

Description

The present invention relates to a high purity gas delivery assembly.

It is known that in many industrial processes it is necessary to control the flow of process gases. In the manufacture of semiconductor devices such as integrated circuits the process gases used must be of high purity and must be particle free. With the ever increasing density of circuit components on semiconductor "chips" it is increasingly necessary to reduce contamination levels of these process gases.

Unfortunately one source of particle contamination of the process gases comes from the gas delivery or control assembly itself. There are two main types of gas delivery assemblies, industrially known as valves, which are used to open or close the gas flows during semiconductor device manufacture. The first type uses a diaphragm to interrupt the gas flow but this requires the use of non-linear gas flows which can cause turbulence provoking the production of small particles and causing undesired pressure drops across the delivery assembly. A second type of gas delivery assembly has a "straight through" gas flow and uses a bellows assembly incorporating a translation means and a seat seal to open or close the gas flow. While this second type of gas delivery assembly solves the problems caused by excessive pressure drops, it suffers from several drawbacks.

A bellows configuration has an undulating surface and therefore a large surface area which can act as a source of particles.

Furthermore, movement of the bellows during opening and closing of the gas delivery assembly can create additional particles due to deformation of its surface.

If the bellows assembly is made longer, less relative movement is required to open and close the gas flow. However the surface area of the bellows is increased thus increasing the possibility of loose particle production. Furthermore the walls of the bellows enclosure area are increased again increasing the probability of loose particle production. In addition this increases the dead volume exposed to the gas flow and hence increases the risk of turbulence. This turbulence itself can provoke increased particle production and also create an increased pressure drop across the gas delivery assembly.

Prior art gas delivery assemblies, such as according to FR-A-2151692, are difficult to purge efficiently to remove particles.

It is therefore an object of the present invention to provide a high purity gas delivery control assembly free from one or more of the defects of prior art gas delivery control assemblies, in particular deriv-

ing from the introduction of particles into the gas flow, by providing a high purity gas delivery control assembly easy to purge.

This object is obtained through the features of claim 1.

Additional objects and advantages of the high purity gases delivery control assemblies of the present invention will become apparent to those skilled in the art by reference to the following detailed description thereof and drawings wherein:

FIGURE 1 is a cross sectional drawing of a high purity gas delivery control assembly of the present invention in the open position;

FIGURE 2 is a cross sectional drawing of a high purity gas delivery control assembly of the present invention in the closed position;

FIGURE 3 is a partially cut-away cross section of a high purity gas delivery assembly incorporating a preferred embodiment of a gas flow sealing assembly;

FIGURES 4 and 5 are respectively a plan view and a cross sectional view taken along line 5-5' of Fig. 4 of the gas flow sealing assembly of Fig. 3; and

FIGURE 6 is a cross sectional view, similar to Fig. 5, of an alternative embodiment of the gas flow sealing assembly.

Referring now to the drawings and in particular to Fig. 1 there is shown a high purity gas delivery control assembly 100 of the present invention.

Control assembly 100 comprises a stainless steel body 102 provided with a high purity gas flow inlet port 104. Inlet port 104 preferably has a circular cross section. Body 102 is also provided with a high purity gas flow outlet port 106 which is again preferably of circular cross section having the same diameter as inlet port 104 with which it is coaxial. Body 102 is also provided with a gas flow interruption means translation channel 108 having a circular cross section of diameter greater than that of the inlet port 104. The axis of gas flow interruption means translation channel 108 is at an angle with respect to the axis of the inlet and outlet ports 104, 106. Preferably this angle is of about 45°. Translation channel 108 terminates within body 102 in a cone shaped seat seal receiving surface 110 located at the intersection between translation channel 108 and inlet port 104. Furthermore translation channel 108 terminates externally to body 102 in a gas flow interruption means support end 112.

There is also provided a gas flow interruption means 114 which controls the delivery of high purity gas. It is located between the high purity gas flow inlet port 104 and the high purity gas flow outlet port 106. It is positioned within the interruption means translation channel 108. Gas flow interruption means 114 comprises a bellows assem-

bly 116 which consists of a bellows 118 of circular cross section. The first end 120 of bellows 118 is sealed in a gas tight manner to a gas flow interruption means seal 122 which is preferably of conical shape and whose conical surface 124 forms a gas tight seal with a surface 126 which is preferably curved on the external termination 128 of translation channel 108. The conically shaped seal 122 has a coaxial cylindrical hole 130 through which passes a translation means 132. Translation means 132 is preferably in the form of a cylindrical rod 134. The second end of bellows 118 is connected in a gas tight manner to a gas flow sealing assembly 136 which comprises a dead volume defining means 138. Dead volume defining means 138 comprises a first stainless steel disc 140 which has a diameter less than the diameter of the translation channel 108. Furthermore a dead volume seal disc 142 which may for instance be of the flexible material sold as "Kel-F" having a diameter greater than that of seal disc 140 and slightly less than the diameter of translation channel 108 is in abutting relationship therewith.

Gas flow sealing assembly 136 further comprises a seat seal 144 consisting of a second stainless steel disc 146 having a diameter less than the diameter of the translation channel 108 and having in abutting relationship therewith a seat seal disc 148 which again may for instance be of the flexible material called "Kel-F".

Dead volume defining means 138 and seat seal 144 are distanced apart by means of a hollow stainless steel cylinder 150 and are held rigidly together by a coupling means 152. It is preferable that the dead volume defining means 138 and seat seal 144 are distanced apart by a distance equivalent to that necessary to open and close the gas delivery control assembly 100.

A bellows volume isolation means 154 is provided such that when the gas delivery control assembly 100 is in the open position there is defined an isolated bellows volume 155. Preferably bellows volume isolation means 154 is in the form of a stainless steel cylinder 156 attached to inner wall 158 of translation channel 108 at a position between dead volume defining means 138 and gas flow interruption means seal 122. Stainless steel cylinder 156 may be hermetically attached to gas flow interruption means seal 122.

Referring now to Fig. 2 there is shown the high purity gas delivery control assembly 100 of the present invention as described in detail in Fig. 1 in the open position but here shown in the closed position. Gas flow interruption means 114 is now in such a position that seat seal disc 148 is in contact with cone shaped seat seal receiving surface 110. It is seen that dead volume seal disc 142 is in the proximity of point 160 where gas flow interruption

means translation channel 108 meets high purity gas flow outlet port 106.

The high purity gas delivery control assembly 100 can be provided with purge ports 162, 162' on the interruption means translation channel 108 in fluid communication with the isolated bellows volume 155. Thus when the control assembly 100 is in the open position any particles which have been produced by the bellows can be purged by means of a flow gas through the isolated volume 155. Successively when closing the gas delivery control assembly 100 no particles are released into high purity gas flowing through the outlet port 106. However any particles which are created within gas flow interruptions means translation channel 108 can be removed by means of gas purging from a gas purge port 164 situated near outlet port 106 via one of the purge ports 162, 162' in fluid communication with the isolated bellows volume 155.

Referring now to Fig. 3, in which identical parts are indicated with the same numbers as in Figs. 1 and 2, a partially cut away cross section of a high purity gas delivery assembly according to the invention shows an alternative, preferred embodiment of the flow sealing assembly of which Figs. 4-6 are further, more particular representations. There is shown a gas flow sealing assembly 136 comprising a dead volume defining means 138 which now is in the form of a flexible circular gasket 302 with a convex curved surface for contacting with a bellows volume isolation means 154 and preferably having a circular cross section. Assembly 136 also comprises a seat seal 144 now having the form of a flexible circular gasket 304 with a convex curved surface for contacting with a cone shaped seat seal receiving surface 110, and preferably also having a circular cross section. Both gaskets may for instance be of the flexible material called "Kel-F". Assembly 136 also comprises a distancing means 306, for maintaining said dead volume defining means and said seat seal coaxially distanced from each other, having a circular cross section with an axis of rotation 308. Distancing means 306 has a first end surface 310 which is perpendicular to axis 308 and is adapted to be sealed to a bellows 118. Distancing means 306 also has a first circumferential step 312 adjacent to surface 310 and penetrating both axially, by means of a first axial step wall 311, and radially, by means of a first radial step wall 313 into distancing means 306 for a distance slightly less than the diameter of the cross section of dead volume defining means 302. Step 312 retains means 302 which contacts both walls 311 and 313 in a gas tight manner. Distancing means 306 also has a second end surface 314 perpendicular to axis 308. Adjacent second surface 314 there is a second circumferential step 316 which penetrates both axially, by

means of a second axial step wall 315, and radially, by means of a second radial step wall 317, into distancing means 306 for a distance slightly less than the diameter of the cross section of seat seal 304. Second step 316 retains seat seal 304 which contacts both walls 315 and 317 in a gas tight manner. The gaskets can be heat shrunk into the steps of distancing means 306.

Referring now in particular to Fig. 3 the first end surface 310 of assembly 136 is welded to bellows 118. As shown in Fig. 3 seat seal 304 is in contact with cone shaped seat seal receiving surface 110 for interrupting gas flow through gas delivery assembly 100. When gas flows dead volume defining means 302 is in contact with a bellows volume isolating means 154 and high purity gas flows through the gas delivery assembly.

It should be appreciated that both circular gaskets 302 and 304 could be retained in housings having a shape different from the steps 312, 316 as illustrated in Fig. 5. Fig. 6 shows an alternative preferred embodiment according to which the gaskets 302, 304 are housed in seats 318, 320 respectively, having a circular cross section.

Claims

1. A high purity gas delivery control assembly comprising:

A. a body (100,102) having:

- a. a high purity gas flow inlet port (104);
- b. a high purity gas flow outlet port (106);
- c. a gas flow interruption means translation channel (108); and
- d. a seat seal receiving surface (110) located at the intersection between said inlet port (104) and said translation channel (108);

B. a gas flow interruption means (114), to control the delivery of high purity gas, located between said high purity gas flow inlet port (104) and said high purity gas outlet port (106), and within said interruption means translation channel (108), said interruption means (114) comprising:

- a. a bellows assembly (116) having:
- b. a translation means (132); and
- c. a gas flow sealing assembly (136);

characterized in that: said sealing assembly (136) comprises:

- i) a dead volume defining means (138) located adjacent said bellows assembly (116); and
- ii) a seat seal (144) distanced away from said dead volume defining means (138); and

said gas delivery control assembly further comprising:

C. a bellows volume isolation means (154),
D. At least two purge ports (162, 162') formed on said interruption means translation channel (108) are provided in fluid communication with the isolated bellows volume (155), which is defined by said bellows volume isolation means (154), when the control assembly is in the open position, in cooperation with the dead volume defining means (138).

2. A high purity gas delivery control assembly according to claim 1, characterized in that said body (102) is of metal, with said high purity gas flow inlet port (104) and said high purity gas flow outlet port (106) being both of circular cross section, coaxial to each other and having the same diameter, wherein said gas flow interruption means translation channel (108) has a circular cross section diameter greater than that of the inlet port (104) and whose axis is at an angle to the axes of the inlet and outlet ports, the translation channel (108) terminating within said body (102) in said seat seal receiving surface (110) and furthermore said translation channel terminating externally to said body in a gas flow interruption means support end (112); that said bellows assembly (116) of said gas flow interruption means (114) comprises a bellows (118) the first end (120) of which is sealed in a gas tight manner to a gas flow interruption means seal (122) forming a gas tight seal with a surface (126) on the external termination (128) of the translation channel (108), the seal (122) having a hole (130) through which passes said translation means (132) and said gas flow sealing assembly (136), wherein said bellows volume isolation means (154) is in the form of a stainless steel cylinder.

3. A high purity gas delivery control assembly according to claim 2, characterized in that said metallic body (102) is of stainless steel, with said gas flow interruption means translation channel (108) having its axis at about 45° to the axes of the inlet and outlet ports, and said seat seal receiving surface (110) being cone-shaped; that said bellows (118) is of circular cross section and said gas flow interruption means seal (122) is conically shaped having a conical surface (124) which forms a gas tight seal with said surface (126), which is curved, with said cylindrical hole (130) being formed coaxially for passing therethrough of both said translation means (132) in the form of a cylindrical rod (134) and of said gas flow sealing assembly (136), with said dead volume defin-

means of a second axial step wall 315, and radially, by means of a second radial step wall 317, into distancing means 306 for a distance slightly less than the diameter of the cross section of seat seal 304. Second step 318 retains seat seal 304 which contacts both walls 315 and 317 in a gas tight manner. The gaskets can be heat shrunk into the steps of distancing means 306.

Referring now in particular to Fig. 3 the first end surface 310 of assembly 136 is welded to bellows 118. As shown in Fig. 3 seat seal 304 is in contact with cone shaped seat seal receiving surface 110 for interrupting gas flow through gas delivery assembly 100. When gas flows dead volume defining means 302 is in contact with a bellows volume isolating means 154 and high purity gas flows through the gas delivery assembly.

It should be appreciated that both circular gaskets 302 and 304 could be retained in housings having a shape different from the steps 312, 316 as illustrated in Fig. 5. Fig. 6 shows an alternative preferred embodiment according to which the gaskets 302, 304 are housed in seats 318, 320 respectively, having a circular cross section.

Claims

1. A high purity gas delivery control assembly comprising:

A. a body (100,102) having:

- a. a high purity gas flow inlet port (104);
- b. a high purity gas flow outlet port (106);
- c. a gas flow interruption means translation channel (108); and
- d. a seat seal receiving surface (110) located at the intersection between said inlet port (104) and said translation channel (108);

B. a gas flow interruption means (114), to control the delivery of high purity gas, located between said high purity gas flow inlet port (104) and said high purity gas outlet port (106), and within said interruption means translation channel (108), said interruption means (114) comprising:

- a. a bellows assembly (116) having:
- b. a translation means (132); and
- c. a gas flow sealing assembly (136);

characterized in that: said sealing assembly (136) comprises:

- i) a dead volume defining means (138) located adjacent said bellows assembly (116); and
- ii) a seat seal (144) distanced away from said dead volume defining means (138); and

said gas delivery control assembly further comprising:

C. a bellows volume isolation means (154),
D. At least two purge ports (162, 162') formed on said interruption means translation channel (108) are provided in fluid communication with the isolated bellows volume (155), which is defined by said bellows volume isolation means (154), when the control assembly is in the open position, in cooperation with the dead volume defining means (138).

2. A high purity gas delivery control assembly according to claim 1, characterized in that said body (102) is of metal, with said high purity gas flow inlet port (104) and said high purity gas flow outlet port (106) being both of circular cross section, coaxial to each other and having the same diameter, wherein said gas flow interruption means translation channel (108) has a circular cross section diameter greater than that of the inlet port (104) and whose axis is at an angle to the axes of the inlet and outlet ports, the translation channel (108) terminating within said body (102) in said seat seal receiving surface (110) and furthermore said translation channel terminating externally to said body in a gas flow interruption means support end (112); that said bellows assembly (116) of said gas flow interruption means (114) comprises a bellows (118) the first end (120) of which is sealed in a gas tight manner to a gas flow interruption means seal (122) forming a gas tight seal with a surface (126) on the external termination (128) of the translation channel (108), the seal (122) having a hole (130) through which passes said translation means (132) and said gas flow sealing assembly (136), wherein said bellows volume isolation means (154) is in the form of a stainless steel cylinder.

3. A high purity gas delivery control assembly according to claim 2, characterized in that said metallic body (102) is of stainless steel, with said gas flow interruption means translation channel (108) having its axis at about 45° to the axes of the inlet and outlet ports, and said seat seal receiving surface (110) being cone-shaped; that said bellows (118) is of circular cross section and said gas flow interruption means seal (122) is conically shaped having a conical surface (124) which forms a gas tight seal with said surface (126), which is curved, with said cylindrical hole (130) being formed coaxially for passing therethrough of both said translation means (132) in the form of a cylindrical rod (134) and of said gas flow sealing assembly (136), with said dead volume defin-



ing means (138) comprising a first stainless steel disc (140) having a diameter less than the diameter of the translation channel (108) and a flexible dead volume seal disc (142) having a diameter greater than that of the seal disc (140) and slightly less than the diameter of the translation channel (108); and said seat seal (144) comprising a second stainless steel disc (146) having a diameter less than the diameter of the translation channel (108) and a flexible seat seal disc (148), there being provided a hollow stainless steel cylinder (150) to distance apart said dead volume defining means (138) and said seat seal (144) held rigidly together by coupling means (152); wherein said bellows volume isolation means (154) in the form of a stainless steel cylinder (156) is attached to inner wall (158) of translation channel (108) at a position between dead volume defining means (138) and conically shaped gas flow interruption means seal (122).

4. A high purity gas delivery control assembly according to claim 2, characterized in that said gas flow sealing assembly (136) comprises:

A. a dead volume defining means (138) in the form of a circular gasket (302) having a convex curved surface for contacting with said bellows volume isolation means (154);
 B. a seat seal (144) in the form of a circular gasket (304) having a convex curved surface for contacting with said seat seal receiving surface (110) being cone-shaped; and
 C. distancing means (306) for maintaining said dead volume defining means (138, 302) and said seat seal (144, 304) coaxially distanced from each other.

5. A high purity gas delivery control assembly according to claim 4, characterized in that said circular gaskets (302, 304) are flexible and have a circular cross section.

6. A high purity gas delivery control assembly according to claim 5, characterized in that said distancing means (306) has:

A. a circular cross section;
 B. an axis of rotation (308);
 C. a first end surface (310) perpendicular to said axis of rotation (308) adapted to be sealed to said bellows (118);
 D. a first retaining means (312, 318) adjacent said first end surface (310), penetrating both axially and radially into said distancing means (306) for a distance slightly less than the diameter of the cross section of said dead volume defining means (138, 302) for

retaining said dead volume defining means;
 E. a second end surface (314) perpendicular to said axis of rotation (308); and
 F. a second retaining means (316, 320) adjacent said second end surface (314) penetrating both axially and radially into said distancing means (306) for a distance slightly less than the diameter of the cross section of said seat seal (144, 304), for retaining said seat seal.

7. A high purity gas delivery control assembly according to claim 6, characterized in that said first and second retaining means is a circumferential step (312, 316), respectively.

8. A high purity gas delivery control assembly according to claim 6, characterized in that said first and second retaining means is a circumferential housing (318, 320), respectively of said circular gaskets (302, 304), having a circular cross section.

Patentansprüche

1. Zuführsteuereinheit für ein Gas hoher Reinheit mit:

A. einem Gehäuse (100, 102) mit
 a. einer Einlaßöffnung (104) für ein Gas hoher Reinheit;
 b. eine Auslaßöffnung (106) für ein Gas hoher Reinheit;
 c. einem Gasstromunterbrechungstranslationskanal (108); und
 d. einer Sitzdichtungsaufnahmeffläche (110), die am Schnittpunkt zwischen der Einlaßöffnung (104) und dem Translationskanal (108) angeordnet ist;

B. einer Gasstromunterbrechungseinrichtung (114) zum Steuern der Zufuhr des Gases hoher Reinheit, die zwischen der Einlaßöffnung (104) und der Auslaßöffnung (106) für das Gas hoher Reinheit und in dem Unterbrechungstranslationskanal (108) angeordnet ist, wobei die Gasstromunterbrechungseinrichtung (114) umfaßt:

a. eine Balgeinheit (116), die
 b. eine Translationseinrichtung (132) und
 c. eine Gasstromabdichtungseinheit (136) aufweist,

dadurch gekennzeichnet, daß die Abdichtungseinheit (136) umfaßt:

i) eine ein Totvolumen definierende Einrichtung (138), die benachbart zur Balgeinheit (116) angeordnet ist; und
 ii) eine Sitzdichtung (144), die im Abstand von der das Totvolumen definierenden Einrichtung (138) angeordnet



ist; und

die Gaszuführsteuereinheit des weiteren umfaßt:

C. eine Balgvolumenisolationseinrichtung (154) und

D. mindestens zwei Reinigungsöffnungen (162, 162'), die am Unterbrechungstranslationskanal (108) ausgebildet sind und mit dem isolierten Balgvolumen (155), das durch die Balgvolumenisolationseinrichtung (154) gebildet ist, wenn sich die Steuereinheit in der offenen Position befindet, in Strömungsmittelverbindung stehen, in Zusammenwirkung mit der das Totvolumen definierenden Einrichtung (138).

2. Zuführsteuereinheit für ein Gas hoher Reinheit nach Anspruch 1, dadurch gekennzeichnet, daß das Gehäuse (102) aus Metall besteht, daß die Einlaßöffnung (104) und die Auslaßöffnung (106) für das Gas hoher Reinheit einen kreisförmigen Querschnitt besitzen, coaxial zueinander angeordnet sind und den gleichen Durchmesser aufweisen, daß der Gasstromunterbrechungstranslationskanal (108) einen kreisförmigen Querschnitt mit einem größeren Durchmesser als dem der Einlaßöffnung (104) aufweist, dessen Achse unter einem Winkel zu den Achsen der Einlaßöffnung und Auslaßöffnung angeordnet ist, der Translationskanal (108) im Gehäuse (102) in der Sitzdichtungsaufnahmefläche (110) endet und der Translationskanal des weiteren außerhalb des Gehäuses in einem Gasstromunterbrechungseinrichtungslagerende (112) endet und daß die Balgeinheit (116) der Gasstromunterbrechungseinrichtung (114) einen Balg (118) aufweist, dessen erstes Ende (120) in gasdichter Weise an einer Gasstromunterbrechungseinrichtungsdichtung (122) abgedichtet ist, die eine gasdichte Dichtung mit einer Fläche (126) am äußeren Ende (128) des Translationskanales (108) bildet, wobei die Dichtung (122) ein Loch (130) aufweist, durch das sich die Translations-einrichtung (132) und die Gasstromabdichtungseinheit (136) erstrecken und wobei die Balgvolumenisolationseinrichtung (154) die Form eines Zylinders aus rostfreiem Stahl besitzt.

3. Zuführsteuereinheit für ein Gas hoher Reinheit nach Anspruch 2, dadurch gekennzeichnet, daß das metallische Gehäuse (102) aus rostfreiem Stahl besteht, daß der Gasstromunterbrechungstranslationskanal (108) eine Achse besitzt, die unter einem Winkel von etwa 45° zu den Achsen der Einlaßöffnung und Auslaßöffnung angeordnet ist, daß die Sitzdichtungs-

aufnahmefläche (110) konisch ausgebildet ist, daß der Balg (118) einen kreisförmigen Querschnitt besitzt und daß die Gasstromunterbrechungseinrichtungsdichtung (122) konisch geformt ist und eine konische Fläche (124) aufweist, die eine gasdichte Dichtung mit der Fläche (126), die gekrümmt ist, bildet, daß das zylindrische Loch (130) coaxial ausgebildet ist, um sowohl die Translationseinrichtung (132) in der Form einer zylindrischen Stange (134) als auch die Gasstromabdichtungseinheit (136) hindurchzulassen, daß die das Totvolumen definierende Einrichtung (138) eine erste Scheibe (140) aus rostfreiem Stahl mit einem Durchmesser, der geringer ist als der Durchmesser des Translationskanales (108), und eine flexible Totvolumenabdichtungsscheibe (142) mit einem Durchmesser, der größer ist als der der Dichtungsscheibe (140) und geringfügig kleiner als der Durchmesser des Translationskanales (108), aufweist und daß die Sitzdichtung (144) eine zweite Scheibe (146) aus rostfreiem Stahl mit einem Durchmesser, der geringer ist als der Durchmesser des Translationskanales (108), und eine flexible Sitzdichtungsscheibe (148) umfaßt, wobei ein Hohlzylinder (150) aus rostfreiem Stahl vorgesehen ist, um die das Totvolumen bildende Einrichtung (138) und die Sitzdichtung (144), die über eine Kupplungseinrichtung (152) starr zusammengehalten werden, auf Abstand zu halten, und wobei die Balgvolumenisolationseinrichtung (154) in der Form eines Zylinders (156) aus rostfreiem Stahl an der Innenwand (158) des Translationskanales (108) an einer Stelle zwischen der das Totvolumen definierenden Einrichtung (138) und der konisch geformten Gasstromunterbrechungseinrichtungsdichtung (122) befestigt ist.

4. Zuführsteuereinheit für ein Gas hoher Reinheit nach Anspruch 2, dadurch gekennzeichnet, daß die Gasstromabdichtungseinheit (136) umfaßt:

A. eine ein Totvolumen definierende Einrichtung (138) in der Form eines kreisförmigen Dichtungsringes (302) mit einer konvex gekrümmten Oberfläche, um mit der Balgvolumenisolationseinrichtung (154) in Kontakt zu treten;

B. eine Sitzdichtung (144) in der Form eines kreisförmigen Dichtungsringes (304) mit einer konvex gekrümmten Oberfläche, um mit der konisch ausgebildeten Sitzdichtungsaufnahmefläche (110) in Kontakt zu treten; und
C. eine Distanzeinrichtung (306), um die das Totvolumen definierende Einrichtung (138, 302) und die Sitzdichtung (144, 304) coaxial im Abstand voneinander zu halten.



5. Zuführsteuereinheit für ein Gas hoher Reinheit nach Anspruch 4, dadurch gekennzeichnet, daß die kreisförmigen Dichtungsringe (302, 304) flexibel sind und einen kreisförmigen Querschnitt besitzen.

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6. Zuführsteuereinheit für ein Gas hoher Reinheit nach Anspruch 5, dadurch gekennzeichnet, daß die Distanzeinrichtung (306) aufweist:

A. einen kreisförmigen Querschnitt;

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B. eine Drehachse (308);

C. eine erste Endfläche (310), die senkrecht zur Drehachse (308) verläuft und mit dem Balg (118) abgedichtet werden kann;

D. eine erste Halteeinrichtung (312, 318) benachbart zur ersten Endfläche (310), die sowohl axial als auch radial in die Distanzeinrichtung (306) um eine Strecke eindringt, die geringfügig kleiner ist als der Durchmesser des Querschnitts der das Totvolumen definierenden Einrichtung (138, 302), um die das Totvolumen definierende Einrichtung zu halten;

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E. eine zweite Endfläche (314) senkrecht zur Drehachse (308); und

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F. eine zweite Halteeinrichtung (316, 320) benachbart zur zweiten Endfläche (314), die sowohl axial als auch radial in die Distanzeinrichtung (306) eine Strecke eindringt, die geringfügig kleiner ist als der Durchmesser des Querschnitts der Sitzdichtung (144, 304), um die Sitzdichtung zu halten.

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7. Zuführsteuereinrichtung für ein Gas hoher Reinheit nach Anspruch 6, dadurch gekennzeichnet, daß die erste und zweite Halteeinrichtung durch eine Umfangsstufe (312, 316) gebildet sind.

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8. Zuführsteuereinheit für ein Gas hoher Reinheit nach Anspruch 6, dadurch gekennzeichnet, daß die erste und zweite Halteeinrichtung durch ein Umfangsgehäuse (318, 320) der kreisförmigen Dichtungsringe (302, 304) mit kreisförmigem Querschnitt gebildet sind.

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Revendications

1. Une unité de commande de distribution de gaz à haute pureté comprenant :

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A. un corps (100, 102) présentant :

a. un orifice d'entrée (104) d'écoulement de gaz à haute pureté ;

b. un orifice de sortie (106) d'écoulement de gaz à haute pureté ;

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c. un canal de translation (108) de moyens d'interruption de l'écoulement de gaz ; et

d. une surface (110) recevant un joint de siège placée à l'intersection entre ledit orifice de sortie (104) et ledit canal de translation (108) ;

B. des moyens d'interruption (114) de l'écoulement de gaz, pour commander la distribution du gaz à haute pureté, placés entre ledit orifice d'entrée (104) de l'écoulement de gaz à haute pureté et ledit orifice de sortie (106) du gaz à haute pureté, et à l'intérieur dudit canal de translation (108) des moyens d'interruption, lesdits moyens d'interruption (114) comprenant :

a. une unité à soufflet (116) présentant :

b. des moyens de translation (132) ; et

c. une unité d'obturation (136) de l'écoulement de gaz,

caractérisée en ce que : ladite unité d'obturation (136) comprend :

(i) des moyens de détermination (138) du volume mort placés de manière adjacente à ladite unité à soufflet (116) ; et

(ii) un joint de siège (144) à distance desdits moyens de détermination (138) du volume mort ; et

ladite unité de commande de distribution de gaz comprenant en outre :

C. des moyens d'isolation (154) de volume de soufflet ;

D. au moins deux orifices de purge (162, 162') formés sur ledit canal de translation (108) des moyens d'interruption sont disposés en communication d'écoulement avec le volume isolé de soufflet (155) qui est défini par lesdits moyens d'isolation (154) du volume de soufflet, quand l'unité de commande est en position ouverte, en coopération avec les moyens de détermination (138) du volume mort.

2. Une unité de commande de distribution de gaz à haute pureté selon la revendication 1, caractérisée en ce que ledit corps (102) est en métal, avec ledit orifice d'entrée (104) d'écoulement de gaz à haute pureté et ledit orifice de sortie (106) de l'écoulement de gaz à haute pureté, les deux étant de section transversale circulaire, coaxiaux l'un par rapport l'autre et présentant le même diamètre, dans lequel ledit canal de translation (108) des moyens d'interruption de l'écoulement de gaz présente un diamètre de section transversale circulaire supérieur à celui de l'orifice d'entrée (104) et dont l'axe fait un angle par rapport aux axes des orifices d'entrée et de sortie, le canal de translation (108) se terminant à l'intérieur dudit corps (102) en ladite surface (110) recevant le joint de siège et, en outre, ledit canal de trans-



lation se terminant à l'extérieur dudit corps en une extrémité de support (112) pour les moyens d'interruption de l'écoulement de gaz ; en ce que ladite unité à soufflet (116) desdits moyens d'interruption (114) de l'écoulement de gaz comprend un soufflet (118) dont la première extrémité (120) est scellée d'une manière étanche au gaz à un obturateur (122) des moyens d'interruption de l'écoulement de gaz, en formant un obturateur étanche au gaz avec une surface (126) sur l'extrémité externe (128) du canal de translation (108), l'obturateur (122) présentant un trou (130) à travers lequel passent lesdits moyens de translation (132) et ladite unité d'obturation (136) de l'écoulement de gaz, dans lequel lesdits moyens d'isolation (154) du volume de soufflet présentent la forme d'un cylindre en acier inoxydable.

3. Une unité de commande de distribution de gaz à haute pureté selon la revendication 2, caractérisée en ce que ledit corps métallique (102) est en acier inoxydable avec ledit canal de translation (108) des moyens d'interruption de l'écoulement de gaz présentant son axe à environ 45° par rapport aux axes des orifices d'entrée et de sortie et ladite surface (110) recevant le joint de siège étant en forme de cône ; en ce que ledit soufflet (118) est de section transversale circulaire et ledit obturateur (122) des moyens d'interruption de l'écoulement de gaz est de forme conique avec une surface conique (124) qui forme un obturateur étanche au gaz avec ladite surface (126) qui est incurvée, ledit trou cylindrique (130) étant conformé coaxialement pour le passage à la fois desdits moyens de translation (132) sous la forme d'une tige cylindrique (134) et de ladite unité d'obturation (136) de l'écoulement de gaz, avec lesdits moyens de détermination (138) du volume mort comprenant un premier disque (140) en acier inoxydable ayant un diamètre inférieur au diamètre du canal de translation (108) ; et un disque flexible d'obturation (142) du volume mort ayant un diamètre supérieur à celui du disque d'obturation (140) et légèrement inférieur au diamètre du canal de translation (108) ; et ledit joint de siège (144) comprenant un second disque (146) en acier inoxydable présentant un diamètre inférieur au diamètre du canal de translation (108) et un disque flexible (148) de joint de siège, un cylindre creux (150) en acier inoxydable étant prévu pour séparer lesdits moyens de détermination (138) du volume mort et ledit joint de siège (144) qui sont maintenus ensemble de manière rigide par des moyens d'accouplement (152) ; dans lequel ledit moyens d'isola-

tion (154) du volume de soufflet sous la forme d'un cylindre (156) en acier inoxydable sont fixés à la paroi interne (158) du canal de translation (108) à une position entre les moyens de détermination (138) du volume mort et l'obturateur (122) de forme conique des moyens d'interruption de l'écoulement de gaz.

4. Une unité de commande de distribution de gaz à haute pureté selon la revendication 2, caractérisée en ce que ladite unité d'obturation (136) de l'écoulement de gaz comprend :
 - A. des moyens de détermination (138) du volume mort sous la forme d'un joint circulaire (302) présentant une surface incurvée convexe pour venir en contact avec lesdits moyens d'isolation (154) du volume de soufflet ;
 - B. un joint de siège (144) sous la forme d'un joint circulaire (304) présentant une surface incurvée convexe pour venir en contact avec ladite surface (110) de forme conique recevant ledit joint de siège ; et
 - C. des moyens d'écartement (306) pour maintenir lesdits moyens de détermination (138, 302) du volume mort et ledit joint de siège (144, 304) à distance coaxiale les uns des autres.
5. Une unité de commande de distribution de gaz à haute pureté selon la revendication 4, caractérisée en ce que lesdits joints circulaires (302, 304) sont flexibles et présentent une section transversale circulaire.
6. Une unité de commande de distribution de gaz à haute pureté selon la revendication 5, caractérisée en ce que lesdits moyens d'écartement (306) présentent :
 - A. une section transversale circulaire ;
 - B. un axe de rotation (308) ;
 - C. une première surface d'extrémité (310) perpendiculaire audit axe de rotation (308) appropriée à être scellée audit soufflet (118) ;
 - D. des premiers moyens de retenue (312, 318) adjacents à ladite première surface d'extrémité (310) pénétrant à la fois axialement et radialement dans lesdits moyens d'écartement (306) pour une distance légèrement inférieure au diamètre de la section transversale desdits moyens de détermination (138, 302) du volume mort pour retenir lesdits moyens de détermination du volume mort ;
 - E. une seconde surface d'extrémité (314) perpendiculaire audit axe de rotation (308) ;



et

F. des seconds moyens de retenue (316, 320) adjacents à ladite seconde surface d'extrémité (314) pénétrant à la fois axialement et radialement dans lesdits moyens d'écartement (306) pour une distance légèrement inférieure au diamètre de la section transversale dudit joint de siège (144, 304), pour retenir ledit joint de siège.

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7. Une unité de commande de distribution de gaz à haute pureté selon la revendication 6, caractérisée en ce que lesdits premiers et seconds moyens de retenue sont un gradin circonferentiel (312, 316) respectivement.

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8. Une unité de commande de distribution de gaz à haute pureté selon la revendication 6, caractérisée en ce que lesdits premiers et seconds moyens de retenue sont un logement circonferentiel (318, 320), respectivement desdits joints circulaires (302, 304), présentant une section transversale circulaire.

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