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(54) **A METHOD AND AN APPARATUS FOR ODORIZATION**

VERFAHREN UND VORRICHTUNG ZUM VERTEILEN VON DUFTSTOFFEN

PROCEDE ET DISPOSITIF DE DISTRIBUTION D'AGENTS ODORANTS

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Description

[0001] The present invention refers to a method of adding an odorant to a conduit system for gas, comprising addition of the odorant to a carrier gas subsequently added to the conduit system. The invention also refers to an apparatus for adding an odorant to a conduit system for gas, comprising a conduit member extending from a first source of a carrier gas and a second source of an odorant to the conduit system and being arranged to enable the addition of the odorant to the carrier gas subsequently being added to the conduit system.

[0002] The invention is especially but not exclusively applicable to the case when there is a consumer of relatively large quantities of gas and it is desirable to provide a system for warning persons in the area of the consumer if this gas is leaking to the surroundings. For instance, one may mention oxygen gas which in case of leakage may lead to a very high risk for explosion or fire. Such a warning system may include the addition of a relatively strong odorant, being sweet-smelling or nasty-smelling, to the gas so that leakage at an early stage may be detected by persons staying in the neighbourhood of the consumer or the conduit system which is used for the supply of gas to the consumer.

[0003] Generally, the odorant has a very high concentration , i.e. merely a very small quantity of odorant needs to be added in order to obtain a strong odour effect. This is the case, for instance, when dimethylsulphide, DMS, is used as an odorant. Because of this it is difficult to add the odorant in a quantity precisely dosed in relation to the consumer gas. In order to solve this problem it is known to first mix the odorant with a diluting gas, for example carbon dioxide or oxygen, to a so called master gas before the odorant may be added to the consumer gas. Thereby, it is also known, when the odorant is to be added, to use such a preproduced master gas, which may be added to the consumer gas in a proper quantity by relatively simple means. Such preproduced master gas has a relatively low percentage of odorant in order to enable proper dosing in an easy manner. In the case of DMS the percentage may typically be 4%. Because of this there is a relatively large quantity of master gas or a great number of containers of master gas, and this results in significant handling problems. Furthermore, the cost, not only of the handling but also of the master gas per se, is relatively high.

[0004] WO-A-9 006 170 discloses a method for adding an odorant to a consumer gas to be distributed to a consumer. According to this method the odorant is dissolved in condensed carbon dioxide in a pressure container which will contain a liquid phase as well as a gas phase. Thereafter, merely the liquid phase of the mixture of carbon dioxide and the odorant is discharged from the vessel and prior to adding the mixture to the consumer gas said mixture is vaporized.

[0005] EP-B-533 670 discloses a similar method for adding an odorant to a consumer gas, said consumer gas being oxygen.

[0006] DE-A-4 317 395 discloses another method of adding an odorant to a consumer gas, utilizing a buffer volume for the consumer gas in such a manner that, when the pressure in the buffer volume decreases below a predetermined lowest level, consumer gas is supplied until the pressure has increased to a predetermined highest level. The odorant is added to the consumer gas by means of a dosage pump and an injector during the supply of consumer gas to the buffer volume.

[0007] WO-A-9 424 480 discloses a further method of adding an odorant to a consumer gas. This document seeks a solution to the problem of dosing the quantity of the odorant added. Thereby, a carrier gas is conducted through a container having an odorant in a liquid state in a lower part of the container and in a saturated gaseous state in an upper part of the container. In this way a mixture of the carrier gas and the odorant is obtained and this mixture thereafter is added to the consumer gas.

[0008] JP-A-60255893 discloses a even further method for adding an odorizing agent in a liquid state to a carrier gas.

SUMMARY OF THE INVENTION

[0009] The object of the present invention is to remedy the disadvantages mentioned above and develop an improved method of adding an odorant to a consumer gas. In particular, the invention aims at a method and an apparatus, respectively, which enables a precise dosage of odorant and simultaneously reduces the cost.

[0010] This object is obtained by the method initially defined and is characterized in that the odorant and the carrier gas are supplied to a buffer container, that the odorant is vaporized to be in a gaseous state in the buffer container and forms a gas mixture together with the carrier gas, and that gas mixture present in the buffer container is supplied to the conduit system. Consequently, a method is obtained by means of which it is possible to produce a gas mixture, having such a concentration that it may added to the gas at a precise dosage, in situ, i.e. where the odorant is to be added to the gas. Furthermore, the difficult handling of a great number of containers with preproduced master gas is avoided, since the odorant to be mixed with the carrier gas may have a concentration of 100%.

[0011] According to an embodiment of the invention the odorant supplied to the buffer container is discharged from a source in which it is in a liquid state and that the treatment of the odorant comprises vaporization thereof. In order to obtain an appropriate mixing the odorant may be vaporized before being added to the carrier gas, and that the odorant vaporized together with the carrier gas are supplied to the buffer container, the carrier gas being given such a temperature that the odorant remains in a gaseous state when contacting the carrier gas. Furthermore, such a vaporization before the

buffer container is easy to perform since the gas quantity is relatively small and the risk that the odorant would be in a liquid state in the buffer container decreases, which otherwise may result in a deteriorated dosage accuracy. Furthermore, the temperature and the pressure of the gas mixture are maintained at such a level that the odorant does not condense but remains in a gaseous state. Thereby, the amount of the odorant added to the carrier gas is always smaller than the amount resulting in a saturated gas mixture at the actual pressure and temperature.

[0012] According to a further embodiment of the invention, the odorant and the carrier gas are supplied to the buffer container when the pressure therein has reached a smallest first level and that the supply is interrupted when the pressure has reached a highest second level. By means of such intermittent or discontinuous supply of odorant and carrier gas the advantage is obtained that the flow of odorant and carrier gas, respectively, during the supply proper may be kept on a level sufficiently high to enable a proper mixing accuracy. Thereby, the pressure of the gas mixture in the buffer container is maintained between 15 and 30 bar. By such a pressure the gas mixture thereafter may in an easy manner be added to the gas in the conduit system with a proper dosage.

[0013] According to a further advantageous embodiment, the supply of the odorant and the carrier gas to the buffer container may be performed in such a manner that the gas from a source of carrier gas is divided into two subflows, one relatively small subflow pressurizing the odorant and transporting the odorant to the carrier gas forming the second relatively big subflow, the odorant and the carrier gas being subjected to the same pressure before the supply to the buffer container.

[0014] Advantageously, the carrier gas may essentially consist of argon, nitrogen, air or a mixture of at least two of these gases. The odorant may preferably be dimethylsulphide (DMS) or tetrahydrothiophen (THT).

[0015] The object is also obtained by the apparatus initially defined and characterized in that the conduit member comprises a buffer container, arranged to store a mixture of the carrier gas and the odorant, an inlet side, arranged to connect the first and second sources to the buffer container, and an outlet side arranged to connect the buffer container to the conduit system. Such an apparatus enables production in situ in direct connection to the conduit system of a gas mixture having such a concentration of odorant that it in an easy manner may be added to the gas in the conduit system with a proper dosage.

[0016] Advantageous embodiments of this apparatus are defined in the claims 12 to 21.

BRIEF DESCRIPTION OF THE DRAWING

[0017] The present invention shall now be explained more closely with reference to different, by way of example defined embodiments, one of which is disclosed in the drawing attached. Fig 1 of the drawing discloses an apparatus for adding an odorant to a gas.

DETAILED DESCRIPTION OF DIFFERENT EMBODIMENTS

[0018] With reference to Fig 1 a conduit 1 for the transport of a gas is disclosed. The gas conduit 1 may be a part of a conduit system for the supply of, for instance, oxygen to an oxygen consumer. Of course, the invention is applicable also to other gases, for example odourless, toxic gases or combustible gases such as natural gas, propane, butane, town gas etc. The gas conduit 1 comprises an injector 2, through which a gas mixture containing an odorant may be added from an apparatus to be described more closely below, and a flow measuring device for enabling a precise dosage of the quantity of the gas mixture added in relation to the quantity of gas flowing through the gas conduit 1.

[0019] Essentially pure odorant, e.g. dimethylsulphide, DMS, to be added is stored in liquid state in a replaceable storage container 4 of standard type. A carrier gas to be mixed with the odorant prior to the addition to the gas in the gas conduit is supplied from a source which in the example disclosed consists of replaceable pressure containers 5 of standard type. The carrier gas may also be supplied directly from a stationary plant for production of such carrier gas. The carrier gas should be available with a relatively high pressure, preferably of about 20-35 bar. Preferably, any more or less inert gas, such as argon or nitrogen, may be used as carrier gas. Also air and in certain applications carbon dioxide may be utilized as carrier gas. The carrier gas may also consist of a mixture of two or more of these gases.

[0020] As is disclosed in Fig 1 there is a first conduit 6 connecting the pressure container 5 to a joining member 7, a second conduit 8 connecting the storage container 4 to the joining member 7 and a third conduit 9 connecting a joining member 7 to a buffer container 10. From the buffer container 10 extends a fourth conduit 11 to the injector 2 provided in the gas conduit 1. Thus, the joining member 7 comprises a three-way joint permitting gas flow from each of the conduits 6 and 8 to the conduit 9. Furthermore, the first conduit 6 is directly connected to the storage container 4 via a fifth further conduit 12. At the first conduit 6 there is a heating device 13 arranged to heat the carrier gas to a temperature of about 30-40°C. Also the conduit 8 passes through another part of the heating device 13 arranged to heat the odorant to the vaporization temperature and vaporize the odorant discharged in liquid state from the storage container 4. It should be noted that the heating device 13 may comprise two separate heating members, one for the first conduit 6 and one for the second conduit 8.

[0021] Furthermore, there is an enclosure 14 comprising a heat insulating material. The buffer container

10, the joining member 7, the heating device, the third conduit 9 and parts of the conduits 6, 8, 11 and 12 are disposed within the heat insulating enclosure 14. Additionally, a further heating device 15 is provided within the enclosure 14 for maintaining the temperature of about 30-40°C in the enclosure 14.

[0022] Furthermore, there is a pressure sensor 16 for sensing the pressure in the buffer container 10, and a flow measuring device 17 for sensing the flow through the fourth conduit 11, and a temperature sensor 18 for sensing the temperature in the enclosure 14. As is schematically disclosed in Fig 1 the pressure sensor 16, the flow measuring device 17, the temperature sensor 18 and the flow measuring device 3 are connected to an electronic control unit 19.

[0023] In order to regulate the different gas flows in the apparatus valve members are provided as is disclosed in Fig 1. The valve members shall now be described more closely. At the pressure container 5 there is a manual shut-off valve 20 provided on the first conduit 6. In series with the manual shut-off valve 20 on the first conduit 6 there is a valve device 21 activatable by the control unit 19 and enabling closing of the first conduit 6 and comprising air-venting means as a security measurement in case of back-flow in the system. In series with this valve device 21 on the conduit 6 a pressure regulating valve 22 is provided to reduce the pressure of the carrier gas from the pressure container 5 so that a pressure of about 20-35 bar is maintained. Furthermore, there are shut-off valves 23, 24, 25, 26 activatable by means of the control unit 19 and provided on the first conduit 6, the second conduit 7, the fourth conduit 11 and the fifth conduit 12, respectively. Finally, the first conduit 6 and second conduit 8 comprise a respective throttle valve 27 and 28 which are arranged to throttle the flow through the respective conduit in order to regulate the amount of gas flowing therethrough. The throttling valves 27 and 28 may in the most uncomplicated embodiment comprise fixed throttlings so that a fixed predetermined quantity relation is obtained or be adjustable to different throttling degrees.

[0024] The apparatus functions in the following way. The carrier gas in the pressure containers 5 is subjected to a relatively high pressure, up to 300 bar. When odorant is to be supplied to the buffer container 10 a manual valve 20, a passage through the valve device 21 and the valves 23, 24 and 26 are opened. Thereby, carrier gas under high pressure will flow through the first conduit 6 and the fifth conduit 12, and force liquid odorant out of the storage container 4 through the conduit 8. The liquid odorant is vaporized by means of the heating device 13 before it is supplied to the carrier gas at the joining member 7. In order to prevent that the odorant is not condensed again when it contacts the carrier gas, the carrier gas also may be somewhat heated by means of the heating device 13. Thereafter, due to the pressure the gas mixture of the odorant and the carrier gas is fed through the third conduit 9 into the buffer container 10. The pressure sensor 16 senses the pressure in the buffer container 10 and when the pressure has increased to a predetermined level, for example 20 bar, the control unit 19 will initiate closing of at least the valves 23, 24. When the valve 25 is open the gas mixture of odorant and carrier gas will flow through the fourth conduit 11 and the injector 2 into the gas conduit 1 and be mixed with the gas flowing through the gas conduit 1. Due to this discharge of the gas mixture the pressure in the buffer container 10 decreases and when the pressure has reached a predetermined lowest level, for example 15 bar, the control unit 19 once again initiates the opening of the valves 23, 24, thereby starting a new filling of the buffer container. It should be noted that the valve 25 also may be open during filling of the buffer container 10. Thus, the addition of odorant to the gas in the gas conduit 1 may be performed continuously whereas the filling of the buffer container 10 is performed discontinuously or intermittent. By sensing the gas flow in the gas conduit 1 by means of the flow measuring device 3, the quantity of the gas mixture of odorant and carrier gas supplied to the gas conduit 1 may be controlled by means of the valve 25 and the control unit 19 in such a manner that a precise dosage is obtained. By means of the further heating device 15 such a temperature in the enclosure 14 and buffer container 10 is maintained that the condensing of the odorant in the buffer container 10 is prevented, for instance between 30 and 40°C.

[0025] The invention is applicable also to other odorants than DMS, for example tetrahydrothiophen, THT.

Claims

1. A method of adding an odorant to a conduit system for gas, comprising addition of the odorant to a carrier gas subsequently added to the conduit system, the odorant and the carrier gas being supplied to a buffer container, characterized in that the odorant is vaporized to be in a gaseous state in the buffer container and forms a gas mixture together with the carrier gas, and that gas mixture present in the buffer container is supplied to the conduit system.

2. A method according to claim 1, characterized in that the odorant supplied to the buffer container is discharged from a source in which it is in a liquid state.

3. A method according to claim 2, characterized in that the odorant is vaporized before being added to the carrier gas, and that the odorant vaporized together with the carrier gas are supplied to the buffer container, the carrier gas being given such a temperature that the odorant remains in a gaseous state when contacting the carrier gas.

4. A method according to any one of claims 2 and 3, characterized in that the temperature and the pres-

sure of the gas mixture are maintained at such a level that the odorant does not condense but remains in a gaseous state.

5. A method according to any one of the preceding claims, characterized in that the amount of the odorant added to the carrier gas is always smaller than the amount resulting in a saturated gas mixture at the actual pressure and temperature.

6. A method according to one or more of claims 1 to 5, characterized in that the odorant and the carrier gas are supplied to the buffer container when the pressure therein has reached a smallest first level and that the supply is interrupted when the pressure has reached a highest second level.

7. A method according to one or more of claims 1 to 6, characterized in that the pressure of the gas mixture in the buffer container is maintained between 15 and 30 bar.

8. A method according to one or more of claims 1 to 7, characterized in that gas from a source of carrier gas is divided into two subflows, one relatively small subflow pressurizing the odorant and transporting the odorant to the carrier gas forming the second relatively big subflow, the odorant and the carrier gas being subjected to the same pressure before the supply to the buffer container.

9. A method according to one or more of claims 1 to 8, characterized in that the carrier gas essentially consists of argon, nitrogen, air or a mixture of at least two of these gases.

10. A method according to one or more of claims 1 to 9, characterized in that the odorant comprises dimethylsulphide (DMS) or tetrahydrothiophen (THT).

11. An apparatus for adding an odorant to a conduit system (1) for gas, comprising a conduit member extending from a first source (5) of a carrier gas and a second source (4) of an odorant to the conduit system (1) and being arranged to enable the addition of the odorant to the carrier gas subsequently being added to the conduit system, the conduit member comprising a buffer container (10), arranged to store a mixture of the carrier gas and the odorant, an inlet side (6, 8, 9, 12), arranged to connect the first and second sources to the buffer container (10), and an outlet side (11) arranged to connect the buffer container (10) to the conduit system (1), characterized by a heating device (13) arranged to vaporize the odorant to be in a gaseous state in the buffer container (10).

12. An apparatus according to claim 11, characterized in that the inlet side of the conduit member comprises a joining member (7), a first conduit (6) arranged to connect the first source (5) to the joining member (7), a second conduit (8) arranged to connect the second source (4) to the joining member (7), and a third conduit (9) arranged to connect the joining member (7) to the buffer container (10).

13. An apparatus according to claim 12, characterized in that the heating device (13a) is provided on the second conduit (8) and arranged to vaporize the odorant flowing through the second conduit (8).

14. An apparatus according to claim 11 or 13, characterized in that the inlet side of the conduit member comprises a further conduit (12) arranged to connect the first source (5), in which the carrier gas is subjected to a relatively high pressure, to the second source (4) and in this manner produce a flow of odorant from the second source (4) through the second (8) and the third conduits (9) to the buffer container (10).

15. An apparatus according to any one of claims 11 to 14, characterized by valve devices (23, 24, 25, 26) arranged to open and close, respectively, the supply of the carrier gas and the odorant from the first (5) and second (4) sources, respectively, to the buffer container (10) and the supply of the mixture from the buffer container (10) to the conduit system (1).

16. An apparatus according to claim 15, characterized by a pressure sensor (16) arranged to sense the pressure in the buffer container (10) and to activate the valve devices (23, 24) in such a manner that the supply of carrier gas and the odorant is started when the pressure in the buffer container (10) has reached a first smallest level and that the supply is interrupted when the pressure has reached a highest, second level.

17. An apparatus according to any one of claims 11 to 16, characterized by throttling members (27, 28) arranged to control the amount of odorant and carrier gas supplied to the buffer container (10) in such a manner that a determined mixture relation is obtained.

18. An apparatus according to claims 11 and 17, characterized in that the throttling members comprise a first throttling valve (27) provided on the first conduit (6) and a second throttling valve (28) provided on the second conduit (8).

19. An apparatus according to any one of claims 11 to 18, characterized by means to regulate the temperature (15) arranged to maintain such a temperature

in the buffer container (10) that the odorant remains in a gaseous state therein.

20. An apparatus according to claim 19, characterized in that the temperature regulating means (15) comprises an enclosure (14) enclosing the buffer container (10), the joining member (7) and possibly the heating device (13).

Patentansprüche

1. Verfahren, einen Duftstoff einem Gasleitungssystem zuzusetzen, welches den Zusatz des Duftstoffs zum Trägergas und dessen nachfolgenden Zusatz zum Leitungssystem umfaßt, wobei der Duftstoff und das Trägergas einem Pufferbehälter zugeführt werden, dadurch gekennzeichnet, daß der Duftstoff im Pufferbehälter verdampft wird, so daß er im Pufferbehälter im gasförmigen Zustand vorliegt, und eine Gasmischung mit dem Trägergas bildet, und daß die im Pufferbehälter vorhandene Gasmischung dem Leitungssystem zugeführt wird.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß der dem Pufferbehälter zugeführte Duftstoff aus einem Speicher entnommen wird, in welchem er im flüssigen Zustand vorliegt.

3. Verfahren nach Anspruch 2, dadurch gekennzeichnet, daß der Duftstoff vor der Zugabe zum Trägergas verdampft wird und der verdampfte Duftstoff zusammen mit dem Trägergas dem Pufferbehälter zugeführt wird, wobei das Trägergas auf einer solchen Temperatur gehalten wird, daß der Duftstoff im gasförmigen Zustand verbleibt, wenn er auf das Trägergas trifft.

4. Verfahren nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß die Temperatur und der Druck der Gasmischung auf einem solchen Niveau gehalten werden, daß der Duftstoff nicht kondensiert, sondern im gasförmigen Zustand verbleibt.

5. Verfahren nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die Menge des dem Trägergas zugesetzten Duftstoffs in jedem Fall kleiner ist als die bei vorliegendem Druck und Temperatur zu einer gesättigten Gasmischung führenden Menge.

6. Verfahren nach einem oder mehreren der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß der Duftstoff und das Trägergas dem Pufferbehälter zugeführt werden, wenn der Druck darin eine kleinste erste Druckschwelle erreicht hat, und daß die Zufuhr unterbrochen wird, wenn der Druck eine höchste zweite Schwelle erreicht hat.

7. Verfahren nach einem oder mehreren der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß der Druck der Gasmischung im Pufferbehälter zwischen 15 und 30 bar gehalten wird.

8. Verfahren nach einem oder mehreren der Ansprüche 1 bis 7, dadurch gekennzeichnet, daß das Gas von einem Speicher des Trägergases in zwei untergeordnete Ströme geteilt wird, wobei ein relativ kleiner untergeordneter Strom den Duftstoff mit Druck beaufschlagt und den Duftstoff zu dem den zweiten, relativ großen untergeordneten Strom bildenden Trägergas transportiert, wobei der Duftstoff und das Trägergas vor der Zufuhr zum Pufferbehälter mit demselben Druck beaufschlagt werden.

9. Verfahren nach einem oder mehreren der Ansprüche 1 bis 8, dadurch gekennzeichnet, daß das Trägergas im wesentlichen aus Argon, Stickstoff, Luft oder einer Mischung von mindestens zwei dieser Gase besteht.

10. Verfahren nach einem oder mehreren der Ansprüche 1 bis 9, dadurch gekennzeichnet, daß der Duftstoff Dimethylsulfid (DMS) oder Tetrahydrothiophen (THT) umfaßt.

11. Vorrichtung zum Zusatz eines Duftstoffes zu einem Gasleitungssystem (1), welche ein Leitungsstück umfaßt, das sich von einem ersten Speicher (5) von Trägergas und einem zweiten Speicher (4) eines Duftstoffes zum Leitungssystem (1) erstreckt und das so angeordnet ist, daß es die Zugabe des Duftstoffs zum Trägergas, und dessen nachfolgenden Zustand zum Leitungssystem ermöglicht, wobei das Leitungsstück einen Pufferbehälter (10) umfaßt, der zur Speicherung einer Mischung des Trägergases und des Duftstoffs eingerichtet ist, sowie einen Einlaßteil (6, 8, 9, 12), welcher zur Verbindung der ersten und zweiten Speicher mit dem Pufferbehälter (10) angeordnet ist, sowie einen Auslaßteil (11), welcher zur Verbindung des Pufferbehälters (10) mit dem Leitungssystem (1) angeordnet ist, gekennzeichnet durch ein Heizelement (13), das zur Verdampfung des Duftstoffes eingerichtet ist, so daß dieser im Pufferbehälter im gasförmigen Zustand vorliegt.

12. Vorrichtung nach Anspruch 11, dadurch gekennzeichnet, daß das Einlaßteil des Leitungsstücks ein Verbindungsstück (7), eine erste Leitung (6), welche zur Verbindung des ersten Speichers (5) mit dem Verbindungsstück (7) eingerichtet ist, eine zweite Leitung (8), welche zur Verbindung des zweiten Speichers (4) mit dem Verbindungsstück (7) eingerichtet ist, und eine dritte Leitung (9), welche zur Verbindung des Verbindungsstücks (7) mit dem Pufferbehälter (10) eingerichtet ist, umfaßt.

13. Vorrichtung nach Anspruch 12, dadurch gekennzeichnet, daß das Heizelement (13a) an der zweiten Leitung (8) angeordnet ist und zur Verdampfung des durch die zweite Leitung (8) strömenden Duftstoffes eingerichtet ist.

14. Vorrichtung nach Anspruch 11 oder 13, dadurch gekennzeichnet, daß der Einlaßteil des Leitungsstükkes eine weitere Leitung (12), eingerichtet zur Verbindung des ersten Speichers (5), in welchem das Trägergas mit einem relativ hohen Druck beaufschlagt wird, mit dem zweiten Speicher (4), umfaßt, und in dieser Weise ein Strom von Duftstoff vom zweiten Speicher (4) durch die zweiten (8) und die dritten Leitungen (9) zum Pufferbehälter (10) erzeugt wird.

15. Vorrichtung nach einem der Ansprüche 11 bis 14, gekennzeichnet durch Ventilelemente (23, 24, 25, 26), an die zum Öffnen bzw. Schließen der Zufuhr des Trägergases und des Duftstoffs von den ersten (5) bzw. zweiten Speichern (4) zum Pufferbehälter (10) und der Zufuhr der Mischung vom Pufferbehälter (10) zum Leitungssystem (1) angeordnet sind.

16. Vorrichtung nach Anspruch 15, gekennzeichnet durch einen Drucksensor (16), der zur Druckmessung im Pufferbehälter (10) und zur Betätigung der Ventilelemente (23, 24,) in der Weise angeordnet ist, daß die Zufuhr von Trägergas und vom Duftstoff begonnen wird, wenn der Druck im Pufferbehälter (10) eine erste niedrigste Schwelle erreicht hat und daß die Zufuhr unterbrochen wird, wenn der Druck eine höchste zweite Schwelle erreicht hat.

17. Vorrichtung nach einem der Ansprüche 11 bis 16, gekennzeichnet durch Drosselelemente (27, 28), welche zur Steuerung der dem Pufferbehälter (10) zuzuführenden Menge von Duftstoff und Trägergas in der Weise angeordnet sind, daß ein bestimmtes Mischungsverhältnis erreicht wird.

18. Vorrichtung nach Anspruch 11 oder 17, dadurch gekennzeichnet, daß die Drosselelemente ein erstes, an der ersten Leitung (6) eingerichtetes Drosselventil (27) und ein zweites, an der zweiten Leitung (8) eingerichtetes Drosselventil (28) umfasen.

19. Vorrichtung nach einem der Ansprüche 11 bis 18, gekennzeichnet durch Mittel zur Temperaturregulierung (15), eingerichtet zur Aufrechterhaltung einer solchen Temperatur im Pufferbehälter (10), daß der Duftstoff darin im gasförmigen Zustand verbleibt.

20. Vorrichtung nach Anspruch 19, dadurch gekennzeichnet, daß die Mittel zur Temperaturregulierung (15) ein Gehäuse (14) zum Einschluß des Pufferbehälters (10), des Verbindungsstücks (7) und ggf. des Heizelements (13) umfassen.

Revendications

1. Procédé pour l'addition d'une substance odorante à un système de conduit de gaz, comprenant l'addition de la substance odorante à un gaz porteur ajouté de manière subséquente à un système de conduit, la substance odorante et le gaz porteur alimentant un conteneur tampon, **caractérisé en ce que** la substance odorante est vaporisée en un état gazeux dans le conteneur tampon et forme un mélange de gaz conjointement avec le gaz porteur et en ce que le mélange de gaz présent dans le conteneur tampon alimente le système de conduit.

2. Procédé selon la revendication 1, **caractérisé en ce que** la substance odorante qui alimente le conteneur tampon est délivrée à partir d'une source dans laquelle, elle se trouve dans un état liquide.

3. Procédé selon la revendication 2, **caractérisé en ce que** la substance odorante est vaporisée avant d'être ajoutée au gaz porteur et en ce que la substance odorante qui est vaporisée ensemble avec le gaz porteur alimentent le conteneur tampon, le gaz porteur possédant une température telle que la substance odorante reste dans un état gazeux lorsqu'elle contacte le gaz porteur.

4. Procédé selon l'une quelconque des revendications 2 et 3, **caractérisé en ce que** la température et la pression du mélange de gaz sont maintenues à un niveau tel que la substance odorante ne se condense pas mais reste dans un état gazeux.

5. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la quantité de substance odorante ajoutée au gaz porteur est toujours plus petite que la quantité résultant en un mélange de gaz saturé à la température et à la pression ambiante (« actual »).

6. Procédé selon l'une quelconque ou plus des revendications 1 à 5, **caractérisé en ce que** la substance odorante et le gaz porteur alimentent le conteneur tampon lorsque la pression à l'intérieur de celui-ci a atteint un premier plus petit niveau et en ce que l'alimentation est interrompue lorsque la pression a atteint un deuxième plus haut niveau.

7. Procédé selon l'une quelconque ou plus des revendications 1 à 6, **caractérisé en ce que** la pression du mélange de gaz dans le conteneur tampon est maintenue entre 15 et 30 bars.

8. Procédé selon l'une quelconque ou plus des revendications 1 à 7, **caractérisé en ce que** du gaz à partir d'une source de gaz porteur est divisé en deux sous flux, un sous flux relativement petit pressurisant et transportant la substance odorante en direction du gaz porteur formant le second sous flux relativement grand, la substance odorante et le gaz porteur étant soumis à la même pression avant d'alimenter le conteneur tampon.

9. Procédé selon l'une ou plus des revendications 1 à 8, **caractérisé en ce que** le gaz porteur consiste essentiellement en l'argon, l'azote, l'air ou un mélange d'au moins deux de ces gaz.

10. Procédé selon une ou plus des revendications 1 à 9, **caractérisé en ce que** la substance odorante comprend du sulfure de diméthyle (DMS) ou du tétrahydrothiophène (THT).

11. Appareil pour l'addition d'une substance odorante à un système de conduit pour gaz (1) comprenant un membre de type conduit se prolongeant à partir d'une première source (5) d'un gaz porteur et une seconde source d'une substance odorante (4) vers le système de conduit (1) et étant conçu de manière à permettre l'addition de la substance odorante au gaz porteur qui est ajouté de manière subséquente au système de conduit, le membre de conduit comprenant un conteneur tampon (10), conçu pour stocker un mélange de gaz porteur et de substance odorante, un côté d'entrée (6, 8, 9, 12), conçu pour se connecter à la première et à la seconde source au conteneur tampon (10) et un côté d'échappement (11) conçu pour se connecter au conteneur tampon (10) vers le système de conduit (1), **caractérisé par** un dispositif de chauffage (13) conçu pour vaporiser la substance odorante en un état gazeux dans le conteneur tampon (10).

12. Appareil selon la revendication 11, **caractérisé en ce que** le côté d'entrée du membre de conduit comprend un membre de jointure (7) (« joining member »), un premier conduit (6) conçu pour connecter la première source (5) au membre de jointure (7), un second conduit (8) conçu pour connecter la seconde source (4) au membre de jointure (7), et un troisième conduit (9) conçu pour connecter le membre de jointure (7) au conteneur tampon (10).

13. Appareil selon la revendication 12, **caractérisé en ce que** le dispositif de chauffage (13a) est muni sur le second conduit (8) et conçu de telle manière à vaporiser le flux de substance odorante à travers le second conduit (8).

14. Appareil selon les revendications 11 ou 13, **caractérisé en ce que** le côté d'entrée du membre de type conduit comprend en outre un conduit (12) conçu pour connecter la première source (5), dans lequel le gaz porteur est soumis à une pression relativement élevée, à la seconde source (4) et de cette manière de produire un flux de substance odorante à partir de la seconde source (4) à travers les second (8) et le troisième (9) conduits vers le conteneur tampon (10).

15. Appareil selon l'une quelconque des revendications 11 à 14, **caractérisé par** des dispositifs de vannes (23, 24, 25, 26) conçus pour ouvrir et fermer respectivement l'alimentation de gaz porteur et la substance odorante à partir de la première (5) et seconde (4) sources respectivement, vers le conteneur tampon (10) et l'alimentation du mélange à partir du conteneur tampon (10) vers le système de conduit (1).

16. Appareil selon la revendication 15, **caractérisé par** un capteur de pression (16) conçu pour capter la pression dans le conteneur tampon (10) et activer les dispositifs de vannes (23, 24) de telle manière que l'alimentation en gaz porteur et en substance odorante débute lorsque la pression dans le conteneur tampon (10) a atteint un premier plus petit niveau et que l'alimentation est stoppée lorsque la pression a atteint un second plus haut niveau.

17. Appareil selon une quelconque des revendications 11 à 16, **caractérisé par** des membres d'étranglement (27, 28) conçus pour contrôler la quantité de substance odorante et de gaz porteur qui alimente le conteneur tampon, de telle manière qu'un rapport de mélange déterminé est obtenu.

18. Appareil selon les revendications 11 et 17, **caractérisé en ce que** les membres d'étranglement comprennent une première vanne d'étranglement (27) disposée sur le premier conduit (6) et une seconde valve d'étranglement (28) disposée sur le second conduit (8).

19. Appareil selon l'une quelconque des revendications 11 à 18, **caractérisé par** des moyens de réguler la température (15) conçus pour maintenir une telle température dans le conteneur tampon (10) de sorte que la substance odorante reste sous forme gazeuse à l'intérieur de celui-ci.

20. Appareil selon la revendication 19, **caractérisé en ce que** les moyens de régulation de température (15) comprennent une enceinte (14) contenant le conteneur tampon (10), le membre de jointure (7) et si possible le dispositif de chauffage (13).

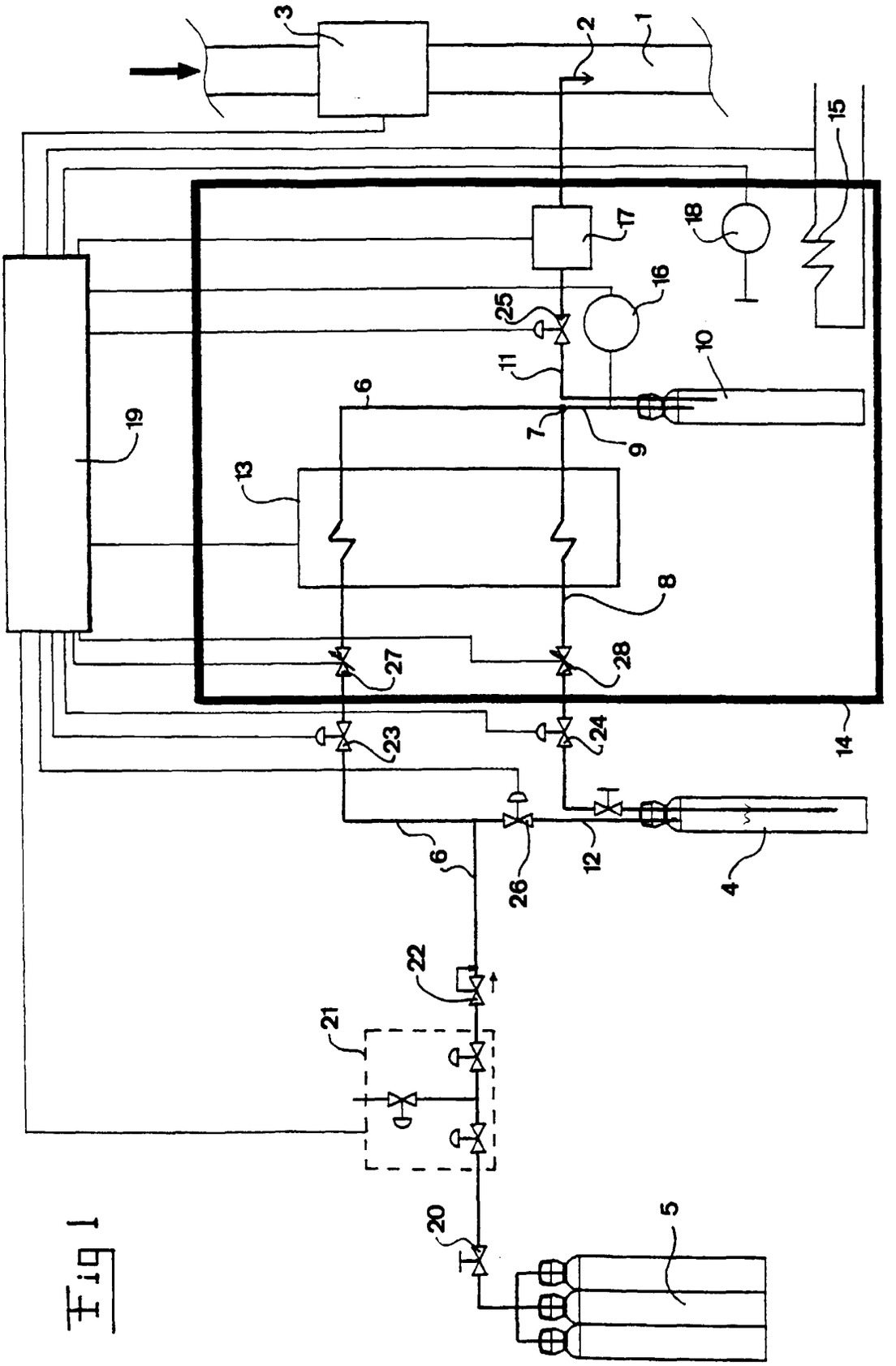

Fig 1