(12) PATENT APPLICATION **(11)** Application No. **AU 199916393 A1**
(19) AUSTRALIAN PATENT OFFICE

(54) Title
Device for the analysis of a gaseous component in a gas stream

(51)[7] International Patent Classification(s)
G01N 033/497 **G01L 013/06**
A61B 005/08 **G01L 027/00**
A61B 005/097 **G01N 001/22**

(21) Application No: **199916393** (22) Application Date: **1999.02.10**

(30) Priority Data

(31) Number	(32) Date	(33) Country
19833991	**1998.07.29**	**DE**

(43) Publication Date : **2000.03.23**
(43) Publication Journal Date : **2000.03.23**

(71) Applicant(s)
Drager Sicherheitstechnik GmbH

(72) Inventor(s)
Burkhard Stock

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

Abstract

Device for the analysis of a gaseous component in a gas stream

A device for the analysis of a gaseous component in a gas stream, which enters into a measuring chamber (4) via a sampling line (3), comprising a flow restrictor (8) in the sampling tube (3) and a pressure sensor (9) that detects the pressure upstream of the flow restrictor (8), is to be improved so that the pressure sensor (9) can also be used to measure the ambient pressure. To meet the objective it is proposed to place a flow sensor (10), which produces a zero flow signal, into the extent of the sampling tube (3). (Figure)

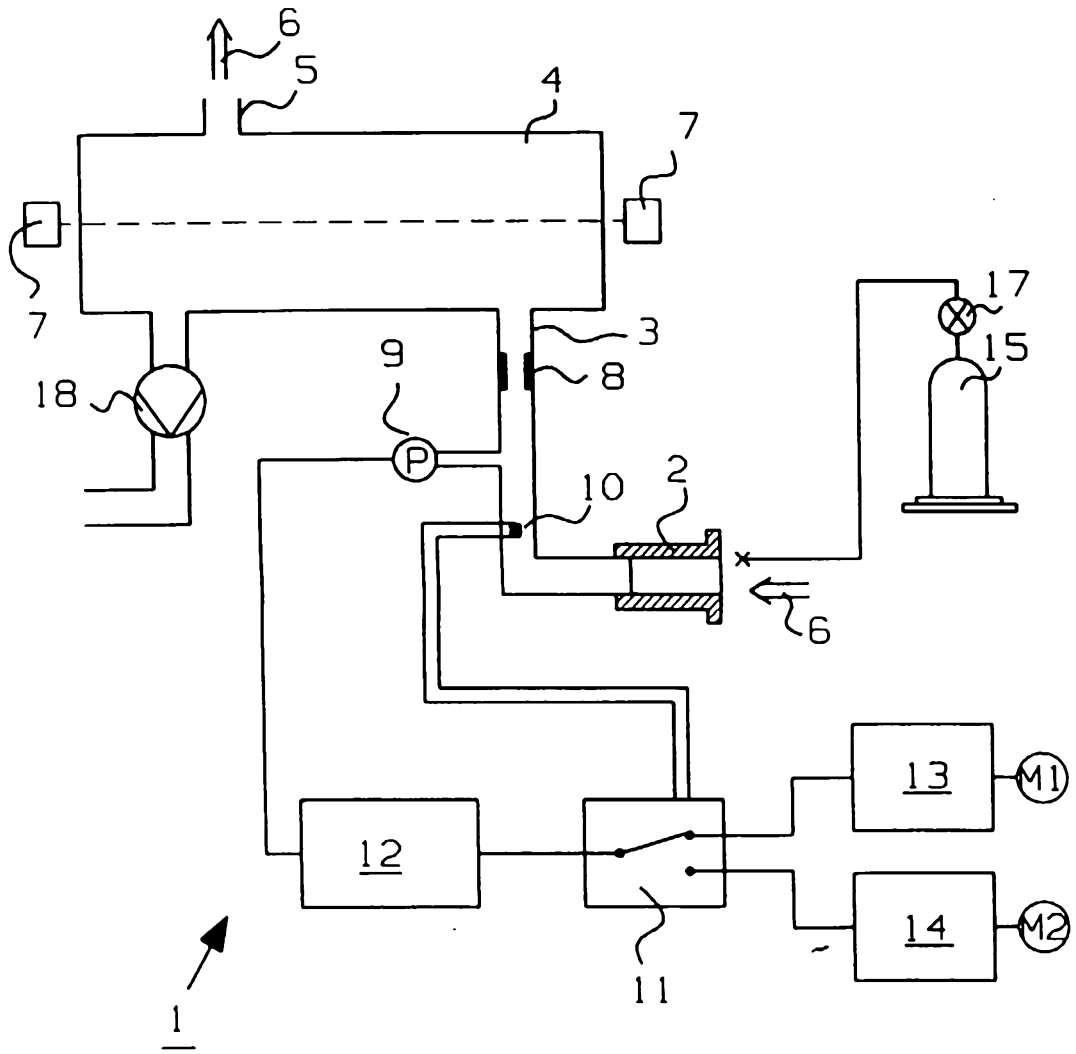

Figure 1

P/00/011 28/5/91
Regulation 3.2(2)

AUSTRALIA

Patents Act 1990

ORIGINAL
COMPLETE SPECIFICATION
STANDARD PATENT

Application Number:

Lodged:

Invention Title: DEVICE FOR THE ANALYSIS OF A GASEOUS COMPONENT IN A GAS STREAM

The following statement is a full description of this invention, including the best method of performing it known to us :-

Description

Dräger Sicherheitstechnik GmbH, Revalstraße 1,
23560 Lübeck, Germany

Device for the analysis of a gaseous component in a gas stream

The invention concerns a device with the characteristics of the preamble of claim 1, and an advantageous application of the device.

A device for the analysis of a gaseous component in air is known from DE 37 00 460 A1, which comprises a measuring chamber through which a gas is able to flow from a gas inlet to a gas outlet. The gas sample to be analysed is conducted through a sampling tube to the gas inlet of the measuring chamber. By means of a flow restrictor a pressure build-up is created in the sampling tube upstream of said flow restrictor, which is detected by a pressure sensor. The pressure signal supplied by the pressure sensor is a measure of the gas flow velocity within the sampling tube. A value that is proportional to the gas volume can be ascertained by means of integration of the pressure signal over time.

Devices are known that require a measuring value proportional to the ambient pressure for calibration purposes. Reference gases are used from gas bottles, which are fed into the measuring unit to be tested. The reference gas concentration is generally stated on the bottles in ppm or in percentage by volume and is therefore independent of pressure. The concentration value stated on the bottles and the value supplied by the measuring unit only agree at that ambient pressure, at which the measuring unit was calibrated using this reference gas. A change in ambient pressure results in a deviation, which must be corrected. A device for correcting

the ambient pressure influence has become known from US 5,400,637.

It is the object of the invention to improve a device of the kind mentioned in such a way that a sampling tube with zero flow can be recognised.

This object is achieved by means of the characteristics of claim 1.

The advantage of the invention lies essentially in the fact that the flow sensor in the sampling tube is able to recognise a zero gas flow. This means that the existing pressure sensor can not only be utilised for detecting the gas flow velocity within the sampling tube, but also for determining the absolute ambient pressure.

Advantageous embodiments of the invention are described in the sub-claims.

The flow sensor used is preferably a hot-wire anemometer. The cooling down of the hot-wire is a measure for the presence of a flow. Measuring systems other than the hot-wire anemometer may also be used, in which a flexible tongue protruding into the gas flow is deflected.

It is of particular advantage to use a changeover switching means that is actively connected with the flow sensor, in which said changeover switching means is used to make a connection to a first evaluation path if the presence of a zero flow signal is detected. Said first evaluation path provides a first pressure signal that is proportional to the ambient pressure. As soon as the flow sensor supplies a value other than zero, the changeover switching means makes a connection to the second evaluation path, which determines from the measured pressure signal a value that is proportional

to the velocity of the gas flow in the sampling tube. The changeover switching means and the evaluation paths may be implemented through discrete components or in form of software modules of a microprocessor.

The device according to the invention is particularly useful as a breathalyser, in which a calibration with a mixture of reference gases must be carried out at certain intervals.

An exemplary embodiment of the invention is depicted in the drawing and explained in detail below.

The only Figure shows a schematic representation of the measuring device 1 for ascertaining the alcohol concentration in breath. A sample supplier not shown in the Figure blows the gas sample to be analysed through a mouthpiece 2 and a sampling tube 3 into a measuring chamber 4, which has a gas outlet 5 that is open to the atmosphere. The flow direction in the sampling tube 3 and in the measuring chamber 4 is indicated by arrows 6 in the Figure. Attached to the measuring chamber 4 is an infrared measuring unit 7, which analyses the gas sample that was blown in. As a result of a flow restrictor 8 a pressure build-up occurs in sampling tube 3, which is detected by a pressure sensor 9. Located upstream of the pressure sensor 9 in the sampling tube 3 is a flow sensor 10 in form of a hot-wire anemometer, which issues a control signal in form of a zero flow signal to a changeover switch 11 if there is no flow in the sampling tube 3. The changeover switch 11 is connected via an evaluation unit 12 to the pressure sensor 9. The evaluation unit 12 transforms the detected pressure into an electrical pressure signal. Depending upon the position of the changeover switch 11, a signal flows either from the evaluation unit 12 to a first evaluation path 13, or the evaluation unit 12 is connected to a second evaluation path 14. A measuring signal M1 proportional to the ambient pressure is formed from the

pressure signal of the first evaluation path 13, whereas the second evaluation path 14 provides a second measuring signal M2 from the pressure signal, which is proportional to the gas flow in the sampling tube 3. The Figure depicts the position of the changeover switch 11 for a sampling tube 3 with zero flow, in which the evaluation unit 12 is connected to a first evaluation path 13.

The calibration of the measuring device 1 is carried out as follows. A gas bottle 15 filled with reference gas and shut off by means of valve 17 is connected via a hose 16 to mouthpiece 2. On opening of valve 17 the measuring chamber 4 is flushed with reference gas. The flow sensor 10 detects a gas flow in the sampling tube 3, and as a result the evaluation unit 12 is connected via changeover switch 11 to the second evaluation path 14. The measuring signal M2 obtained via the second evaluation path 14 is a measure that the measuring chamber 4 was flushed sufficiently with reference gas. Then the infrared measuring unit 7 determines the gas component of the reference gas that is to be analysed. After valve 17 has been shut off the flow sensor 10 detects no flow in the sampling tube 3, and as a result of the zero flow signal produced by the flow sensor 10 the changeover switch 11 is switched into the position shown in the Figure. The pressure sensor 9 can now be used to measure the ambient pressure. The pressure equalisation of the measuring chamber 4 and the sampling tube 3 to the atmosphere takes place via gas outlet 5. The measuring chamber 4 can then be flushed with ambient air using pump 18, and thus prepare it for testing of a sample supplier.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

Claims

1. Device for the analysis of a gaseous component in a gas stream, which enters into a measuring chamber (4) via a sampling tube (3), comprising a flow restrictor (8) in the sampling tube (3) and a pressure sensor (9) that detects the pressure upstream of the flow restrictor (8), characterised in that a flow sensor (10) for generating a zero flow signal is provided within the extent of the sampling tube (3).

2. Device according to claim 1, characterised in that the flow sensor takes the form of a hot-wire anemometer.

3. Device according to claim 1 or 2, characterised in that a changeover switching means (11) is provided, which is actively connected with at least the flow sensor (10), and that through changeover switching means (11) a switched connection is made to a first evaluation path (13) if a zero flow signal is present, and where in said evaluation path (13) a first measuring signal is formed from the pressure signal supplied by the pressure sensor (9) that is proportional to the ambient pressure.

4. Device according to claim 3, characterised in that a switched connection to a second evaluation path (14) is provided through the changeover switching means (11) if a flow signal other than zero is present, and where in said evaluation path (14) a second measuring signal, which is proportional to the gas flow in the sampling tube (3), is formed from the pressure signal.

5. Application of a device according to one of the claims 1 to 4 as a breathalyser.

DATED THIS 10th day of February, 1999

DRAGER SICHERHEITSTECHNIK GMBH

WATERMARK PATENT & TRADEMARK ATTORNEYS
2nd Floor, 290 Burwood Road,
HAWTHORN. VICTORIA 3122.

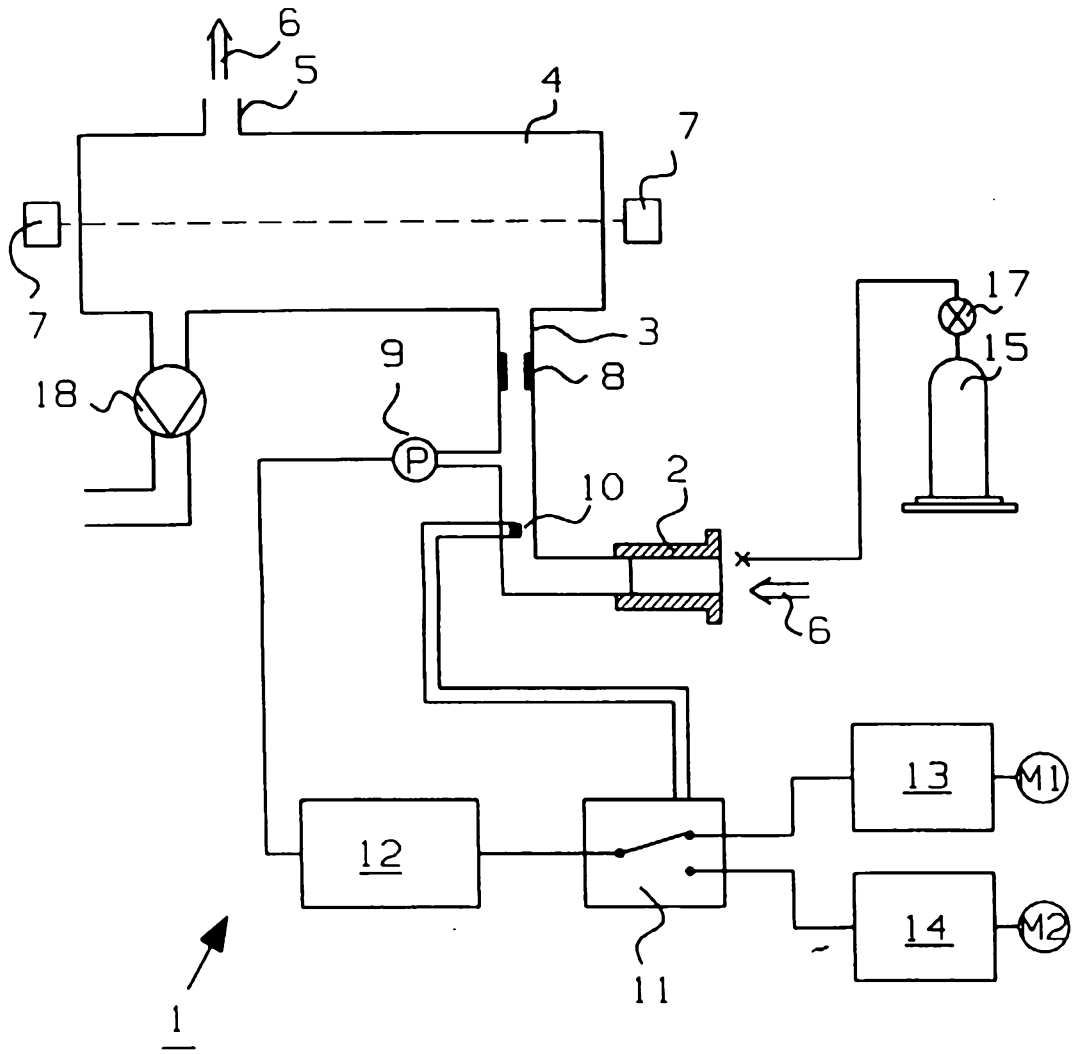

Figure 1