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(54) A leakage control mechanism for LPG cylinders

(57) The invention is related with a leakage control mechanism (1) for LPG cylinders (7). 0.2 gr/h valve and body leakages can be detected with this mechanism (1). In addition, the cylinders (7) can automatically be controlled on the line without requiring an operator.

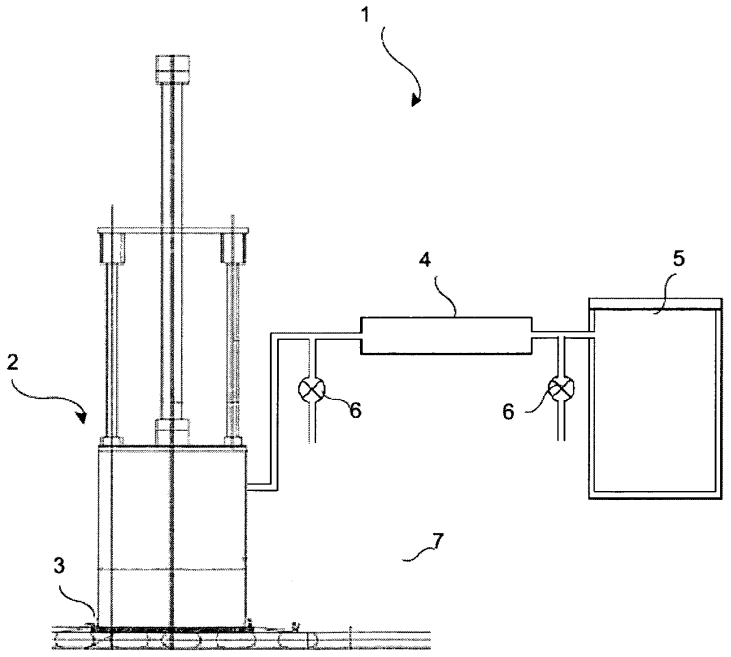

Figure1

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Description

Field of the invention

[0001] This invention is related with the mechanism which checks LPG cylinders against leakage.

Background of the invention

[0002] LPG cylinders that arrive at many filling facilities are checked regarding their conformity for filling according to various standards and nonconforming cylinders are set apart before filling. One of the most important among these cheeks is the cylinder leakage control. As LPG is a flammable and explosive material, this check is critical for fire safety. Leakage control is performed after filling, and the cylinder's body and valve is required to be checked against leakages. For the sake of operation efficiency, this control process is performed by operators and/or machinery on the filling conveyor line, while the cylinders advance.

[0003] European patent document EP0387542 mentions an LPG cylinder leakage detection system. The system takes the cylinder on the conveyor line and performs the leakage test. The system includes a sensor which sends a signal to the system and ensures discarding the cylinder from the conveyor when the system identifies a mechanical brake or leakage that stops the newly received cylinder. This system resembles to the invention with regard to taking the cylinder from the conveyor line and transferring to leakage detection section. In this system, only the valve leakages can be identified, Valve and the body of the cylinder are not checked simultaneously. Besides, the air wiped from the leakage zone in the system is taken to the combustion room and it is burnt there, and the existence of LPG in the environment is checked according to the emerging energy level.

[0004] European patent document EP0441632 mentions an apparatus which detects minor gas leakages in compressed containers. The apparatus is plugged to the neck of the pressurized container. There is an O ring on the skirt of the apparatus, which is used for preventing gas leakage from the apparatus. The section between the apparatus and the neck is a room. And the air that remains in the room may exit through the hole 48. If the container leaks, then the pressure in the room increases and this pressure is detected by the sensor. This document mentions a simple apparatus.

[0005] Japanese patent document JP2000352539 mentions a gas leakage detection system. In this system, the component to be tested is placed in the hollow section of the pressure tank and the pressure of the hollow section and the pressure of the pressure section are equated. Gas leakage from a potential hole increases the pressure of the hollow section. The pressure difference is detected by the pressure sensor. This system resembles to the invention as it includes a reference pressure compartment and a pressure sensor.

[0006] American patent document US5831147 mentions a gas leakage detection system. In this system, the test object is dropped in a test compartment. It is known that this system makes a measurement by using the pressure difference. It is required to be examined and compared by the owner of the invention. This system is not automated.

[0007] According to the practices known by those skilled in the art, the checks are performed with the machinery that employ infrared and catalytic technology and with the leakage control pool where manual check is performed. With this machinery, LPG leakages higher than 1.5 gr/h can be detected and the leakages on the cylinder body cannot be detected. Failure to detect body/welding leakages has necessitated a solution for this technical problem.

Brief Description of the Invention

[0008] The purpose of the invention is to create a leakage control mechanism for LPG cylinders which enables detecting 0.2 gr/h valve and body leakages.

[0009] Another purpose of the invention is to develop a leakage control mechanism for LGP cylinders which provides automatic control on the line without requiring the operator's intervention.

Detailed Description of the Invention

[0010] "A leakage control mechanism for LPG tubes" which has been realized to achieve this purpose is shown in the appended figures, and among these figures;

Figure 1 - Displays valve and body leakage control mechanism on an LPG cylinder

Figure 2- Elevation of impermeability surface

[0011] The pieces in the figures are numbered individually and the fellowing items are represented by the reciprocal numbers.

1. A leakage control mechanism for LPG cylinders
2. Compartment
3. Impermeability surface
4. Measuring equipment
5. Tank
6. Valve
7. Cylinder

[0012] A leakage control mechanism for LPG cylinders (7) most basically contains;

- Minimum one leak-proof compartment (2) that allows for measuring the leakage,
- In the leak-proof compartment (2), an impermeability surface (3) which can be in different shapes preferably in conical shape with double o-rings and which creates a lcak-proof environment to isolate the cylinders from the external environment and measure,
- minimum one measuring equipment (4) which measures the pressure difference that would be created by the cylinder after the leak-proof compartment (2) is closed through the movement of the filaments which are included in the sensor group that the compartment contains,
- minimum one compensation tank (5) which ensures a constant external atmospheric pressure and which prevents potential pressure changes, thus ensuring a safe measurement,
- Minimum two discharge valves (6) that open and close in order to discharge the pressure which occurs in the control mechanism,
- and the LPG cylinder (7) which is checked against leakage.

[0013] The invention is related with the leakage control of LPG cylinders with a leakage control mechanism (1) for LPG cylinders. The cylinders (7) on the conveyor line are initially taken into the leak-proof compartment (2). After the cylinder (7) is taken into leak-proof compartment (2), the leak-proof compartment (2) is lowered on the cylinder (7) and the cylinder (7) is isolated from the external environment. A fully impermeable environment is created with the impermeability surface (3). After full impermeability is obtained, the pressure changes of the compartment (2) are measurement by the measuring equipment (4), and the leaking cylinders (7) are automatically removed from the line according to the pressure differences that occur in the case of a leakage. Accordingly, if any point of the cylinder (7) leaks, then the pressure in the leak-proof compartment (2) increases. As a result, a flow occurs due to the positive pressure from the leak-proof compartment (2) to the compensation tank (5). The compensation tank (5) compensates the pressure changes in the external environment and creates an environment with a constant pressure; so the pressure changes in the leak-proof (compartment) are correctly detected by the measuring equipment (4). Measuring equipment (4) detects this flow, that is the leakage which occurs on the cylinder (7). When the identified leakage would be higher than the pre-defined value, the measuring equipment (4) sends a signal to remove the leaking cylinders from the line.

[0014] In the leak-proof compartment (2) of the invention, the cylinder (7) is required to be taken in a completely impermeable volume. The conical and double O-ring surface (3) in the leak-proof compartment (2) isolates the cylinders from the external environment. The section to be controlled is required to be isolated from the environment as fully impermeable. So, the impermeable environment desired for measuring is created. The leak-proof compartment (2) and the impermeability surface (3) play critical roles for the measurement to be realized as free of defects. When impermeability cannot be fully provided, conducting the measurement by the measuring equipment (4) shall not be possible.

[0015] In the mechanism, conical and double O-ring impermeable surface (3) is used to isolate the leak-proof compartment (2) from the external environment. They can be in different sizes, volumes and shapes.

[0016] Discharge valves (6) open during the lowering of the leak-proof compartment (2) in order to compensate the sudden pressure change which occurs during the closure of the leak-proof compartment (2) that includes a leakage control mechanism (1) for LPG cylinders. After the pressure changes are stabilized, the valves (6) are closed and the pressure change in the leak-proof compartment (2) is monitored by the pressure change measuring equipment (4). Compensation tank (5) is used to have a correct measurement. Compensation tank (5) provides a constant atmospheric pressure in the external environment and prevents potential pressure changes.

[0017] The compensation tank (5) of the invention compensates the pressure changes in the external environment and creates an environment with constant pressure. So, the pressure changes in the leak-proof compartment (2) are detected by the measurement equipment (4).

Claims

1. In order to use for leak detection of LPG cylinders (7);

- minimum one teak-proof compartment (2),
- An impermeable surface (3) in leak- proof compartment (2),
- a small measuring equipment (4) which is found between the leak-proof compartment (2) and the compensation tank (5), and connected with the valves,
- minimum one balancing tank (5) which ensures a constant external atmospheric pressure and which prevents potential pressure changes, thus ensuring a safe measurement,
- minimum two discharge valves (6) that open and close in order to discharge the pressure which occurs in the control mechanism,
- A leakage control mechanism (I) for LPG cylinders (7) **characterized in that** it contains a LPG cylinder (7) which is checked against leakage, and minimum one leak-proof compartment (2), in which the cylinder (7) is placed to measure the leakage and which isolates the cylinder (7) from the external environment.

2. A leakage control mechanism (1) for LPG cylinders (7) according to Claim 1, **characterized in that** it

contains an impermeability surface (3) which may be in different shapes, preferably in conical shape with double O-rings, and which creates complete impermeability for measurement in the leak-proof compartment (2).

3. A leakage control mechanism (1) for LPG cylinders (7) according to Claim 1 and 2 **characterized in that** it contains minimum one measurement equipment (4) which monitors the pressure changes of the leak-proof compartment (2) after full impermeability is obtained, and which emits the signals that are required for automatically separating leaking cylinders (7) from the line according to the pressure differences that occur in the case of a leakage.

4. A leakage control mechanism (1) for LPG cylinders (7) according to Claims 1 to 3 **characterized in that** it contains a compensation tank (5) which compensates the pressure changes in the external environment and creates an environment with a constant pressure; so the pressure changes in the leak-proof (compartment) are correctly detected by the measuring equipment (4).

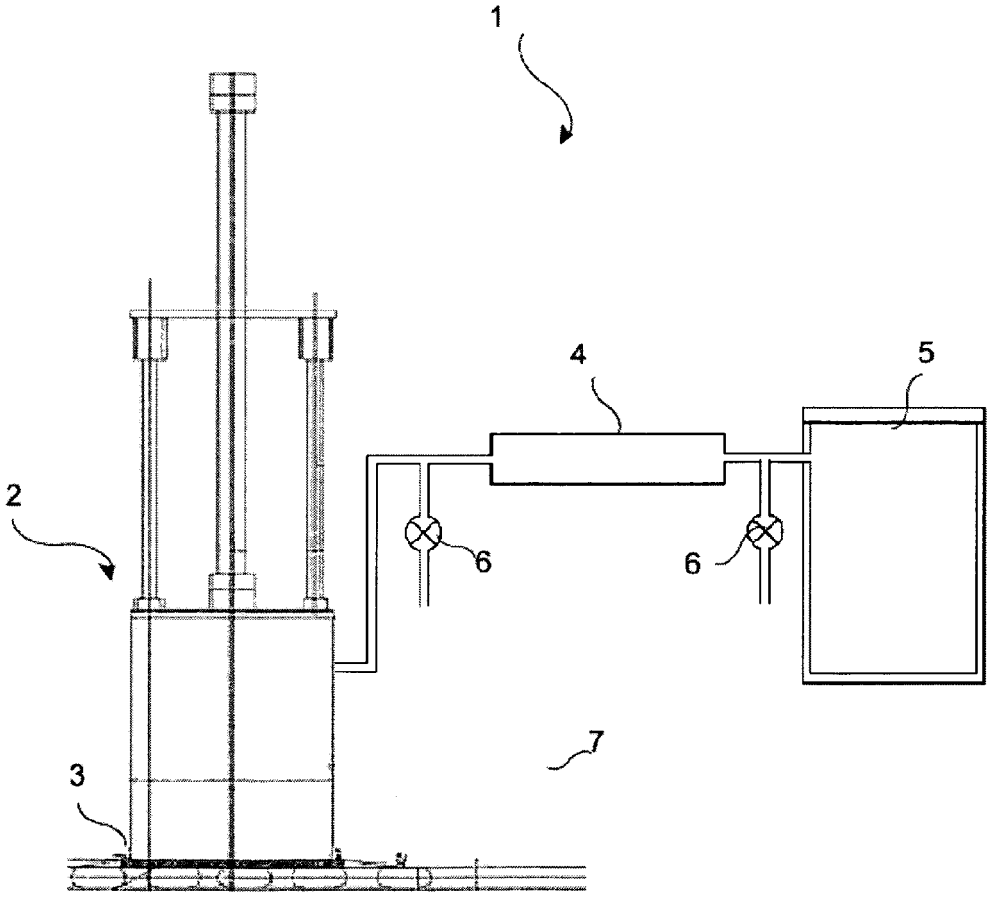

Figure1

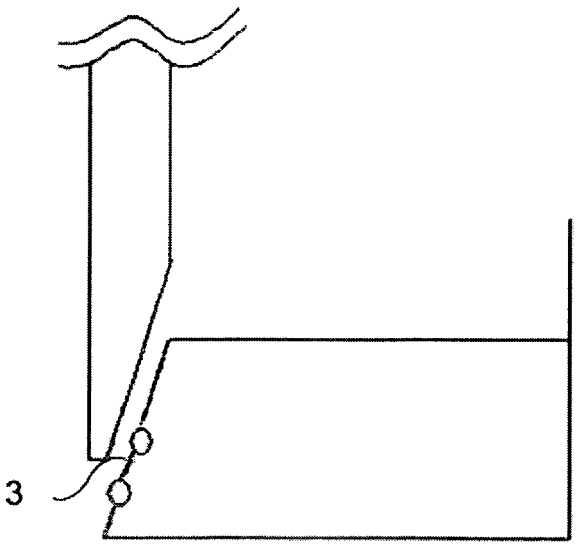

Figure2

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EUROPEAN SEARCH REPORT

Application Number
EP 09 17 8694

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC) F17C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	3 May 2010	Stängl, Gerhard

CATEGORY OF CITED DOCUMENTS

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A : technological background
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E : earlier patent document, but published on, or after the filing date
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& : member of the same patent family, corresponding document

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 17 8694

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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03-05-2010

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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- EP 0441632 A **[0004]**
- JP 2000352539 B **[0005]**
- US 5831147 A **[0006]**