen by the user, so the user is well informed that the gas is flowing and the device is under pressure. With a thus designed indication of the pressure the user can be thereby easily guided to a safe and proper operation of the connecting device.

[0052] At the position of the connecting device shown in figure 4, the gas is used up and there is no more pressurized gas within the diffusion member 2, so there is no force to lift the shaft 7a and the shaft 7a is drawn out of the chamber 12 by the pressed spring 7c. The slider 10 is unlocked and free to slide.

[0053] In figure 5, the slider 10 is shifted against the slider spring 11 over the indicator pin 7 to disengage the pawl 13 from the ratchet gear 8. The container 3 and the diffusion member 2 are free to be unscrewed to remove the empty gas cylinder 1 off the piercing member 5.

Claims

1. a connecting device comprises:

- a gas cylinder for storing pressurized gas which has a piecerable gas outlet
- a container adapted to hold the gas cylinder inside which has a female threading portion
- a diffusion member to release the pressurized gas from the gas cylinder in a controlled manner and the diffusion member comprising, a piercing member to pierce the gas outlet of the gas cylinder and lead the pressurized gas from the gas cylinder to the diffusion member, a gas outlet to deliver the gas from the diffusion member to at least one consumer, a male threading portion which corresponds to the female threading portion of the container, **characterized in that** the container comprises a ratchet gear and the diffusion member further comprises:
 - an indicator pin which comprises a shaft, a housing and a spring, wherein the shaft is positioned inside the housing and the spring is fitted around the shaft,
 - a gas communication between the piercing member and the indicator pin,
 - a slider provided with a slider spring which is slidable and possesses a chamber which is sized to allow the shaft of the indicator pin to be pushed into,
 - a pawl provided with a pawl spring which is attached with the slider, wherein the pawl matches the ratchet gear of the container, so after the pawl has engaged the ratchet gear no turn back is possible, wherein the slider has at least one lock position and one unlock position, wherein the lock position is reached when the shaft of the indicator pin is pushed into the chamber of the slider by the pressure inside the diffusion member, wherein the unlock position is reached when the shaft falls out of the chamber and the slider is free to slide to disengage the pawl from the ratchet gear.

2. A connecting device according to claim 1, **characterized in that** the gas cylinder has a neck portion and a collar is arranged on this neck portion, wherein the collar comprises at least one first gasket which creates a radial seal with the diffusion member

and/or at least one second gasket which creates a axial seal with the piercing member.

3. A connecting device according to claim 2, **characterized in that** the first gasket is formed as an O-ring sitting in a groove of the collar.
4. A connecting device according to claim 2 or 3, **characterized in that** the collar has an exclusive construction to connect with the diffusion member, wherein the exclusive construction prevents the gas cylinder rotating with the container.
5. A connecting device according to one of the preceding claims, **characterized in that** the piercing member is provided with a channel to lead the pressurized gas.
6. A connecting device according to one of the preceding claims, **characterized in that** the diffusion member and the gas cylinder are both portable.
7. A connecting device according to one of the preceding claims, **characterized in that** the pressurized gas contains more than 21 vol.-% oxygen, preferably more than 80 vol.-%, particular preferably more than 99 vol.-%.
8. A connecting device according to one of the preceding claims, **characterized in that** the lock position and the unlock position can be distinguished by a person from outside of the diffusion member.
9. A connecting device according to one of the preceding claims, **characterized in that** the gas outlet of the diffusion member has the same direction as the piercing member and the indicator pin is positioned vertical to this direction.
10. A connecting device according to one of the preceding claims, **characterized in that** the indicator pin and the slider are so arranged that the pushing direction of the shaft is vertical to the sliding direction of the slider.
11. A connecting device according to one of the preceding claims, **characterized in that** the gas outlet of the diffusion member is connected with a tube, which is able to be inserted into a wine bottle.
12. An application of the device according to one of the preceding claims, **characterized in that** the device is used to aerate wine with oxygen.
13. A connecting process comprises
 - a pressurized gas provided in a gas cylinder which is held in a container

- a piercing member to pierce the gas cylinder
- a diffusion member to release the pressurized gas from the gas cylinder in a controlled manner,
- a screwing means between the container and the diffusion member to screw the container onto the diffusion member

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characterized in that the screwing means is locked when the diffusion member is under pressure, and the screwing means is unlocked when the pressure in the diffusion member reliefs.

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14. A connecting process according to claim 13, **characterized in that** the screwing means is locked before the gas cylinder getting pierced.

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15. A connecting process according to any claim 13 or 14, **characterized in that** the screwing means is locked to allow the rotary motion of the screwing means only in one direction while preventing motion in opposite direction.

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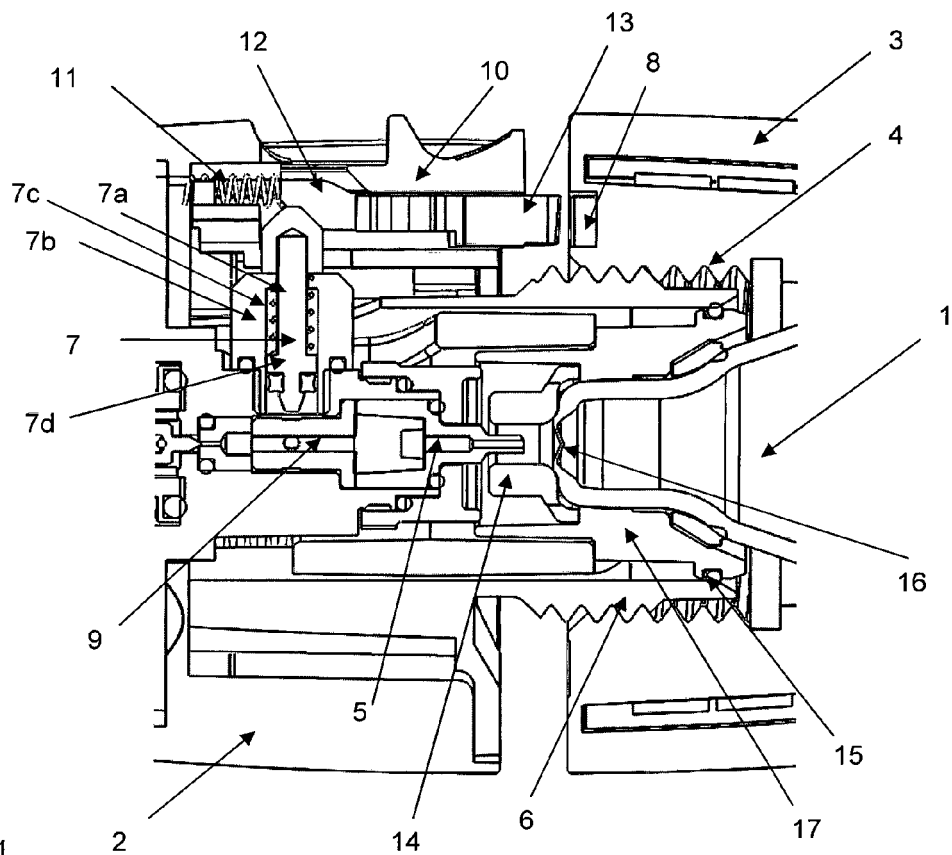


Fig. 1

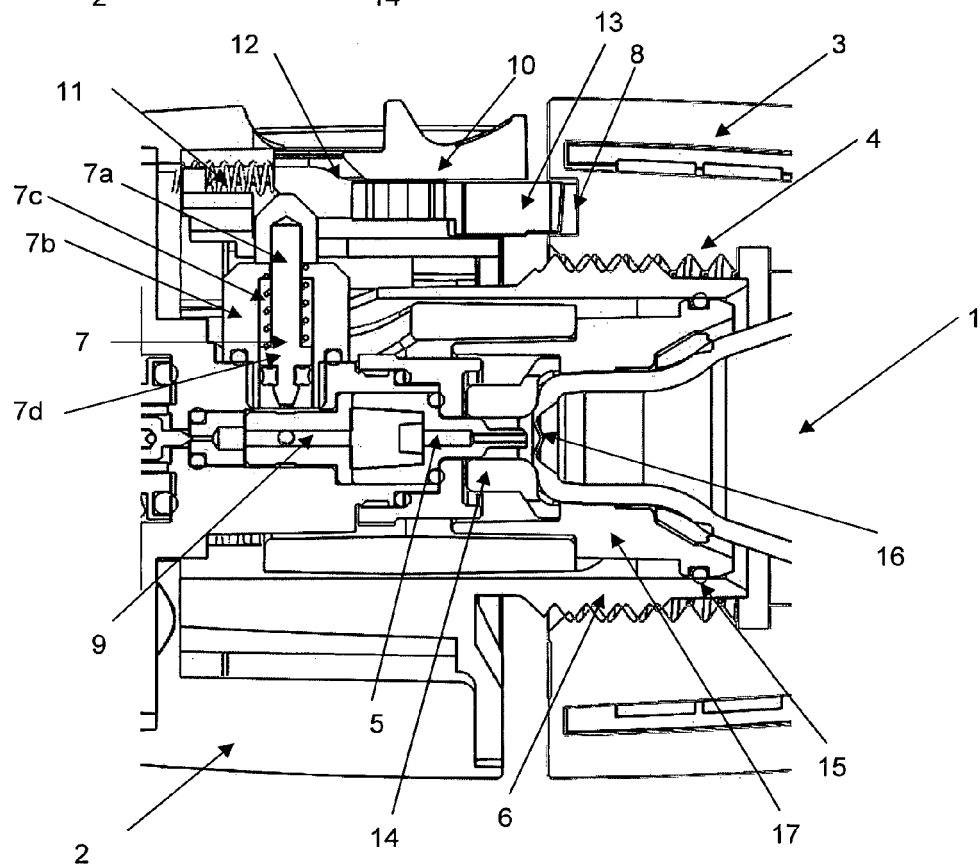
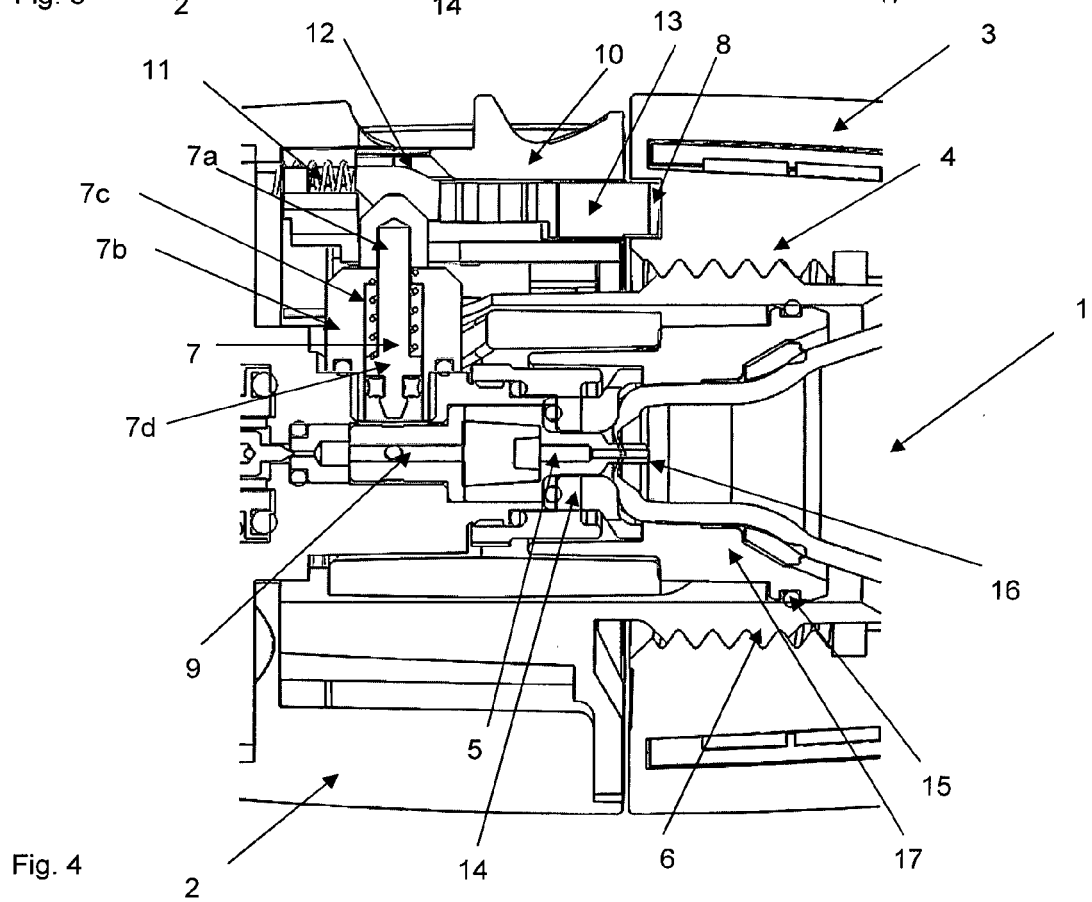
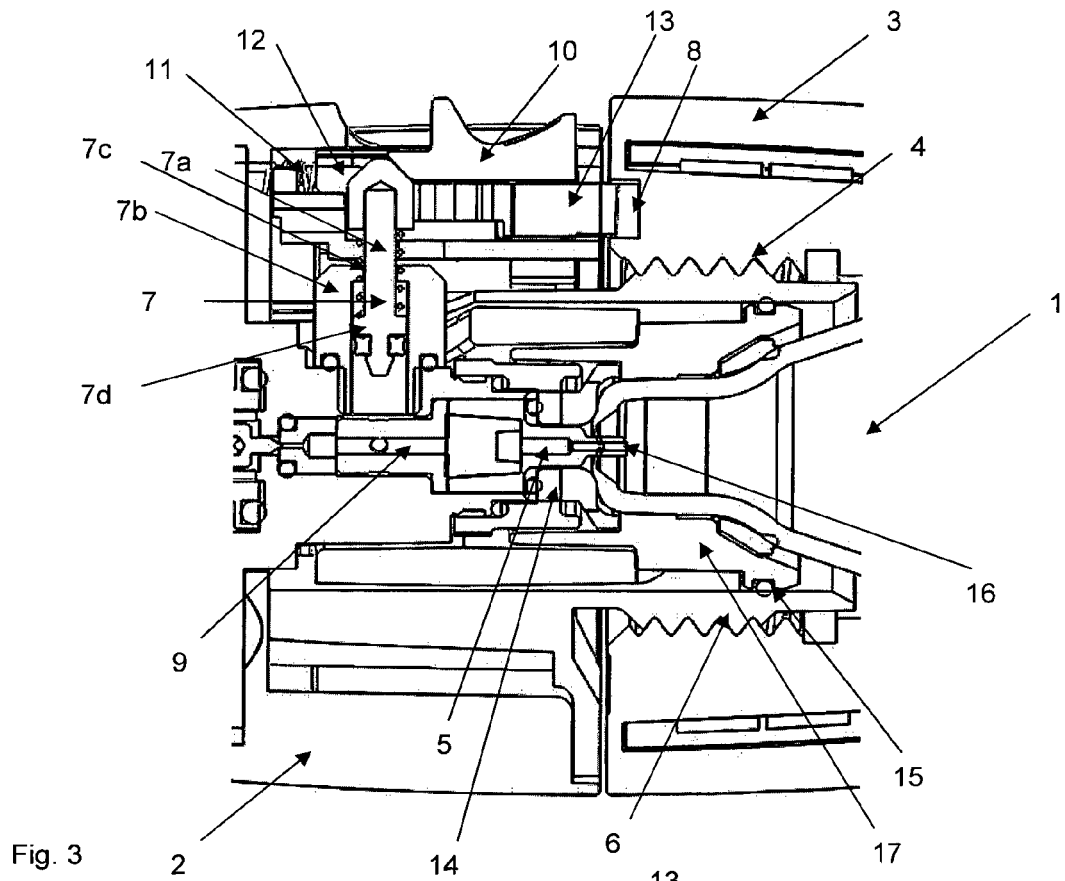


Fig.2



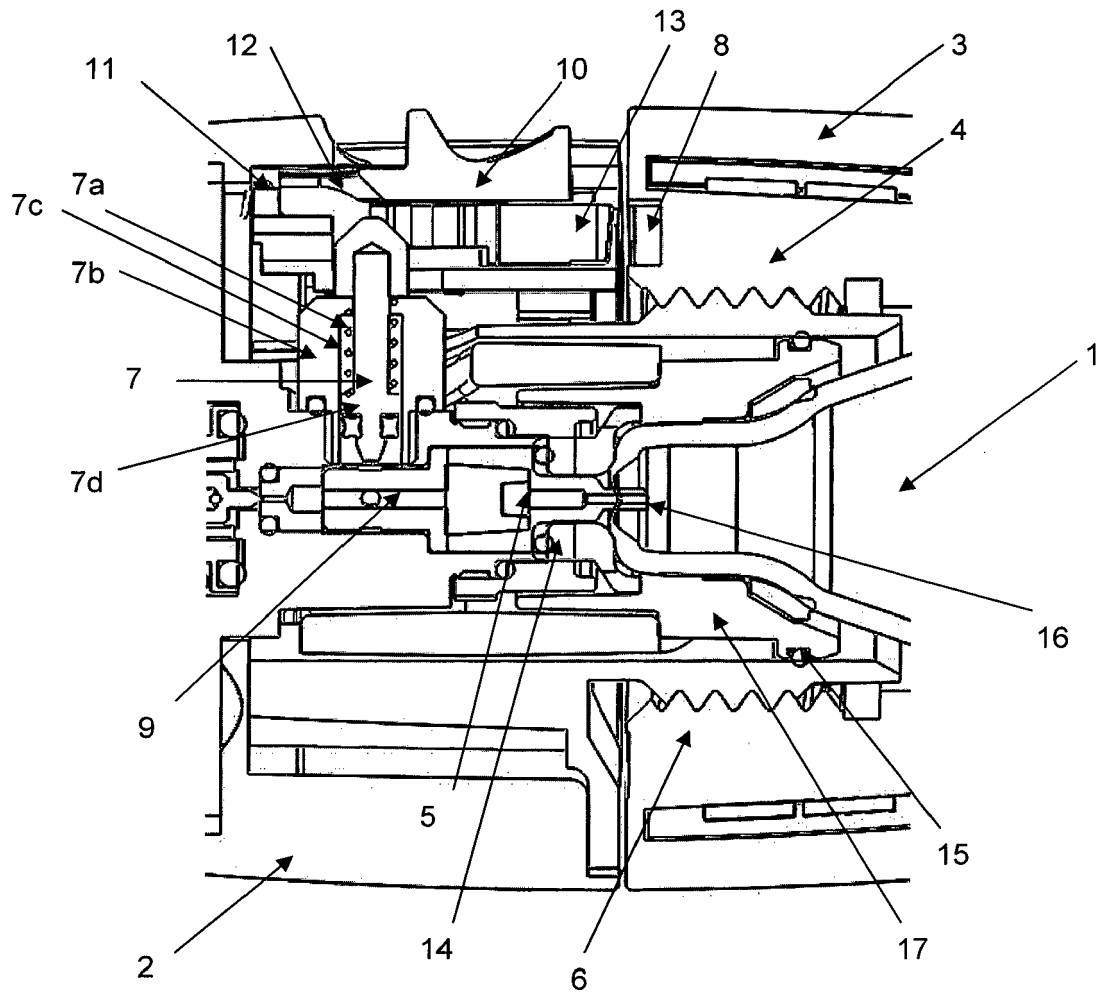


Fig. 5



EUROPEAN SEARCH REPORT

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			F17C
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Place of search Munich		Date of completion of the search 10 February 2017	Examiner Ott, Thomas
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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