(12) PATENT
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. AU 199663728 B2
(10) Patent No. 711329

(54) Title
Breathing equipment

(51)[6] International Patent Classification(s)
A62B 018/08

(21) Application No: 199663728

(22) Application Date: 1996.06.27

(87) WIPO No: WO97/02070

(30) Priority Data

(31) Number	(32) Date	(33) Country
9502439	1995.07.05	SE

(43) Publication Date : 1997.02.05
(43) Publication Journal Date : 1997.03.27
(44) Accepted Journal Date : 1999.10.14

(71) Applicant(s)
Interspiro AB

(72) Inventor(s)
Pierre Buhlmann

(74) Agent/Attorney
WATERMARK PATENT and TRADEMARK ATTORNEYS,Locked Bag 5,HAWTHORN VIC 3122

(56) Related Art
WO 96/25982
AU 52233/93
AU 36982/93

OPI DATE 05/02/97 APPLN. ID 63728/96
AOJP DATE 27/03/97 PCT NUMBER PCT/SE96/00852

AU9663728

(51) International Patent Classification 6 : A62B 18/08 — A1

(11) International Publication Number: WO 97/02070

(43) International Publication Date: 23 January 1997 (23.01.97)

(21) International Application Number: PCT/SE96/00852

(22) International Filing Date: 27 June 1996 (27.06.96)

(30) Priority Data:
9502439-4 5 July 1995 (05.07.95) SE

~~(71) Applicant (for all designated States except US): COMASEC INTERNATIONAL S.A. [FR/FR]; 6-10, quai de Seine, F-93200 Saint-Denis (FR).~~

(72) Inventor; and
(75) Inventor/Applicant (for US only): BÜHLMANN, Pierre [SE/SE]; Hövdingevägen, S-181 62 Lidingö (SE).

(74) Agents: AXELSSON, Rolf et al.; Kransell & Wennborg AB, P.O. Box 27834, S-115 93 Stockholm (SE).

(71) INTERSPIRO AB
Box 10060
S-181 10 Lidingo
Sweden

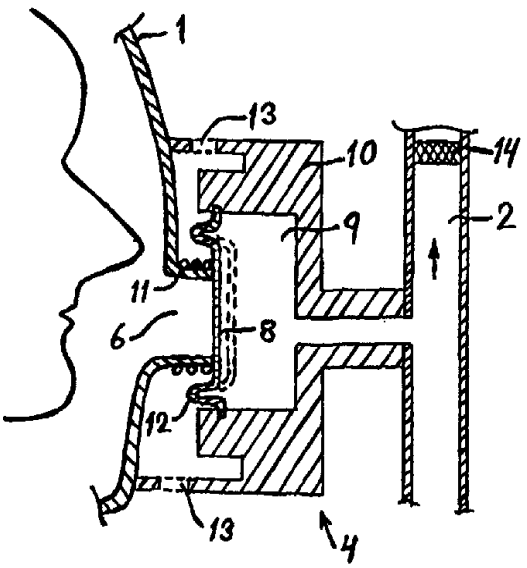
(81) Designated States: AU, CA, JP, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.
In English translation (filed in Swedish).

(54) Title: BREATHING EQUIPMENT

(57) Abstract

Breathing equipment including a breathing mask, breathing hood (1) or the like, and a conduit (2) through which breathing gas is delivered to the mask or hood. The equipment also includes a valve means (4) which is normally closed in use and which when open connects the space in the mask or hood (1) with the surrounding atmosphere so that said atmosphere can be breathed. To this end, means (8, 11) are provided for detecting when the supply of breathing gas to the mask or the hood (1) has fallen beneath a given level and therewith open the valve means. The valve means (4) is suitably a pressure-controlled arrangement which opens when the pressure in the breathing gas conduit (2) has fallen beneath a predetermined value.



A BREATHING EQUIPMENT

The present invention relates to breathing equipment of the kind which includes a breathing mask, a breathing hood or the like, and conduit means for delivering breathing gas to the mask or hood.

By mask is meant here both full face masks that are provided with a viewing visor, and so-called half masks which cover only the nose and mouth of the wearer. Masks of this kind are used together with many different types of breathing apparatus used by firemen, military personnel and industrial personnel working in toxic environments, for instance. The term breathing hood includes, among other things, so-called evacuation or escape hoods which are used temporarily when evacuating a building or a locality filled with smoke or some other gas, possibly toxic gas, for instance.

A common feature of these devices is that breathing gas is supplied to the space delimited by the mask or hood. If a fault should occur so that the supply of breathing gas ceases or becomes insufficient, for instance as a result of a mechanical fault in the equipment or because the supply of breathing gas has been exhausted, no fresh gas will be supplied to the wearer of the equipment. As a result, the carbon dioxide content of the available breathing air will build-up while the oxygen content diminishes at the same time, which can quickly lead to suffocation.

It has been proposed to provide breathing equipment of this kind with alarm means which functions to warn the wearer that the concentration of harmful substances in the breathing air is approaching a critical level. When an alarm is activated, the wearer must quickly remove the mask or hood and take himself/herself to a safe area.

Thus, this requires the wearer to be fully instructed beforehand of the measures and procedures that should be taken when an alarm is activated, for instance. It is very likely that a person wearing a so-called evacuation or escape hood will not have sufficient knowledge of recommended procedures or the presence of mind to handle such an emergency correctly. It is also possible that the wearer has been rendered unconscious or is close to unconsciousness prior to an alarm signal being given, therewith rendering the person incapable of taking any safety measures at all.

The main object of the present invention is to provide breathing equipment of the aforesaid kind which in the event of a malfunction in the breathing gas supply will automatically open a connection between the interior of the mask or hood and the surrounding atmosphere so as to enable this atmosphere to be breathed by the wearer of the mask or hood.

This object is achieved with breathing equipment of the kind which is defined in the first paragraph and which is characterized in accordance with the invention by a valve means which is normally closed in use and which when open connects the space delimitated by the mask or by the hood with the surrounding atmosphere, therewith to enable this atmosphere to be breathed, and by means for detecting when the supply of breathing gas to the mask or hood has fallen beneath a given level and for opening the valve means in accordance therewith.

When wearing breathing equipment of this kind, the wearer will always be able to breathe the surrounding atmosphere in the event of a malfunctioning of the breathing gas supply without needing to do anything himself/herself. This minimizes the risk of the wearer suffocating.

It is preferred that the valve means is a pressure-controlled valve adapted to open when the pressure in the breathing gas

conduit has fallen beneath a predetermined value. In this regard, the valve means may conveniently include a spring-biassed valve body which is pressed sealingly against a valve seat when the conduit pressure exceeds said value, but which is moved away from the seat by spring force when the pressure falls beneath said value.

This provides an automatic valve function without the need of additional control and manoeuvering means.

In one preferred embodiment of the invention, the valve body has the form of a spring-loaded valve plate which is actuated directly by the pressure of the breathing gas. The plate is disposed in a housing which is intended to be fitted over an opening in the mask or hood and which includes a chamber that communicates with the breathing gas conduit and whose one wall is comprised either completely or partially of said plate, which closes the opening when the pressure prevailing in the chamber is sufficient to this end. Passageways are provided which connect the interior of the mask or hood with the surrounding atmosphere when the plate is moved away from the opening.

Other features of the invention will be apparent from the following Claims.

The invention will now be described in more detail with reference to an exemplifying embodiment thereof and also with reference to the accompanying drawing, in which

Fig. 1 is a schematic illustration of a so-called escape hood supplemented with an inventive arrangement; and

Fig. 2 illustrates schematically an exemplifying embodiment of the inventive arrangement.

Fig. 1 illustrates a so-called escape hood 1 which is connected to a breathing gas container (not shown) by means of a conduit 2. A hood of this kind can be used temporarily, for instance, to protect against smoke and gases in an emergency, for instance in the case of fire, gas leakages from gas pipes, or in toxic gas environments created by chemicals.

As breathing gas flows through the conduit, a throttle means 14 in the conduit 2 generates an overpressure therein. In the case of the illustrated embodiment, a valve means 4 is connected so as to be actuated by the gas pressure in the conduit 2.

When the system functions normally, the wearer breathes gas flowing from the conduit 2 into the hood 1 via an inlet 3. Exhalation air leaves the hood 1 through an exhalation valve 5 or simply as a result of leakage locations between the hood and the wearer's neck.

When all of the gas carried in the container connected to the conduit 2 has been consumed or when the gas supply falls off for some other reason, the situation is sensed by the valve means 4 which therewith opens a connection between an opening 6 in the hood 1 and the surrounding atmosphere, via at least one combined outlet and inlet 7.

Thus, the wearer is able to breathe the surrounding atmosphere when the supply of breathing gas ceases or has fallen to beneath a given value. This is a better alternative than breathing the exhalation air under any circumstance. Inhalation of exhalation air would quickly result in suffocation. The danger of the surrounding atmosphere being immediately fatal is very small in many cases.

Fig. 2 illustrates an embodiment of an inventive valve means in more detail, wherein those components that find correspon-

dence in Fig. 1 have been identified by the same reference signs.

Reference numeral 1 thus identifies part of the wall of a hood shown in Fig. 1. The wall has provided therein an opening 6 which is held closed by a valve plate 8 in normal use conditions. The plate 8 forms one wall of a chamber 9 in a housing 10 mounted on the hood 1. The chamber 9 communicates with the breathing gas supply conduit 2, so that the pressure in the conduit 2 will act directly on the plate 8 and a diaphragm 12. When gas flows to the wearer, the pressure in the conduit 2 may correspond to an overpressure of about 0.1-0.2 bar for instance, which is sufficient to hold the valve plate 8 in sealing abutment with the defining edges of the opening 6. If the pressure in the conduit 2 falls beneath a predetermined value, the valve plate 8 will be moved away from the edges of the opening 6 in response to the force exerted by a pressure spring 11 mounted around the opening. This movement of the plate 8 is enabled by a flexible diaphragm 12 of the so-called roll diaphragm type fitted to the housing 10.

When the plate 8 is in an open position, shown in broken lines, the interior of the hood 1 communicates with the surrounding atmosphere through openings 13 in the housing 10, these openings corresponding to the outlet and inlet 7 shown in Fig. 1. The wearer is then able to breath the surrounding atmosphere freely. If desired, the openings 13 may, of course, be provided with suitable filter means.

The valve means can be constructed to open at a desired pressure level in the conduit 2, by appropriate choice of the area of the valve plate 8 and the force of the spring 11.

In addition to finding use in a breathing hood 1, the inventive arrangement can also be used in a full face mask or a so-called half mask. The illustrated and described

embodiment has been chosen merely to describe the principle of the invention in a simple manner. The design and attachment of the arrangement can be varied as desired within the scope of the Claims. For instance, the conduit 2 can be connected to the chamber 9 so that all breathing gas will pass through the chamber before being delivered to the hood or mask. The design of the valve means can also be varied in several respects while maintaining its function of controlling the supply of breathing gas, such that the valve will automatically open the connection between the interior of the hood or the mask and the surrounding atmosphere when necessary, without requiring the wearer to perform any action in this regard, which is a central characteristic feature of the inventive arrangement.

In addition to being placed on the outside of a breathing hood or mask, the inventive valve means may alternatively be mounted on the inside of the hood or mask and comprise an inwardly opening valve body. The pressure spring may, of course, be replaced with a pull spring when wishing to place the spring on the other side of the plate 8, for instance. In addition to sensing the pressure in the conduit 2, it is also possible to use means which sense the flow of breathing gas and to initiate automatic opening of the valve means when the rate of flow is low or non-existent.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Breathing equipment including a breathing mask, breathing hood or the like, and a conduit for supplying breathing gas to the mask or hood, characterised by a valve means which is normally closed in use and which when open connects the interior space of the mask or hood with the surrounding atmosphere to enable said atmosphere to be breathed; and by means for detecting when the supply of breathing gas to the mask or hood has fallen beneath a given level and to open said valve means as a result of detection of such a condition.

2. Breathing equipment according to claim 1, wherein the valve means is pressure controlled and constructed to open when the pressure in the breathing gas conduit has fallen beneath a predetermined value.

3. Breathing equipment according to claim 2, wherein the valve means includes a spring-loaded valve body which is pressed into sealing abutment with a valve seat when the pressure in the breathing gas conduit exceeds said value, but which is moved away from the valve seat by the force of said spring when the pressure falls beneath said value.

4. Breathing equipment according to claim 3, wherein the valve body has the form of a spring-loaded valve plate which is actuated by the pressure of the breathing gas.

5. Breathing equipment according to claim 4, wherein the valve plate is housed in a housing intended to be fitted over an opening in the mask or hood; in that the housing includes a chamber which communicates with the breathing gas conduit and one wall of which is formed completely or partially by said plate; in that the plate functions to close the opening when the pressure prevailing in the chamber is sufficient to overcome the spring-load on the plate; and in that passageways are provided for connecting the interior space of the mask or hood

with the surrounding atmosphere when the plate is moved away from the opening.

6. Breathing equipment according to claim 5, wherein the flow of breathing gas is caused to pass through the chamber before being delivered to the mask or the hood.

7. Breathing equipment according to claim 5 or claim 6, wherein the plate is sealingly mounted in the housing with the aid of a flexible diaphragm.

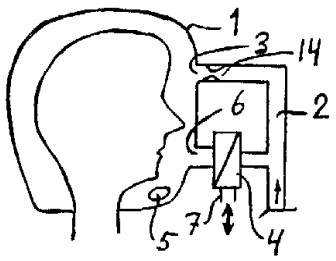
8. Breathing equipment according to any of the claims 1 to 7, characterised by filter means provided in the passageways between the valve means and the surrounding atmosphere.

DATED this 7th day of July, 1999.

INTERSPIRO AB

WATERMARK PATENT & TRADEMARK ATTORNEYS
290 BURWOOD ROAD
HAWTHORN VICTORIA 3122
AUSTRALIA

Fig1



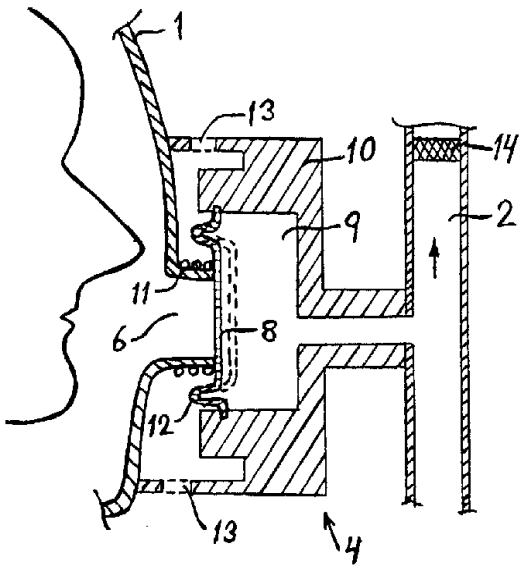


Fig2