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(54) **VALVE UNIT OF A TOTALLY PROTECTIVE CLOTHING**

VENTILEINHEIT FÜR INTEGRAL-SCHUTZKLEIDUNG

UNITE DE VALVE POUR VETEMENT DE PROTECTION INTEGRALE

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Description

[0001] The present invention refers to a valve unit, preferably for air of that kind that is indicated in the preamble of the accompanied main claims.

[0002] Working environments of kind that are dangerous to health are very diversified. In most cases totally protective clothing is required to wear by the person, who is to make an effort in those usually closed spaces. Examples of such ones are nuclear power plants, chemical works, research laboratories, isotope laboratories, wells, of type cesspools and manure wells.

[0003] To its character the contaminated environment can be as well corrosive, as radio active or contain biological active harmful organisms and appear as gases or dust.

[0004] Under the circumstances related above, not merely specific demands on the protective clothing material and the shape of the clothing, but just as least important is the functionality of the valve unit and the surrounding equipments that are connected to the protective clothing and this to make secure and reliable supply of air for ventilation purpose into the clothing for the comfort of the carrier, and furthermore for the latter's continuous and necessary need of breathing air supplied in.

[0005] Known protective clothings have control means, which give undefined flow amounts for ventilation and admit low pressure values to the free space of the clothing, and further more the outbreathed breathing air is used as an essential component in that very flushing air that is to ventilate the protective clothing. Example of such a ventilation, where the outlet valve in the protective clothing continuously drains off outwards a flushing amount corresponding to the outbreathed amount of air is disclosed in the patent specification DE-PS 1241713.

[0006] Protective clothings and equipment belonging to them often are in readiness to be used, when accidents, and where rapid action is necessary to save human lifes or material values. It is then essential that this clothing and above all that its valve- and connecting equipment can be used in so many ways as possible, and consequently be so diversified that change from external air supply to internal sort easily can be carried out. Also is essential that the flows of ventilation and breathing air can be adjusted according to the working conditions and the environment, in which the carrier of the clothing is existing. Sometimes in severe situations the carrier of the clothing have to economize with the air available and in other situations be able quickly, considerably to increase the supply of air into the clothing for breathing- and ventilation purposes.

[0007] Control valve arranged in protective clothing for supply of pressure air for ventilation- and breathing purposes is described in a Swedish patent, published as No. 439588. The control valve is here a pressure control valve essentially comprising a membrane 11 that is spring-loaded and of a handle bar arm arranged on a

pressure valve 10, that sets the membrane to an appropriate position to achieve the overpressure of the clothing.

[0008] The transfer of breathing air is taking place from a non-volume defined inflated free-room 4, and that the out aspirated air more serves as flushing air.

[0009] A carrier of a protective clothing equipped with valve unit according to the invention is always secured pure feeding air from the air supply sources, as the carrier is carrying breathing mask with breathing valve of free-flow helmet. In the specification 439588 is shown that breathing air, taken from the free-room 4, and consequently, is composed by mixed air by the existence of the inhalation valve 3 and the exhalation valve 5. These valves are further more spring-loaded.

[0010] The valve unit for ventilation air according to the invention is essentially cam-profile operated and put under a pressure of 7.5 bars.

[0011] An aim of the present invention is to achieve well-defined, by the carrier person of the clothing, adjustable and in advance by him known air flow volumes in litres per minute, and according to the working conditions related above, adapted flows of ventilation into the protective clothing and by that to attain a comfortable and suitably pressurized free-room between the carrier of the clothing and the clothing itself.

[0012] A purpose is furthermore that the input air fed to the valve unit of the clothing can, alternatively depending on the circumstances, be taken from an external air supply source and be distributed by the valve unit within the clothing as ventilation air at the same time through flow takes place via an overflow passage to air - connected breathing mask/valve, being arranged to the carrier's breathing organ, or where appropriate, that internal container for compressed air, carried under the protective clothing co-operates with the valve unit and connecting components belonging to the same, in order to provide the carrier primarily with breathing air, when the ventilation function can be throttled or by different reasons completely can be blocked.

[0013] A further purpose of the present invention is to increase the level of security in relation to what is known in the art by being able to connect alternative by-pass and switching devices, that can start to function in emergency cases and especially also be used in test situations. So for exaple alternative components can be put in the valve unit as spindles, nozzles etc.

[0014] At a valve unit, tightly connected to a totally protective clothing, the invention solves the aims related above by performing the valve arrangement with those special characterizing parts of the following patent claims.

[0015] With reference to the accompanying drawings it is described below as example a suitable embodiment of the valve unit put in its connection according to the invention. In this case it is shown in

Fig. 1 a schematic outline of a person carrying a

totally protective clothing with the valve unit tightly connected to the clothing wall and passing through the wall, with external and internal hose connectors intended for external and internal air,

Fig. 2 more in detail and partly in section an overview of the connection of the inlets and the internal passages arranged to an interior valve house and the connection of a cam knob to an outer valve housing,

Fig. 3 partly in section a distributing cover that, when applied by screwing against the clothing wall by means of a cover holder, clamps up the distributing cover via the intermediate fitted seal ring, and ensure the valve unit to tighteningly attachment against the clothing wall,

Fig. 4 a lateral view of the cam knob attached to the outer top section of the valve housing,

Fig. 4a a front view of the cam knob with marked values of air indicated as litres per minute that is to vent the protective clothing,

Fig. 4b a cam knob arranged to the valve housing, partly in section, showing a hole, and inside the cam knob a cam-profile path is provided,

Fig. 4c a view of a horizontal section in Fig. 4b and a path of the cam-profile provided concentrically to the fulcrum of the knob and four holes in the valve housing,

Fig. 5 an extension of the cam profile and the positions where a valve spindle with its end abutting the cam-profile,

Fig. 6 an essential part of the valve unit located inside the clothing, and partially as broken up section view, and where a displaceable spindle takes an initial position, a sealing position,

Fig. 7 a next following open seat S_1 as a consequence of the displacement of the spindle, and the path a first ventilation volume takes by its passage out into a distributing cover,

Fig. 8 the same detailed view as in Fig. 7, but the spindle displacement to an off position of a seat S_2 and the passage of air out from the channels of the spindle and via hole in the valve spindle housing,

Fig. 9, detailed view in Fig. 7 and Fig. 8, but with the end position of the displaceable spindle, and a seat S_3 for the passage of the ventilation air via nozzles out into distributing cover,

The Figures 6a, 7a, 8a and 9a are enlarged detail views that principally show the air passages in their positions respectively,

Fig. 10 the transfer passage of the incoming feeding air through the valve unit at closed or open position for ventilation air, so called by-pass function,

Fig. 11 the two channels and T-pieces of the distributing cover,

[0016] In the following an embodiment will be described of a valve unit according to the invention placed in its context, as will be seen from Fig. 1,

[0017] With 1 is designated a totally protective clothing of a modern kind with glass gauge for the carrier's sight and the valve unit 3, tightly attached in front on the chest for safe and comfortable control. An external air source 2a provides the valve unit, via mobile hose 4 and alternative connecting couplings said unit, with air that is flowing through the same. This air will be divided up in the valve unit 3 as ventilation air to the clothing by means of the divert channels 7 and 7' for further passage via ventilation hoses 11 and 11' of the clothing, which each distribute the ventilation air upwards to the arms and downwards to the legs. From the valve unit 3, via transfer channel, air for breathing purposes emanates by an attached hose 6, (see Fig. 10), which connects to a T-piece 5, from where air, via a thereto connected pressure sensing valve 33, is carried further by means of a hose 8 to a breathing mask/breathing valve 10, and to which said T-piece also a feeding hose 9 is connected, which via a connected regulator coupling device 12 is in communication with a compressed air container 2b that the carrier person having with himself inside the clothing.

[0018] That the compressed air container is used and can be connected up shall be seen as an advantage and a many-sidedness that the valve unit offers. Its use will principally be required, in the cases external air by different reasons fails to appear, by hose fracture of the hose 4, rips on the clothing 1 or the like, when the carrier must save himself in escape- situations out from contaminated space. How this is handled in connection with the invention will later on be commented.

[0019] Fig 2 shows an embodiment of the valve unit 3 according to the invention in that a valve housing 13, sealingly attached to the exterior clothing wall 1a, carries a controllable cam knob 19 that by means of a cover plate 21 protects a clamp ring 22 and is snapped in close to the valve housing. The cam knob 19 protects the position defining device inside the casing of the cam knob, as more in detail are shown from the Figures 4b, 4c and Fig. 5. In order that the cam knob 19 always with safe function and not unintentionally will be brought out of its chosen position at a working performance, four holes 24 are arranged in the valve housing 3 for reception of a spring-loaded positioning ball 23 that at the rotary mo-

tion of the cam knob finds its fixed rest position in one respective hole 24. By this arrangement the carrier of the clothing can, with advantage before the carrier person takes it on, adjust desired appropriate position that decides the air flow to the clothing.

[0020] The valve housing 13 has inside the protective clothing an arranged section that must be sealed against out-or inflowing media, and has therefor attached around the wall opening of the clothing a thin sealing ring 34 illustrated according to Fig. 3. The ring 34 is lying over notches 36 in a distributing cover 26 mountable on the above said opening and is by that sealingly located against the clothing wall 1a. In known manner a good sealing is achieved by the fact that a hook-shaped fastener has been arranged around the distributing cover 26, and so performed that it clamps up the clothing wall against the valve housing 13, when a cover holder 27 is screwed on the distributing cover 26. The cover holder is by means of gasket ring, so called O-ring sealingly fixed to the distributing cover, and gives here space for a chamber 11, in that part of the valve unit 3 that protrudes in the protective clothing, i.e. the free space 14. Here the valve unit 3 primarily comprises a therein arranged spindle housing 25 that by means of O-rings 38 (Fig. 6) are sealingly mounted in the space of the distributing cover 26.

[0021] A quick coupling 15 with integreted non-return valve is threadedly fixed to the outer lower part of the valve unit 3, and an overflow channel 16 in the valve housing of the unit 3 is in communication with the chamber 17. To this chamber a communication channel 52 carrying breathing air is connected, and said channel ends in an orifice (see Fig. 10), with the arrangements 45, 51 leading to the distributing cover 26. To the lower part of the distributing cover is sealingly inserted a male piece of a hose coupling that enables engagement of alternative internal connecting devices, as an example plug 53.

[0022] In valve spindle housing 25 a displaceable spindle 28 takes four different positions depending of the control of the cam knob 19. The design of the cam knob is illustrated more in detail in Fig. 4b, 4c and in Fig. 5. In the circular interior hollow space of the cam knob, a cam profile 20 is shaped, with limited, different length of extension between the profile parts, as is obvious from the Fig. 4c. With 24 is designated the four, concentrically around the fulcrum of the knob, performed borings in the abutment surface of the valve housing 13 against the knob 19. Fig. 5 shows in lateral view an extension of the path 20a of the cam profile and illustrates the profile levels, which define the different end positions L_0 , L_2 , L_{30} , L_{150}/L_{100} , that the spindle end 29 can take by abutment against the cam profile part, respectively.

[0023] The spindle 28 lies displaceable in its longitudinal direction in a valve spindle housing 25, that has inlet ports 48, communicating the chamber 17 via an anteroom of the valve spindle housing 25. In this anteroom a sealed seat S_1 is located with associated O-shaped

ring 39a, that seals against a nozzle A_2 (see Fig. 7a). The nozzle A_2 is in communication with a longitudinal channel 37 in the spindle 28. A short distance in on the opposite, solid end 29 of the spindle is concentrically attached an O-shaped ring 41. A way in on the spindle end turned towards the seat S_1 is concentrically attached an O-shaped ring 39b, that forms a seat S_2 to shoulders in the interior space of the spindle housing.

[0024] The spindle 28 has, perpendicular to its longitudinal direction, a bored up, through channel 46, that ends in the channel 37 and permits the larger flow volumes in litres per minute to pass further into the channel 37. An outlet port 49 penetrates through the spindle channel 37 upwards and ends in a transfer channel arranged in the valve spindle housing inside the bored hole 50. This hole is provided with a nozzle.

[0025] The upper opening 42 of the transfer channel in the valve spindle housing 25 leads to the hollow space in the distributing cover 26. From this mentioned cover, wide distributing channels 44a, 44b lead, oriented 180° in relation to each other, the inflowing out into the free-room of the clothing for the ventilation of the same.

[0026] At an end position that the spindle 28 can take by the turning of the cam knob to the position L_{100} , alternatively L_{150} according to Fig. 5, a turned down, longitudinal part of the spindle 28 is exposed, situated a distance in from the seat S_2 , whereupon at the spindle displacement a more wide passage will be opened between said spindle body part and O-shaped ring 39c, lain close to and concentrically arranged around the spindle body. By this, an open seat S_3 is created with shoulders in the valve spindle housing 25.

[0027] In the bore hole 50 then, depending on the flow volume in litres per minute one consider to require of ventilation air, an alternative nozzle can be put in. In the normal case one starts with a nozzle D_1 , giving the flow volume of 150 litres per minute, but it can be replaced with the throttle nozzle D_2 that is screwed into the opening 42 and gives 100 litres per minute of ventilation air into the clothing.

[0028] With reference to Fig. 10 is shown the path that external air flows through the valve unit and how a so called by-pass function is achieved. By this all mentioned ventilation positions of the clothing, as well as closed position of the seat S_1 , can be prevailing.

[0029] In order to fully be able to utilise and achieve the technical effect that is manifested in creating a quickly adapted, comfortable climat for the carrier of the clothing, it is shown in Fig. 11 the inserted angle tees 7, 7' arranged in each of the distributing channels 44a, 44b and in the angle tee 5 with pressure sensing valve 33.

[0030] According to Fig. 10 the external air fed in via hose 4 passes the channel 16 and the chamber 17, at for example closed seat S_1 , whereby an opening 45 in the chamber communicates the chamber 51 and 52 arranged in a lower part 18 of the interior section of the valve housing 13 and connects to the feeding hose 6 for breathing air. Naturally, the reverse passage way for

breathing air is possible, by, according to Fig. 11, internal air being connected to the angle tee 5 via shown hose 9 and regulator 12 and the air source 2b.

[0031] The pressure constituting the control pressure is 7.5 bars for the displacement of the spindle towards the path of the cam profile. This pressure is such that it easily is overcome for the displacement of the spindle in direction towards the seat S_1 . In the case that pressure reduction occurs in the chamber 17, for example at rupture of the hose 4, a reverse motion of the spindle 28 to the seat S_1 takes place not as a consequence of prevailing pressure differences in a channel 37, but readjustment by restoring of the cam knob of the carrier to position L_0 is required and recommended.

[0032] The many-sidedness of the valve unit by its technical design manifests in case of emergency. In this connection the non-return valve 15 starts to function, and does not permit intake into the valve unit of contaminated air, simultaneously as feeding air, automatically or manually, quickly is transmitted from the compressed air container 2b. This is possible as a pressure reduction sensing valve 33 is connected at the angle tee 5 on the feeding conduct. The feeding pressure 7.5 bars is catered for in this case by a regulator 12 arranged to the container 2b.

[0033] The present valve unit has been manufactured and has been tested under different conditions, and aims to constitute an industrial product to form an integral part of modern protective clothings and in that respect at least to stand up to the requirements of reliability that is claimed, when protective work is concerned.

[0034] In severe traying situations for the carrier of the protective clothing the simplicity in the control and the accessibility of the cam knob in the middle of the chest are very important, at the same time as the knob is more protected against impacts and easy to grasp for the carrier.

[0035] Integrated details are tested with carefullness and qualified materials have been chosen, as aluminium and temperature resistant plastics for constancy at as well low temperatures as temperatures up to 90° C.

Claims

1. Valve unit, preferably for air, intended for connection to a compressed air ventilated, totally protective clothing with control devices for adjustment of different defined volumes of air flows, to pass as flushing air through the clothing, and possibility to simultaneous connection of breathing air for the carrier of the clothing, from external as well as internal air source, **characterized therein**, that a sealed, and through the clothing passing valve housing (13), comprising inlets- and control devices (4, 15, 16, 48, ---, and 12, 33, 19, 28, ---), respectively and outlet arrangements (6, 8, 10, 42, 44, 7, 11, ---), are sealingly attached on the clothing wall (1a, 1b) to a dis-

tributing cover (26) sealed and located on the internal wall side (1b) of the clothing and containing the valve housing (13) that is sealed by O-shaped rings, and that a chamber (17), lateral to the valve housing (13), receives air through therein ending transfer channel (16) from a hose coupling (15) arranged outside of the clothing, and that a displaceable spindle (28), arranged in the valve housing (13), with its end directed towards the chamber (17), in an initial stage, is bearing on an O-shaped ring-sealed (first) seat (S_1 , position L_0), and is shutting out ventilation air from communication into the clothing, and that the opposite end (29) of the spindle (28) constantly is bearing on a cam profile (20), during its displacement operations, and dependent of the adjustment of a knob (19), said cam profile (20) gives specific, distinctive positions (L_0 , L_2 , L_{30} , L_{150}/L_{100} ; according to Fig. 5), and that it by bored holes (24) in the valve housing (13), co-operating with a spring loaded positioning ball (23), hereby allows different increasing flow volumes to pass clearly exposed different wide flow passages in a valve spindle housing (25), when the spindle (28) moves from the (first) seat (S_1), and that parallel to the longitudinal direction of the valve spindle housing (25) a nozzle provided longitudinal channel (37) is bored in the valve spindle (28), and that via a nozzle A_2 an air flow volume, passing there is 2 litres per minute in a first opening position, and that the flow volume of air, in a second next following opening position will increase to 30 litres per minute, and that at a further displacement of the spindle (28), an end position is achieved, then in the valve spindle housing (25) a passage, more wide, and by O-shaped ring being sealed, is clearly exposed, creating a 5 times larger flow volume than what the other spindle position has made possible, that the flow volumes of 2 litres per minute and 30 litres per minute at their passages, respectively into the channel (37), will pass a bore (46), arranged perpendicular to and passing through the longitudinal channel (37), that the perpendicular bore, at the flow volumes mentioned, is in communication with a bore hole (50) in the valve housing (13) ending towards nozzle-shaped opening (49) arranged into the longitudinal channel (37), while on the passage of that mentioned larger flow volume, it will pass a second seat S_3 sealed by an O-shaped ring, and flows into a further channel (42), which is nozzle provided, and initially can hold a nozzle (D_1) for 150 litres per minute of ventilation air, alternatively a screwed in throttle nozzle (D_2) for 100 litres per minute, whereby the opening of the further channel (42) is ending in the distributing cover (26) from where, by two circular, wide and open distributing channels (44a, 44b), the air leaves the distributing cover (26) via each an angle tee piece, with connected ventilation hoses (11, 11), whereby the distributing channels (44a, 44b) by their orien-

tations of 180° between them create equal distribution of adjusted volumes of the ventilation flows into the free space (14) of the protective clothing.

2. Valve unit according to claim 1, **characterized therein**, that an air volume having a pressure of 7.5 bars and coming from an external air source (2a), passes the inlet opening via a connecting hose (4) and a non-return valve (15) integrated with a hose coupling and further through the transfer channel (16) into the chamber (17) and out from a chamber opening (51) and a communicating second transfer channel (52), to make possible an internal connection of breathing air in the clothing by means of the outlet device, comprising a hose (6), an angled tee piece (5) and a feeding hose (8) of a breathing mask (10), at closed, sealed position of the spindle (28) against the first seat (S₁), as well as at the mentioned chosen ventilation positions (L₂, L₃₀ and at L₁₅₀), or at an alternative throttle position (L₁₀₀). 5 10 15 20
3. Valve unit according to claim 1 or 2, **characterized therein**, that in the hose coupling (15) there exists a non-return valve being integrated therein and cooperating with the connecting transfer channel (16) and the chamber (17), when pressure reduction appears in the chamber (17), at open first seat (S₁). 25
4. Application of valve unit and its means of connection according to any or some of the previous claims **characterized therein**, that in emergency/escape situations for the carrier of the clothing, of type hose rupture on external hose (4), the non-return valve integrated in the hose coupling (15) prevents penetration of contaminated air through the transfer channel (16) and the chamber (17), simultaneously as pressure reduction appears in the chamber (17), and thereby also in the longitudinal channel (37) of the spindle (28) at open first seat (S₁), resulting in the fact that a throttling of ventilation air takes place, and makes it possible for the carrier of the clothing by himself, by means of the manoeuvring of the cam knob (19), to achieve a final sealing of ventilation air in that the spindle (28) then is moving back to the first seat (S₁), whereby internal air from a compressed air container (2b) automatically, or manually, as breathing air quickly can be connected in by way of known pressure sensing valve (33) and pressure controlling valve (12) and through the angle tee piece (5), connected to the outgoing interior hose (6) and associated hose coupling, attached to the valve housing part (18), whereby passage of breathing air takes place by means of the feeding hose (8) to the breathing mask/breathing valve (10) of the carrier. 30 35 40 45 50 55

Patentansprüche

1. Ventileinheit, vorzugsweise für Luft, die dazu bestimmt ist, verbunden zu werden mit einer mit Pressluft belüfteten Integral-Schutzkleidung mit Steuergeräten zur Regulierung unterschiedlicher definierter Volumina von Luftströmen, zur Passage als Spülluft durch die Kleidung, und Möglichkeit zur gleichzeitigen Verbindung von Atemluft für den Träger der Kleidung, sowohl aus externer als auch aus interner Luftquelle, **dadurch gekennzeichnet, dass** ein verschlossenes und die Kleidung durchquerendes Ventilgehäuse (13), welches Eintrittsöffnungen und Steuergeräte (4, 15, 16, 48, -- , und 12, 33, 19, 28, ---) beziehungsweise und Auslass-Anordnungen (6, 8, 10, 42, 44, 7, 11, ---) umfasst, die auf der Kleidungswand (1a, 1b) mit einer verschlossenen und an der inneren Wandseite (1 b) der Kleidung angeordneten verteilenden Abdeckung (26) verschließend befestigt sind und das Ventilgehäuse (13), das durch O-förmige Ringe verschlossen ist, umfassen und, dass eine Kammer (17), die sich seitlich des Ventilgehäuses (13) befindet, durch einen darin endenden Transferkanal (16) Luft von einer Schlauchkopplung (15) erhält, die außerhalb der Kleidung angeordnet ist und, dass eine verstellbare Spindel (28), die mit ihrem Ende in Richtung der Kammer (17) im Ventilgehäuse (13) angeordnet ist, in einem Anfangsstadium, einen durch einen O-förmigen Ring verschlossenen (ersten) Sitz (S₁, Position L₀) aufweist, und Belüftungsluft von der Verbindung in die Kleidung ausschließt und das entgegengesetzte Ende (29) der Spindel (28) konstant auf einem Nockenprofil (20) trägt, während des Betriebs ihrer Verstellungen, und abhängig von der Regulierung eines Griffknopfs (19), dieses Nockenprofil (20) spezifische, eindeutige Positionen (L₀, L₂, L₃₀, L₁₅₀/L₁₀₀; nach Fig. 5) hergibt und, dass es durch Bohrlöcher (24) im Ventilgehäuse (13) im gemeinsamen Betrieb mit einer gefederten Positionierkugel (23), hierdurch eine Passage von unterschiedlichen zunehmenden Strömungsvolumina durch deutlich unverdeckte unterschiedlich breite Durchflusspassagen in einem Spindelgehäuse (25) ermöglicht, wenn die Spindel (28) aus dem (ersten) Sitz (S₁) bewegt wird und, dass parallel zur Längsrichtung des Ventilspindelgehäuses (25) ein mit einer Düse versehener Längskanal (37) in die Ventilspindel (28) gebohrt ist und, dass ein durch die Düse A2 dort durch fließendes Luftstromvolumen 2 Litern pro Minute in einer ersten offenen Position entspricht und, dass das Strömungsvolumen der Luft in einer zweiten als nächstes folgenden offenen Position auf 30 Liter pro Minute gesteigert wird und, dass durch ein weiteres Verstellen der Spindel (28) eine Endposition erreicht wird, und dann im Ventilspindelgehäuse (25) eine breitere durch einen O-

förmigen Ring verschlossene Passage deutlich unverdeckt ist, was in Bezug auf das durch die andere Spindelposition ermöglichte Strömungsvolumen ein um das fünffache gesteigertes Strömungsvolumen erzeugt, dass die Strömungsvolumina von 2 Litern pro Minute und 30 Litern pro Minute bei deren Passagen, beziehungsweise in den Kanal (37) eine Bohrung (46) passieren, die senkrecht zum Längskanal (37) angeordnet ist und diesen durchquert, dass die senkrechte Bohrung bei den genannten Strömungsvolumina, verbunden ist mit einem Bohrloch (50) im Ventilgehäuse (13), das zur düsenförmigen Öffnung (49), die im Längskanal (37) angeordnet ist, hin endet, während bei der Passage des genannten größeren Strömungsvolumens, es einen zweiten Sitz S3 durchquert, welcher durch einen O-förmigen Ring verschlossen ist, und in einen weiteren Kanal (42) strömt, der mit einer Düse versehen ist, und am Anfang eine Düse (D1) für 150 Liter Belüftungsluft pro Minute halten kann, die wahlweise eine eingeschraubte Drosseldüse (D2) für 100 Liter pro Minute enthält, womit die Öffnung des zusätzlichen Kanals (42) in der verteilenden Abdeckung (26) endet, von wo, durch zwei runde, breite und offene Verteilungskanäle (44a, 44b) die Luft aus der verteilenden Abdeckung (26) jeweils durch ein Teil mit einem T-förmigen Winkel austritt, mit verbundenen Belüftungsschläuchen (11, 11'), womit die Verteilungskanäle (44a, 44b) durch ihre Ausrichtung von 180° in Bezug aufeinander eine gleichmäßige Verteilung der regulierten Volumina der Belüftungsströme in den freien Raum (14) der Schutzkleidung erzeugen.

2. Ventileinheit nach Anspruch 1, **dadurch gekennzeichnet, dass** ein Luftvolumen mit einem Druck von 7.5 bar und aus einer externen Luftquelle (2a), die Eintrittsöffnung passiert durch einen Verbindungsschlauch (4) und ein Rückschlagventil (15), eingebaut mit einer Schlauchkopplung und weiter durch den Transferkanal (16) in die Kammer (17) und austretend aus einer Kammeröffnung (51) und einem verbundenen zweiten Transferkanal (52), um eine interne Verbindung von Atemluft in die Kleidung zu ermöglichen durch ein Auslassgerät, das einen Schlauch (6), ein Teil mit T-förmigem Winkel (5) und einen Füllschlauch (8) einer Atemmaske (10), umfasst, bei geschlossener, verschlossener Position der Spindel (28) gegen den ersten Sitz (S1) sowie bei den genannten gewählten Belüftungspositionen (L2, L30 und bei L150), oder bei einer alternativen Drosselposition (L100).
3. Ventileinheit nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Schlauchkopplung (15) ein Rückschlagventil umfasst, das darin eingebaut ist und gemeinsam mit dem verbindenden Transfer-

kanal (16) und der Kammer (17) betrieben wird, wenn eine Verringerung des Druckes in der Kammer (17) auftritt, bei geöffnetem erstem Sitz (S1).

4. Ventileinheitsanwendung und ihr Verbindungsmittel nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** bei Not- oder Fluchtsituationen für den Träger der Kleidung, der Art eines Schlauchbruchs auf dem externen Schlauch (4), das in die Schlauchkopplung (15) eingebaute Rückschlagventil das Eindringen von kontaminierter Luft durch den Transferkanal (16) und die Kammer (17) verhindert, gleichzeitig mit dem Auftreten der Verringerung des Drucks in der Kammer (17), und infolgedessen auch im Längskanal (37) der Spindel (28) bei geöffnetem erstem Sitz (S1), mit dem Ergebnis, dass eine Drosselung der Belüftungsluft stattfindet, und es dem Träger der Kleidung selbst ermöglicht, durch Betätigung des Nocken-Griffknopfs (19), ein endgültiges Ausschließen der Belüftungsluft zu erreichen, bei dem die Spindel (28) dann in den ersten Sitz (S1) zurückbewegt wird, wodurch innere Luft aus einem Pressluftbehälter (2b) automatisch, oder manuell, als Atemluft schnell in Verbindung gebracht werden kann durch ein bekanntes Druckmessventil (33) und Druckregulierungsventil (12) und durch das Teil mit T-förmigem Winkel (5), verbunden mit dem nach außen führenden inneren Schlauch (6) und der dazu gehörenden Schlauchkopplung, befestigt an dem Ventilgehäuseteil (18), wodurch die Passage der Atemluft stattfindet mittels des Füllschlauchs (8) zur Atemmaske/zum Atemventil (10) des Trägers.

Revendications

1. Unité de vanne, de préférence pour de l'air, destinée à être raccordée à une combinaison de protection intégrale ventilée par de l'air comprimé, avec des dispositifs de commande pour le réglage de différents volumes définis d'amenée d'air, lesquels passent dans la combinaison comme air de rinçage, et ménageant une possibilité de raccordement simultané d'air respiratoire à l'usage du porteur de la combinaison, à partir d'une source d'air interne ou externe, **caractérisée en ce qu'un** corps de vanne (13), scellé et traversant la combinaison, comprenant des dispositifs d'entrée et de commande (4, 15, 16, 48 --- et 12, 33, 19, 28, ---) respectivement et des dispositifs de sortie (6, 8, 10, 42, 44, 7, 11 ---), lesquels sont fixés, de manière étanche sur la paroi de la combinaison (1a, 1b), à un couvercle de distribution (26) scellé et placé sur le côté intérieur de paroi (1b) de la combinaison et contenant le corps de vanne (13), étanché par des joints toriques, et **en ce qu'une** chambre (17), disposée la-

téralement par rapport au corps de vanne (13), reçoit de l'air via un canal de transfert (16) qui y aboutit, à partir d'un raccord de flexible (15) disposé à l'extérieur de la combinaison, et **en ce qu'un** pointeau mobile (28), placé dans le corps de vanne (13), et dont l'extrémité est dirigée vers la chambre (17), dans un premier stade, s'appuie sur un (premier) siège (S_1 , position L_0) étanché par un joint torique et isole l'air de ventilation de la communication vers l'intérieur de la combinaison, et **en ce que** l'extrémité opposée (29) du pointeau (28) porte en permanence sur un profil de came (20) pendant ses mouvements de déplacement, et selon le réglage d'un bouton (19), ledit profil de came (20) donne des positions spécifiques, distinctives (L_0 , L_2 , L_{30} , L_{150} / L_{100} , voir la Fig. 5), et qu'il permette par des trous (24) forés dans le corps de vanne (13), qui coopèrent avec une bille de positionnement (23) chargée par un ressort, à différents débits croissants de passer dans des passages de flux de largeur différente et totalement dégagés dans un logement (25) du pointeau de vanne, lorsque le pointeau (28) se déplace à partir du (premier) siège (S_1), et que, parallèlement à la direction longitudinale du logement (25) de pointeau de vanne, un canal longitudinal (37) pourvu d'un ajutage est foré dans le pointeau de vanne (28), et que via un ajutage A_2 , un volume d'afflux d'air qui y passe est de 2 litres par minute dans une première position d'ouverture, et que le volume d'afflux d'air, dans une deuxième position suivante d'ouverture, passe à 30 litres par minute, et qu'un autre déplacement du pointeau (28) aboutit à une position finale, alors que dans le logement (25) de pointeau de vanne est totalement dégagé un passage plus large et étanché par un joint torique, ce qui crée un débit volumique 5 fois plus grand que ne le permettait l'autre position du pointeau, que les débits volumiques de 2 litres par minute et de 30 litres par minute lors de leur passage, respectivement dans le canal (37), passent dans un alésage (46) disposé perpendiculairement à et traversant le canal longitudinal (37), que l'alésage perpendiculaire, aux débits volumiques mentionnés, est en communication avec un trou foré (50) dans le corps de vanne (13) et se terminant vers l'ouverture en forme d'ajutage (49) ménagée dans le canal longitudinal (37), alors qu'au passage de ce plus grand débit volumique mentionné, il franchira un deuxième siège S_3 étanché par un joint torique, pour s'écouler dans un autre canal (42) muni d'un ajutage et qui peut initialement comporter un ajutage (D_1) débitant 150 litres par minute d'air de ventilation, ou encore un ajutage à papillon (D_2) capable de débiter 100 litres par minute, l'ouverture de l'autre canal (42) se terminant dans le couvercle de distribution (26) d'où, via deux canaux circulaires larges et ouverts (44a, 44b), l'air quitte le couvercle de distribution (26) par, à chaque fois, une pièce en

T, avec des flexibles de ventilation connectés (11, 11'), les canaux de distribution (44a, 44b) créant, par leur orientation de 180° entre eux, une distribution égale de volumes ajustés des débits de ventilation dans l'espace libre (14) de la combinaison de protection.

2. Unité de vanne selon la revendication 1, **caractérisée en ce qu'un** volume d'air présentant une pression de 7,5 bars et provenant d'une source externe d'air (2a) traverse l'ouverture d'entrée via un flexible de connexion (4) et un clapet antiretour (15) intégré à un raccord de flexible et traverse ensuite le canal de transfert (16) pour aboutir dans la chambre (17) et sort par une ouverture (51) de la chambre et un deuxième canal de transfert communicant (52), de manière à permettre une connexion interne de l'air respiratoire dans la combinaison au moyen du dispositif de sortie, comprenant un flexible (6), une pièce en T (5) et un flexible d'alimentation (8) pour un masque respiratoire (10), à une position fermée, étanche du pointeau (28) contre le premier siège (S_1), ainsi que dans les positions choisies mentionnées de ventilation (L_2 , L_{30} et en L_{150}) ou à une position alternative du papillon (L_{100}).
3. Unité de vanne selon la revendication 1 ou 2, **caractérisée en ce que**, dans le flexible de raccordement (15), il existe un clapet antiretour intégré à celui-ci et coopérant avec le canal de transfert de raccordement (16) et la chambre (17), lorsqu'il se produit une baisse de pression dans la chambre (17), au premier siège (S_1) ouvert.
4. Application de l'unité de vanne et de ses moyens de connexion selon l'une quelconque des revendications précédentes, **caractérisée en ce que**, dans une situation d'urgence ou de fuite pour le porteur de la combinaison, du type d'une rupture de flexible sur le flexible externe (4), le clapet antiretour intégré au raccord de flexible (15) empêche la pénétration d'air contaminé via le canal de transfert (16) et la chambre (17), simultanément avec une baisse de pression qui se produit dans la chambre (17), et de cette manière aussi dans le canal longitudinal (37) du pointeau (28) au premier siège ouvert (S_1), ce qui a pour résultat le fait qu'il se produit une restriction de l'air de ventilation, ce qui permet au porteur de réaliser lui-même, en manoeuvrant le bouton de came (19), un isolement définitif de l'air de ventilation du fait que le pointeau (28) est alors retourné au premier siège (S_1), où de l'air interne provenant d'un réservoir d'air comprimé (2b) peut être rapidement connecté, automatiquement, ou manuellement, en tant qu'air respiratoire au moyen d'une vanne manométrique (33) et d'une vanne manostatique (12), et via la pièce en T (5), reliée au flexible intérieur sortant (6) et le raccord

de flexible associé, relié à la partie du corps de vanne (18), et il s'ensuit un passage d'air respiratoire au moyen du flexible d'alimentation (8) vers le masque respiratoire/vanne de respiration (10) du porteur.

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Fig.1

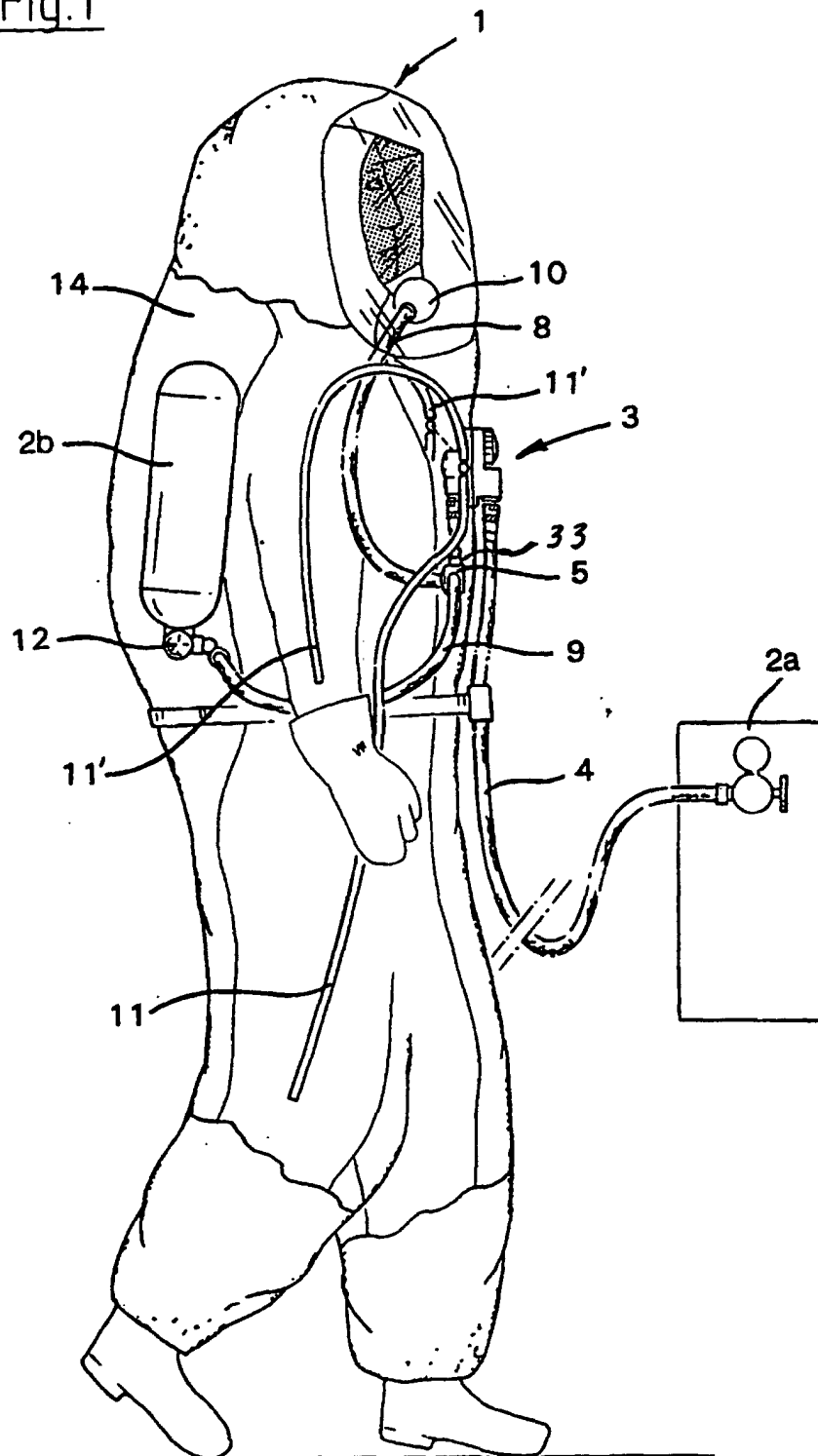


Fig.2

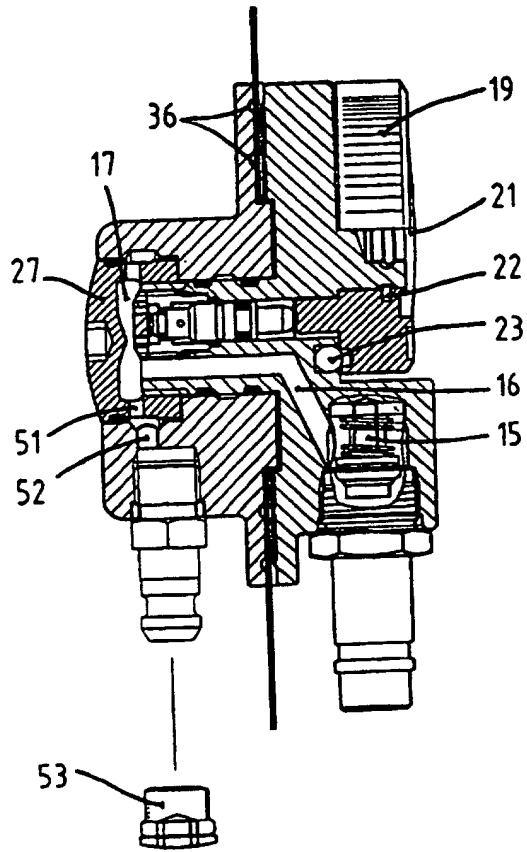


Fig.3

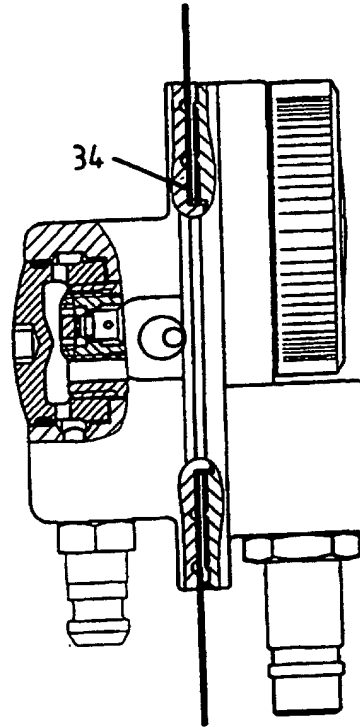


Fig.4

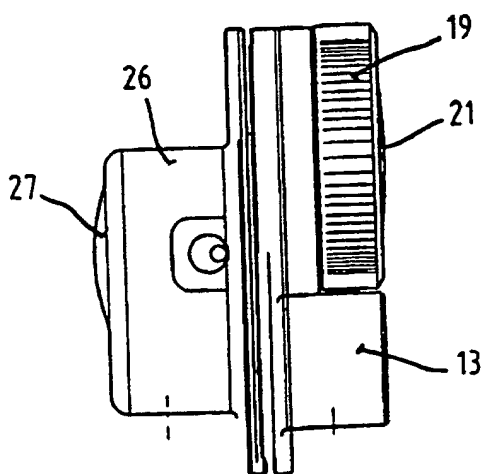


Fig.4a

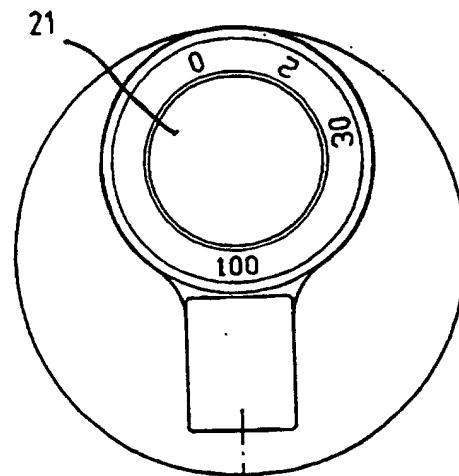


Fig.4b

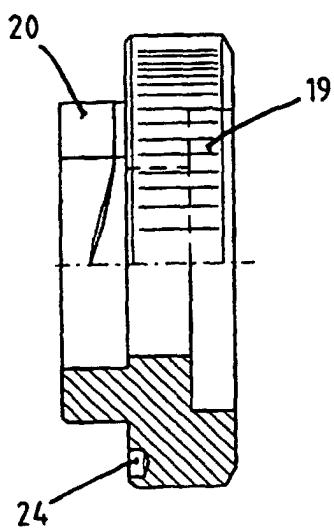


Fig.4c

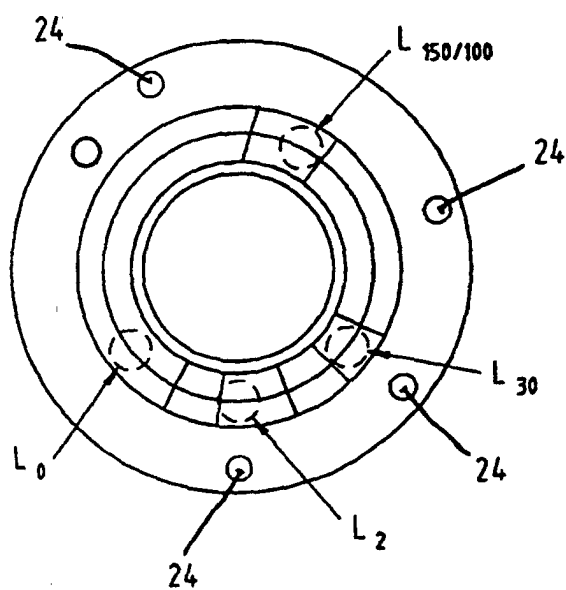


Fig.5

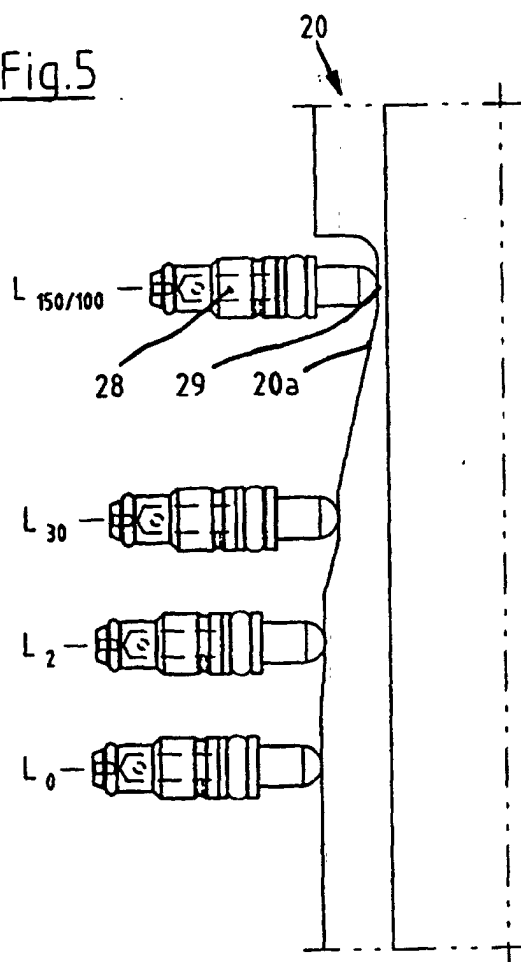


Fig.6

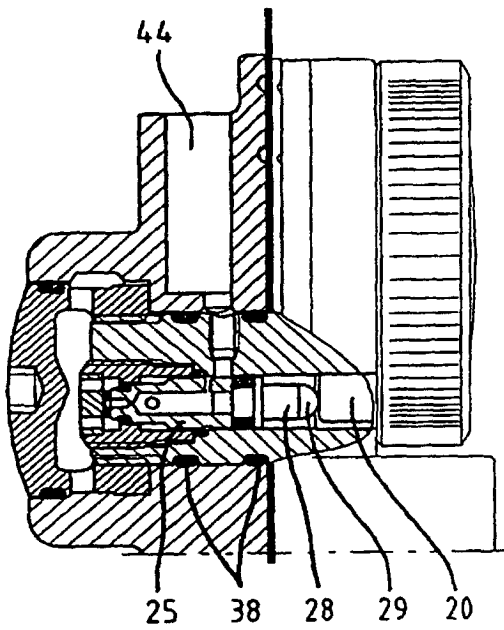


Fig.7

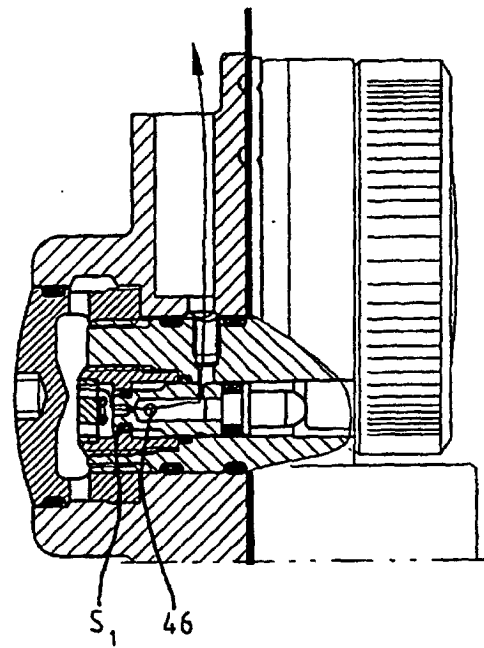


Fig.8

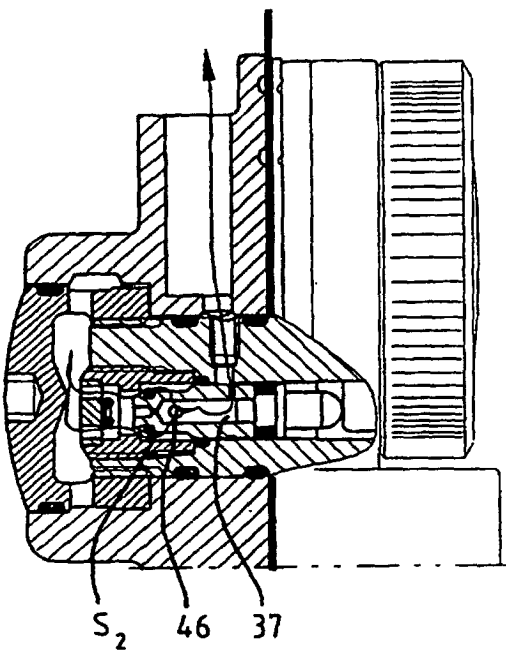


Fig.9

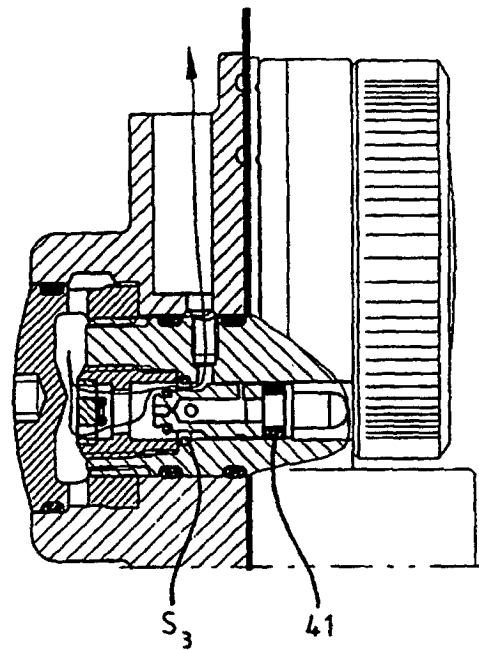


Fig.6a

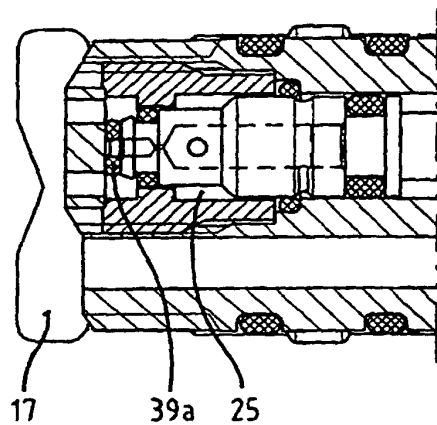


Fig.7a

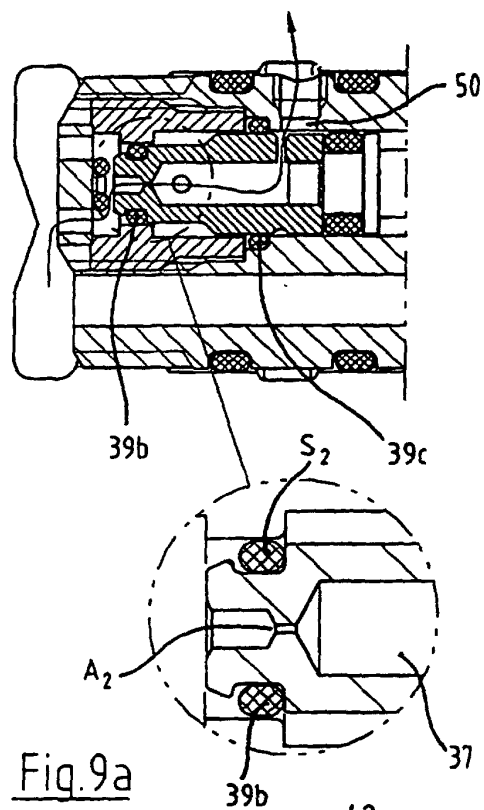


Fig.8a

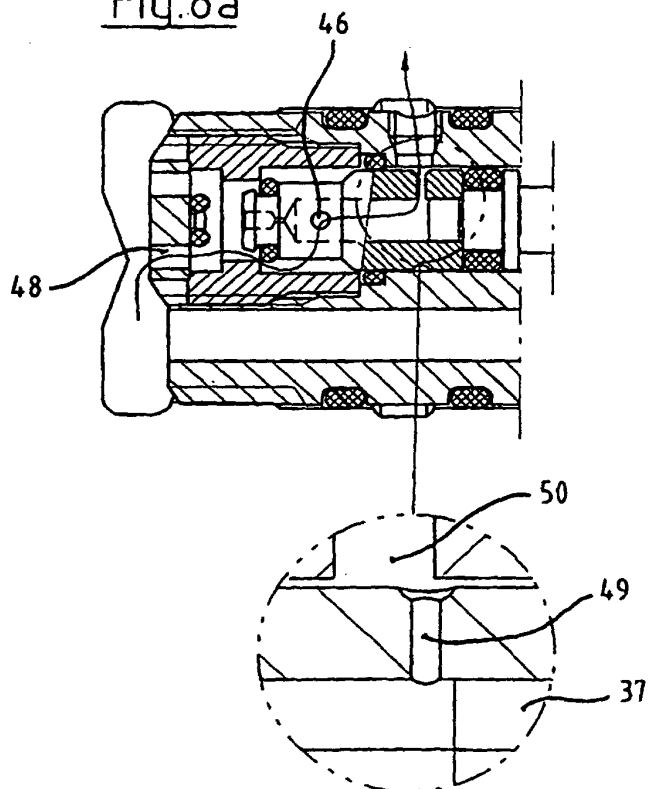


Fig.9a

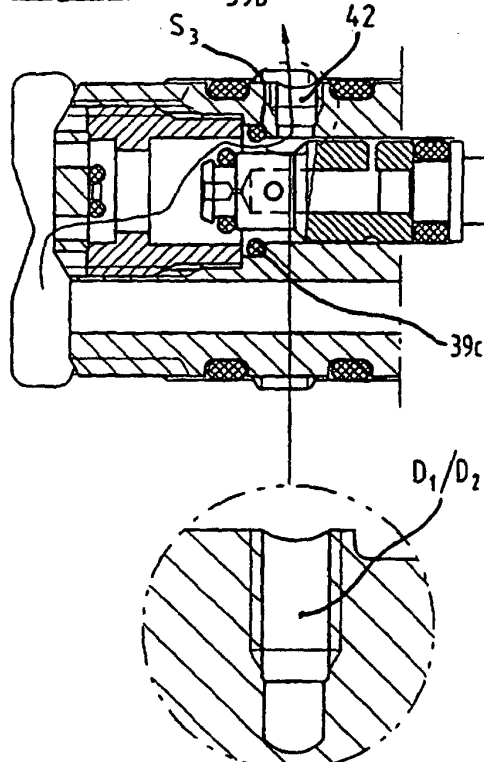


Fig.10

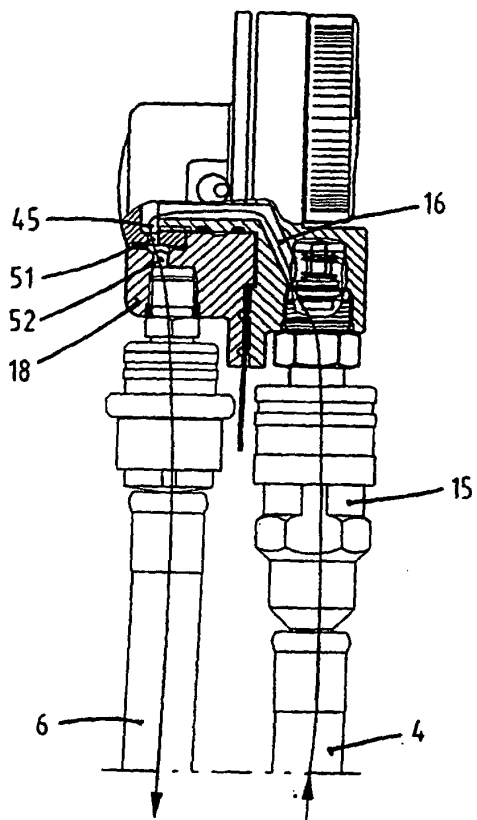


Fig.11

