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(54) DEVICE AND SYSTEM FOR MONITORING GAS LEVEL OF LIQUEFIED PETROLEUM GAS CYLINDER

(57) Provided are a device and system for monitoring a gas level of a liquefied petroleum gas cylinder. The monitoring system comprises a detection device and a level indication terminal. The detection device comprises a supporting means for supporting a liquefied petroleum gas cylinder. The supporting means is provided with a weight measurement element for measuring a weight of the liquefied petroleum gas cylinder. The weight measurement element outputs a measurement result to the level indication terminal. The monitoring system comprises the detection device capable of measuring the weight of the liquefied petroleum gas cylinder and simultaneously feeding back the measured data to the level indication terminal, such that a user can check level information conveniently, and estimate, in advance, a level of a liquefied petroleum gas in a cylinder.

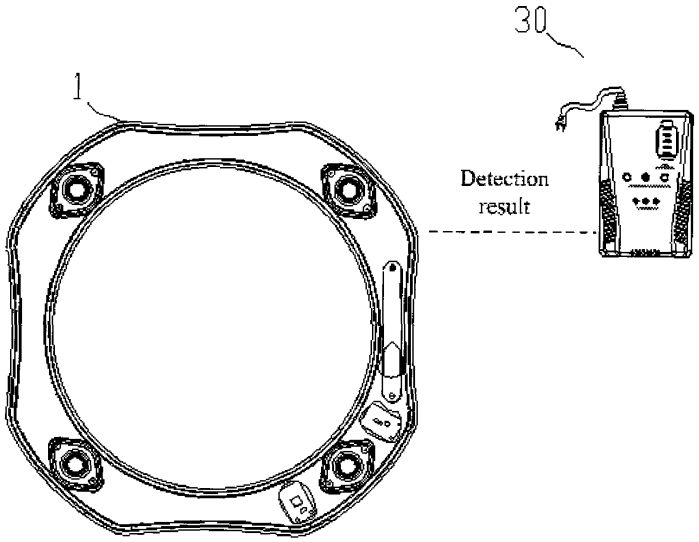

Figure 2

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Description

[0001] This application claims priorities to Chinese Patent Application No. 201621214445.0, titled "SYSTEM FOR MONITORING GAS LEVEL OF LIQUEFIED PETROLEUM GAS CYLINDER", filed with the Chinese Patent Office on November 10, 2016, and Chinese Patent Application No. 201621214541.5, titled "DEVICE FOR MONITORING GAS LEVEL OF LIQUEFIED PETROLEUM GAS CYLINDER", filed with the Chinese Patent Office on November 10, 2016, both of which are incorporated herein by reference in their entireties.

FIELD

[0002] The present disclosure relates to the field of liquefied petroleum gas devices, and in particular to a device and a system for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder.

BACKGROUND

[0003] As a clean energy source, liquefied petroleum gas is still used as an important fuel for cooking and heating in places such as residences and restaurants. Liquefied petroleum gas is generally carried in a special steel cylinder. Since the cylinder is made of non-transparent material, it is impossible to directly observe the remaining gas volume in the cylinder. The user only knows that the liquefied petroleum gas has been used up when it cannot be ignited on the cooker, and cannot know the gas volume in advance, which affects the user experience.

[0004] In view of this, a technical problem to be solved by those skilled in the art is to inform the user of a volume of remaining liquefied petroleum gas in the cylinder.

SUMMARY

[0005] To solve the above problem, a system for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder is provided according to the present disclosure, which can inform the user of a volume of remaining liquefied petroleum gas in the cylinder.

[0006] A device for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder is provided according to the present disclosure, which includes: an annular body having a central hole, where a base of the liquefied petroleum gas cylinder is inserted into the central hole and is supported on the annular body, and the annular body is provided with a weight detection element.

[0007] Optionally, an outer circumference of the annular body may be provided with a recess portion.

[0008] Optionally, the annular body may include an upper cover and a lower cover, which are connected with each other to form a closed cavity, and the weight detection element may be arranged in the closed cavity.

[0009] Optionally, the weight detection element may include a weighing data acquisition board and a data transmission board.

[0010] Optionally, a battery compartment may be provided in the closed cavity, and a battery that supplies power to the weight detection element may be arranged in the battery compartment.

[0011] Optionally, the upper cover may be connected with the lower cover by screwing or buckling to form the closed cavity.

[0012] Optionally, an inner circumference of the annular body may be provided with an annular supporting bevel, for fitting and supporting an arc-shape transition surface at a bottom of the liquefied petroleum cylinder.

[0013] Optionally, the supporting bevel may be provided with magnetic nails, where the magnetic nails are uniformly distributed on the supporting bevel.

[0014] Optionally, casters may be mounted on the bottom of the annular body.

[0015] The monitoring device according to the present disclosure includes an annular body having a central hole, where a base of the liquefied petroleum gas cylinder is inserted into the central hole and is supported on the annular body, and the annular body is provided with a weight detection element, which is configured to detect the weight of the steel cylinder supported by the annular body. The detection value is compared with the initial weight to obtain the volume of remaining gas in the cylinder, with which the user can be informed of the volume of remaining gas in the cylinder. In addition, the cylinder is mounted in the central hole in a stable and reliable manner, without requiring much extra space in a height direction.

[0016] A system for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder is provided according to the present disclosure, which includes a detection device and a remaining volume prompting terminal, where the detection device comprises a supporting portion configured to support the liquefied petroleum gas cylinder (100), the supporting portion is provided with a weight detection element, the weight detection element is configured to detect a weight of the liquefied petroleum gas cylinder, and output a detected result to the remaining volume prompting terminal.

[0017] Optionally, the remaining volume prompting terminal may be provided with at least one of a warning module, a remaining volume display module and a wireless data uploading module, and the wireless data uploading module is configured to upload data regarding the volume of remaining gas to a mobile phone or a computer.

[0018] Optionally, the remaining volume prompting terminal may include a front cover and a rear cover, which are connected with each other to form a housing cavity, and the warning module, the remaining volume display module and the wireless data uploading module may be arranged in the housing cavity.

[0019] Optionally, a bottom of the rear cover may be provided with a mounting plate, configured to mount and fix the remaining volume prompting terminal.

[0020] Optionally, the remaining volume prompting terminal may be provided with a gas detection hole, and the warning module may be configured to issue an alarm in a case that the gas detection hole detects that the gas concentration exceeds a reference value.

[0021] Optionally, the supporting portion may include an annular body having a central hole, where a base of the liquefied petroleum gas cylinder is inserted into the central hole and is supported on the annular body, and the weight detection element is arranged on the annular body.

[0022] Optionally, an outer circumference of the annular body may be provided with a recess portion.

[0023] Optionally, the annular body may include an upper cover and a lower cover, which are connected with each other to form a closed cavity, the weight detection element may be arranged in the closed cavity, a battery compartment may be provided in the closed cavity, and a battery that supplies power to the weight detection element may be arranged in the battery compartment.

[0024] Optionally, an inner circumference of the annular body may be provided with an annular supporting bevel, for fitting and supporting an arc-shape transition surface at a bottom of the liquefied petroleum cylinder.

[0025] Optionally, the supporting bevel may be provided with magnetic nails, where the magnetic nails are uniformly distributed on the supporting bevel.

[0026] Optionally, casters may be mounted on the bottom of the annular body.

[0027] The monitoring system according to the present disclosure includes a detection device, configured to detect the weight of the liquefied petroleum gas cylinder and provide the detected data to the remaining volume prompting terminal, which allows the user to check information regarding the volume of the remaining gas, such that the user can be informed of the volume of remaining liquefied petroleum gas in the cylinder.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028]

Figure 1 is a schematic structural diagram of a commonly used standard liquefied petroleum gas cylinder;

Figure 2 is a schematic structural diagram of a system for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to an embodiment of the present disclosure;

Figure 3 is a schematic structural diagram of a detection device in Figure 2;

Figure 4 is a top view of the detection device shown in Figure 3;

Figure 5 is a cross-sectional view taken along a line A-A of Figure 4;

Figure 6 is a schematic diagram showing arrangement of a weight detection element in Figure 3;

Figure 7 is a schematic structural diagram of a remaining volume prompting terminal in Figure 2;

Figure 8 is a bottom view of the remaining volume prompting terminal shown in Figure 7; and

Figure 9 is a perspective view of the remaining volume prompting terminal shown in Figure 7.

[0029] Reference Numerals in Figure 1 are as follows:

100 liquefied petroleum gas cylinder,

101 arc-shape transition surface,

102 cylinder base, and

103 bottom surface of cylinder.

[0030] Reference Numerals in Figures 2 to 9 are as follows:

1	annular body,	11	upper cover,
12	lower cover,	13	closed cavity,
14	central hole,	15	supporting bevel,
16	magnetic nail,	17	outer arc-shape segment,
18	arc-shape recess portion,	19	caster,
20	bottom surface of annular body.		
21	weighing data acquisition board,	22	data transmission board,
23	battery,	24	battery compartment,
30	remaining volume prompting terminal,	31	front cover,
311	display bar,	312	gas detection hole,
313	power plug,	32	rear cover,
33	mounting plate.		

DETAILED DESCRIPTION OF EMBODIMENTS

[0031] In order to make those skilled in the art better understand the present disclosure, the present disclosure will be further described in detail below in conjunction with the accompanying drawings and specific embodiments.

[0032] Referring to Figures 1 to 2, Figure 1 is a schematic structural diagram of a commonly used standard liquefied petroleum gas cylinder, which shows the structure of a general liquefied petroleum gas cylinder to facilitate understanding of the manner of using the detection device in this embodiment. Figure 2 is a schematic structural diagram of a system for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to an embodiment of the present disclosure. Figure 3 is a schematic structural diagram of a detection device in Figure 2.

[0033] The monitoring system includes a detection device configured to detect a weight of the liquefied petroleum gas cylinder 100. The detection device includes a supporting portion provided with a weight detection element for detecting the weight of the liquefied petroleum gas cylinder 100. The supporting portion includes an annular body 1 formed by an upper cover 11 and a lower cover 12. The upper cover 11 and the lower cover 12 are connected with each other to form a closed cavity 13 and a central hole 14 of the annular body 1. The upper cover 11 may be connected to the lower cover 12 by screwing or buckling, and of course other conventional connections can be used.

[0034] The annular body 1 is provided with a weight detection element. When the detection device is used, the liquefied petroleum gas cylinder 100 is supported on the annular body 1. A cylinder base 102 generally has a circular shape. To ensure that the cylinder base 102 is smoothly inserted into the central hole 14 in the annular body 1 and supported by the annular body 1, the central hole 14 is configured to have a diameter which is greater than that of the circular base 102 of the liquefied petroleum gas cylinder, and smaller than that of the body of the liquefied petroleum gas cylinder 100. As can be seen from Figure 1, the size of the cylinder circular base 102 is smaller than that of the body, so that the liquefied petroleum gas cylinder 100 can be supported by the inner peripheral of the annular body 1.

[0035] Referring to Figure 4, Figure 4 is a top view of the detection device shown in Figure 3.

[0036] In Figure 4, the central hole 14 of the annular body 1 is circular, which matches with the body of the liquefied petroleum gas cylinder 100 which generally has a circular shape, so as to reliably and uniformly support the liquefied petroleum gas cylinder 100. Of course, the central hole 14 may be configured to have a square shape or other shapes, as long as the liquefied petroleum gas cylinder 100 can be supported on the annular body 1 and the cylinder base 102 can be inserted into the annular body 1 to position the liquefied petroleum gas cylinder 100.

[0037] In order that the liquefied petroleum gas cylinder 100 is supported on the annular body 1, and the weight of the liquefied petroleum gas cylinder 100 is detected by the weight detection element, it is obvious that the liquefied petroleum gas cylinder 100 is required to be suspended when the bottom of the liquefied petroleum gas cylinder 100 is inserted into the central hole 14. The liquefied petroleum gas cylinder 100 is kept at a certain distance from the ground or another surface on which the detection device is placed. Therefore, at a proper arrangement, the detection device does not significantly increase the height of the liquefied petroleum gas cylinder 100, thereby reducing space occupation.

[0038] Therefore, with the solution provided according to the present disclosure, on one aspect, the volume of remaining gas can be obtained by detecting the weight of the liquefied petroleum gas cylinder 100 by using the weight detection element, so that the user can be informed of the volume of remaining liquefied petroleum gas, and replenish the cylinder

in time. In addition, the detection device is provided with the annular body 1 and the central hole 14, so that when the liquefied petroleum gas cylinder 100 is placed and supported on the detection device, the position of the liquefied petroleum gas cylinder 100 is fixed, which is favorable for the stability of the liquefied petroleum gas cylinder 100 without requiring much extra space, and improves user experience.

[0039] Referring to Figure 5, Figure 5 is a cross-sectional view taken along line A-A of Figure 4.

[0040] An inner circumference of the annular body 1 is provided with an annular supporting bevel 15. That is, an upper portion of the inner circumference of the annular body 1 has an annular chamfer.

[0041] When the cylinder base 102 of the liquefied petroleum gas cylinder 100 is inserted into the central hole 14 in the annular body 1, the arc-shape transition surface 101 of the cylinder bottom 102 abuts against the supporting bevel 15 of the annular body 1. The supporting bevel 15 functions as a guide for facilitating the insertion of the cylinder base 102. Of course, the supporting inclined surface 15 can alternatively be set as an arc-shape supporting surface to match with the arc-shape transition surface 101, which can increase the supporting contact area and improve the supporting stability.

[0042] In addition, the supporting bevel 15 may be further provided with magnetic nails 16, which are uniformly distributed on the supporting bevel 15. Four magnetic nails 16 are shown in Figure 4. When the liquefied petroleum gas cylinder 100 is supported on the annular body 1, the magnetic nails 16 are attached to the arc-shape transition surface 101, to further position and fix the liquefied petroleum cylinder 100. Obviously, the number of magnetic nails 16 is not limited to four.

[0043] Reference is still made to Figure 4, in this embodiment, the outer circumference of the annular body 1 is provided with a recess portion 18. The arrangement of the recess portion 18 facilitates user handling and saves material. Specifically, the outer circumference of the annular body 1 in Figure 4 is circular, and four recess portions 18 are uniformly distributed on the outer circumference of annular body 1 along the circumferential direction. The recess portion 18 has an arc shape, such that the outer arc-shape segments 17 and the arc-shape recess portions 18 are alternatively connected by small arc transitions, to form a simple and appropriate structure.

[0044] According to this embodiment, casters 19 are also mounted on the bottom of the annular body 1. Four casters 19 are uniformly distributed in the circumferential direction to ensure stability. The casters 19 may be connected to the bottom of the annular body 1 by screwing, such that when the liquefied petroleum cylinder 100 is supported on the annular body 1, it can be conveniently moved. For a heavy liquefied petroleum gas cylinder 100, the rolling movement of the caster 19 is obviously convenient for the user.

[0045] As described above, the cylinder base 102 needs to be suspended, and in a case that the caster 19 is provided, it is only required that the cylinder base 102 is higher than the caster 19. Of course, in order that the device can still be used when the casters are replaced with casters of a different size or removed, the bottom surface 103 of the liquefied petroleum gas cylinder should be higher than the bottom surface 20 of the annular body 1.

[0046] According to this embodiment, the volume of remaining gas in the liquefied petroleum gas cylinder is monitored by measuring the weight of the liquefied petroleum gas cylinder. Therefore, the annular body 1 is provided with a weight detection element.

[0047] Referring to Figure 6, Figure 6 is a schematic diagram showing arrangement of a weight detection element in Figure 3.

[0048] The weight detection element is arranged in the closed cavity 13 of the annular body 1. In addition, as described above, the closed cavity is formed by the upper cover 11 and the lower cover 12 which are connected with each other, and the supporting bevel 15 and the magnetic nails 16 are arranged on the upper cover 11.

[0049] The weight detection element is arranged in the closed cavity 13 of the annular body 1. The closed cavity 13 can protect the weight detection element from contamination and damage. The weight detection element includes a weighing data acquisition board 21 and a data transmission board 22. In addition, a battery compartment 24 for mounting a battery 23 may also be provided in the closed cavity 13. The battery 23 is easy to meet diverse user requirements and is not subject to environmental restrictions. Of course, a power interface can also be set. In this case, a power socket is required where the weight detection element is to be used.

[0050] The weighing data acquisition board 21 includes a weight sensor, a signal processing circuit, and a PCB board. The weighing data acquisition board 21 is configured to collect data and process the collected data. The weight sensor is connected to the upper cover 11 to collect the weight of an object supported on the upper cover 11. The output terminal of the weighing data acquisition board 21 is connected to an input terminal of the data transmission board 22. The battery 23 or another power supply is connected to the power supply terminals of the weighing data acquisition board 21 and the weighing data transmission board 22. The data transmission board 22 is configured to transmit the collected weight data to the outside in a wired or wirelessly manner, where a wireless transmission module may be provided for wireless transmission.

[0051] The liquefied petroleum gas cylinder 100 generally has a standard size, and the detection device provided according to the present disclosure can be fabricated to match the standard liquefied petroleum gas cylinder to meet the requirements of the majority of users. Of course, for non-standard liquefied petroleum gas cylinders, the detection

device is also suitable, as long as the detection device is configured to have a size that can support the cylinder.

[0052] The above description focuses on the structure of the detection device. When the weight information of the liquefied petroleum gas cylinder 100 is detected, the detected result is transmitted to the remaining volume prompting terminal of the monitoring system provided according to the present disclosure. The structure of the remaining volume prompting terminal can be understood with reference to Figures 7 to 9.

[0053] Figure 7 is a schematic structural diagram of a remaining volume prompting terminal in Figure 2, Figure 8 is a bottom view of the remaining volume prompting terminal of Figure 7; and Figure 9 is a perspective view of the remaining volume prompting terminal of Figure 7.

[0054] The remaining volume prompting terminal 30 is used in combination with the above-mentioned detection device. When the weight of the cylinder is detected, the detection device transmits the detected data to the remaining volume prompting terminal 30, and the remaining volume prompting terminal 30 can make a display, an alarm, or the like, to prompt the user.

[0055] According to an embodiment, the remaining volume prompting terminal 30 includes a front cover 31 and a rear cover 32, which are connected with each other to form a housing cavity, and at least one of a remaining volume display module, a warning module and a wireless data uploading module may be provided in the housing cavity.

[0056] As shown in Figure 7, a display bar 311 of the remaining volume display module 30 may be displayed on the outer surface of the front cover 31 for the user to directly observe, and the display bar 311 can be displayed in a pattern of a cylinder plus internal grids shown in Figure 7, to more intuitively show the volume of remaining gas in the cylinder. The weight value when the cylinder is full can be preset for the remaining volume prompting terminal 30, and the volume of remaining gas is obtained based on the detected weight value. Alternatively, a calculation module for obtaining the volume of remaining gas may be provided on the detection device, and the calculation module outputs a result regarding the volume of remaining gas to the remaining volume prompting terminal 30, that is, the detection result shown in Figure 2 is not limited to the directly detected weight value, and may be the volume value of the remaining gas. In comparison, arrangement is facilitated when the calculation module is provided on the remaining volume prompting terminal 30.

[0057] As can be seen from Figure 7, the remaining volume prompting terminal 30 is also provided with a warning module, and an alarm light of the warning module is displayed on the outer surface of the front cover 31. When the volume of remaining gas is insufficient, the alarm light can flash to prompt the user, the insufficient volume of remaining gas may be a set value or may be levels including, for example, an insufficient level and a serious shortage level, and the terminal may be equipped with corresponding alarm lights, such as a yellow light and a red light, to distinguish between the levels. In addition to the insufficient alarm, the terminal may also be equipped with a gas leakage detection element, and the warning module can also alarm in response to a signal indicating gas leakage when the gas leaks to further improve the safety performance.

[0058] In a case that the remaining volume prompting terminal 30 is provided with a wireless data uploading module, the wireless data uploading module transmits data to a computer or a mobile phone (for example, a mobile phone APP), and the user can remotely monitor the volume of remaining gas in the steel cylinder, thereby improving the user experience. Of course, each of the wireless data transmission module, the warning module and the remaining volume display module, can independently implement the function of informing the volume of remaining gas.

[0059] In addition, as shown in Figure 7, the remaining volume prompting terminal 30 is further provided with a self-test button, an SOS button, and a setup button. The self-test button is configured to trigger testing of the function of each part of the monitoring device when pressed, to determine whether the part functions normally. The SOS button is configured to provide functions such as calling for a gas service, making an emergency call, or calling a preset mobile number for help. The setup button can be used to set the basic settings of the monitoring device.

[0060] In addition to the alarm light, a WIFI signal light and a power signal light may also be provided. The WIFI signal light can be used to indicate a current WIFI connection situation, to indicate whether the wireless data uploading module works smoothly. The power signal light shows a current power supply status of the monitoring device.

[0061] In addition, the remaining volume prompting terminal 30 is further provided with a gas detection hole 12 for detecting natural gas or liquefied gas. If a concentration of natural gas or liquefied gas exceeds a reference value, the warning module can alarm. The gas detection hole 12 can also function as a ventilation and heat dissipation hole to extend the service life of internal elements. Gas detection holes 312 may be provided on both sides and the bottom of the front cover 31 as shown in Figure 7.

[0062] A mounting plate 33 may be provided on the bottom of the remaining volume prompting terminal 30, for facilitates mounting of the remaining volume prompting terminal 30 to an easily viewable position such as a wall or a cabinet.

[0063] The housing of the remaining volume prompting terminal 30 may be provided with a power plug 313 to be inserted into a power socket. Of course, the remaining volume prompting terminal 30 can also be equipped with a battery. As described above, the remaining volume prompting terminal 30 can be fixed to a wall or other position where the power socket is usually provided, and in this case, the power plug 313 is provided to easily obtain continuous power supply.

[0064] As can be seen from the above description, the monitoring system according to the present disclosure includes a detection device, which can detect the weight of the liquefied petroleum gas cylinder and provide the detected data

to the remaining volume prompting terminal, such that the user can view the remaining volume information and be informed of the volume of remaining liquefied petroleum gas in the cylinder. Therefore, the supporting portion for supporting the liquefied petroleum gas cylinder 100 is not limited to the above-described annular body 1, and maybe, for example, a body without a central hole, as long as the detection device can detect the weight of the cylinder. Of course, the annular body 1 has a corresponding technical effect as a supporting portion, which is not described herein.

[0065] A system for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder provided according to the present disclosure is described in detail. The principles and implementations are clarified using specific embodiments herein. The above description of the embodiments is only intended to help understanding the method of the present disclosure and the key concept thereof. It should be noted that, for those skilled in the art, improvements and modifications may also be made without departing from the principle of the disclosure. Those improvements and modifications should also be included in the scope of protection of the disclosure.

Claims

1. A device for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder, comprising:

   an annular body (1) having a central hole (14), wherein
   a base (102) of the liquefied petroleum gas cylinder is inserted into the central hole (14) and is supported on the annular body (1), and the annular body (1) is provided with a weight detection element.

2. The device for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to claim 1, wherein an outer circumference of the annular body (1) is provided with a recess portion (18).

3. The device for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to claim 1, wherein the annular body (1) comprises an upper cover (11) and a lower cover (12), which are connected with each other to form a closed cavity (13), and the weight detection element is arranged in the closed cavity (13).

4. The device for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to claim 3, wherein the weight detection element comprises a weighing data acquisition board (21) and a data transmission board (22).

5. The device for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to claim 3, wherein a battery compartment (24) is provided in the closed cavity (13), and a battery (23) that supplies power to the weight detection element is arranged in the battery compartment (24).

6. The device for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to claim 3, wherein the upper cover (11) is connected with the lower cover (12) by screwing or buckling to form the closed cavity (13).

7. The device for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to any one of claims 1 to 6, wherein an inner circumference of the annular body (1) is provided with an annular supporting bevel (15), for fitting and supporting an arc-shape transition surface (101) at a bottom of the liquefied petroleum cylinder (100).

8. The device for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to claim 7, wherein the supporting bevel (15) is provided with magnetic nails (16), wherein the magnetic nails (16) are uniformly distributed on the supporting bevel (15).

9. The device for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to any one of claims 1 to 6, wherein casters (19) are mounted on the bottom of the annular body (1).

10. A system for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder, comprising a detection device and a remaining volume prompting terminal (30), wherein the detection device comprises a supporting portion configured to support the liquefied petroleum gas cylinder (100), the supporting portion is provided with a weight detection element, the weight detection element is configured to detect a weight of the liquefied petroleum gas cylinder (100), and output a detected result to the remaining volume prompting terminal (30), and the detection device is the device for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to any

one of claims 1 to 9.

11. The system for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to claim 10, wherein the remaining volume prompting terminal (30) is provided with at least one of a warning module, a remaining volume display module and a wireless data uploading module, and the wireless data uploading module is configured to upload data regarding the volume of remaining gas to a mobile phone or a computer.

12. The system for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to claim 11, wherein the remaining volume prompting terminal (30) comprises a front cover (31) and a rear cover (32), which are connected with each other to form a housing cavity, and the warning module, the remaining volume display module and the wireless data uploading module are arranged in the housing cavity.

13. The system for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to claim 12, wherein a bottom of the rear cover (32) is provided with a mounting plate (33), configured to mount and fix the remaining volume prompting terminal (30).

14. The system for monitoring a volume of remaining gas in a liquefied petroleum gas cylinder according to claim 12, wherein the remaining volume prompting terminal (30) is provided with a gas detection hole (12), and the warning module is configured to issue an alarm in a case that the gas detection hole (12) detects that the gas concentration exceeds a reference value.

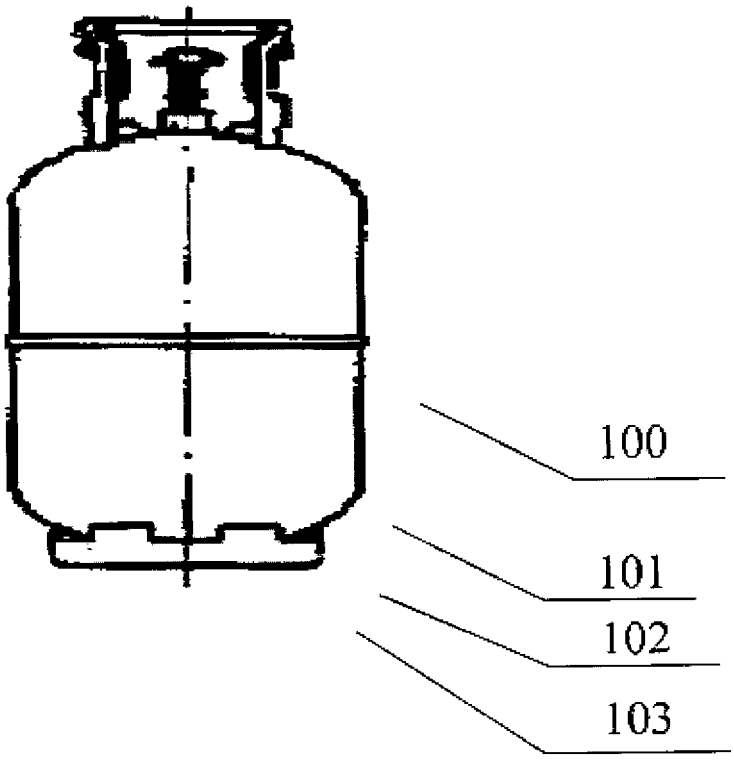

Figure 1

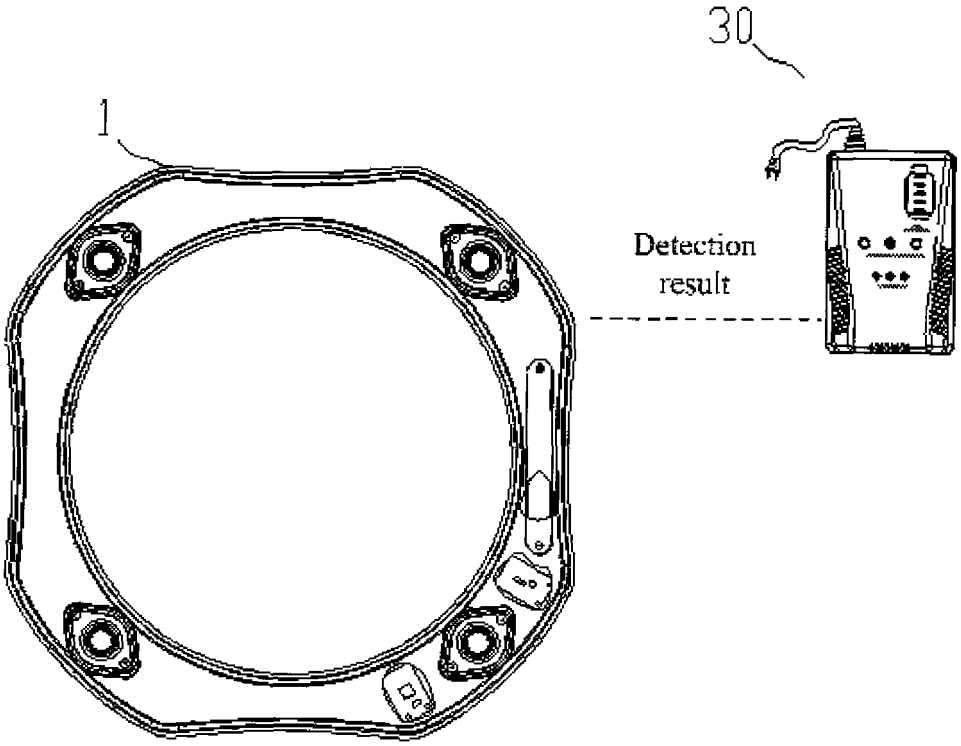

Figure 2

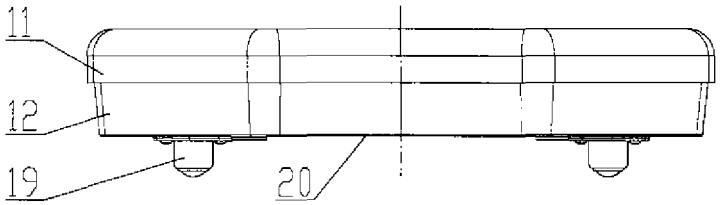

Figure 3

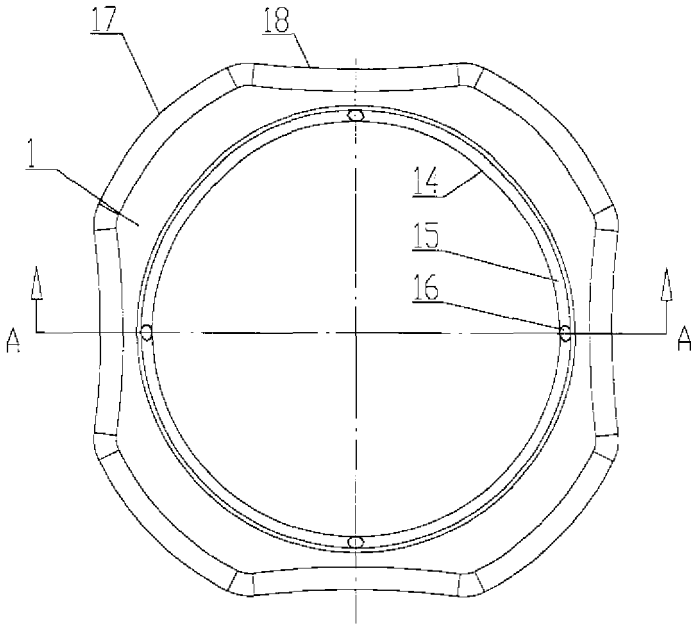

Figure 4

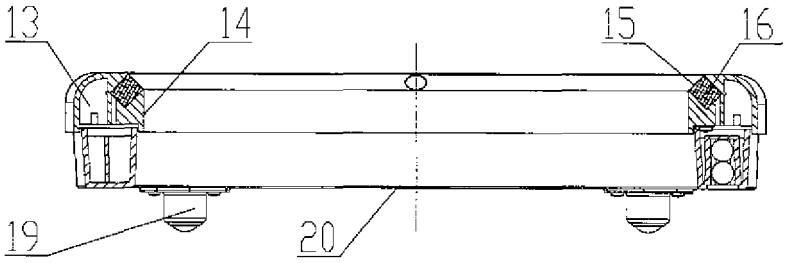

Figure 5

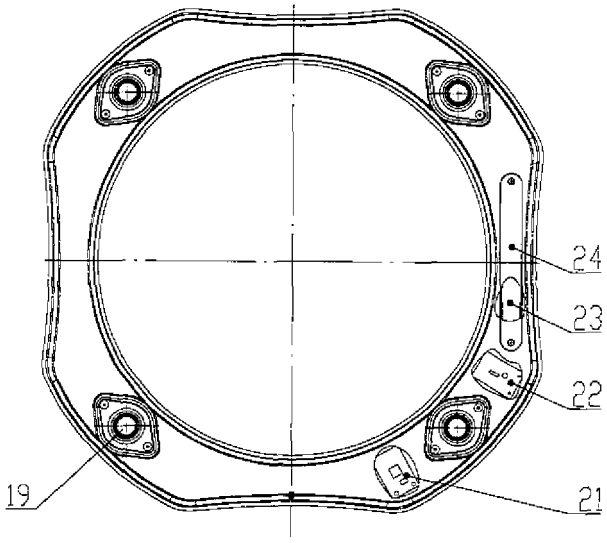

Figure 6

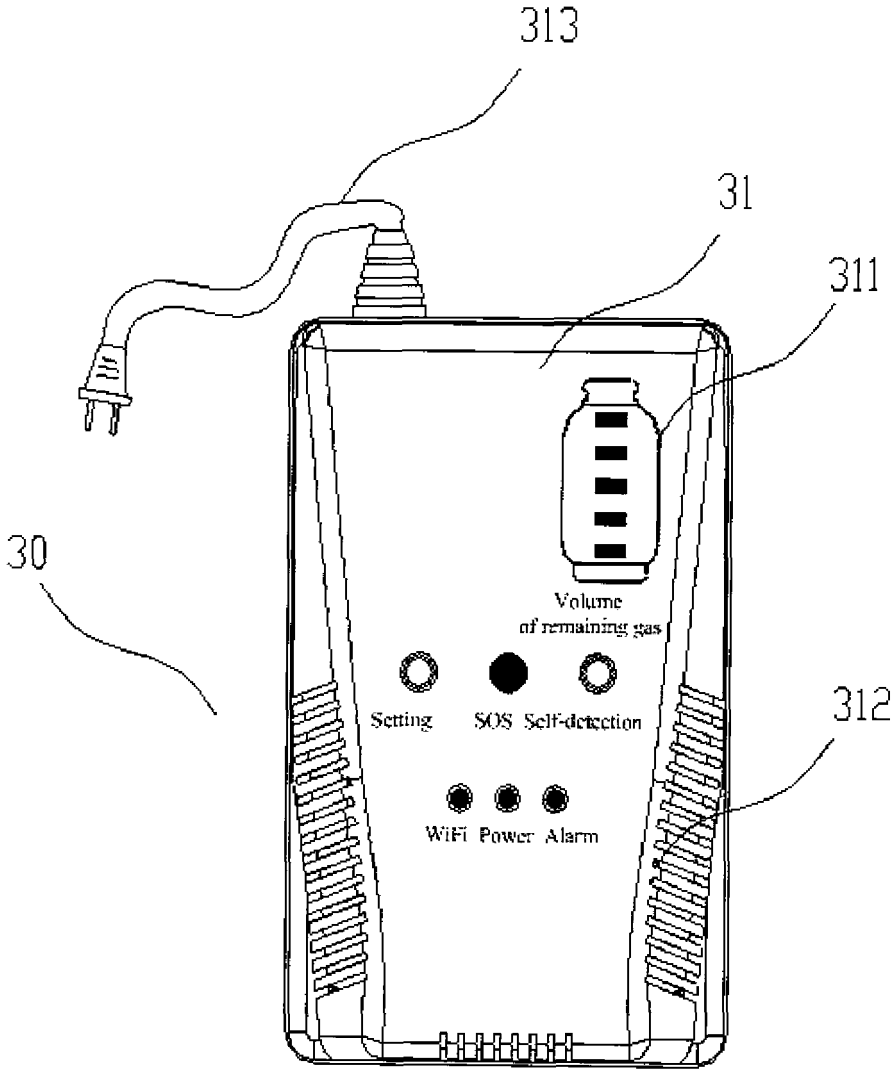
313
31
311
30
Volume
of remaining gas
Setting
SOS
Self-detection
312
WiFi
Power
Alarm

Figure 7

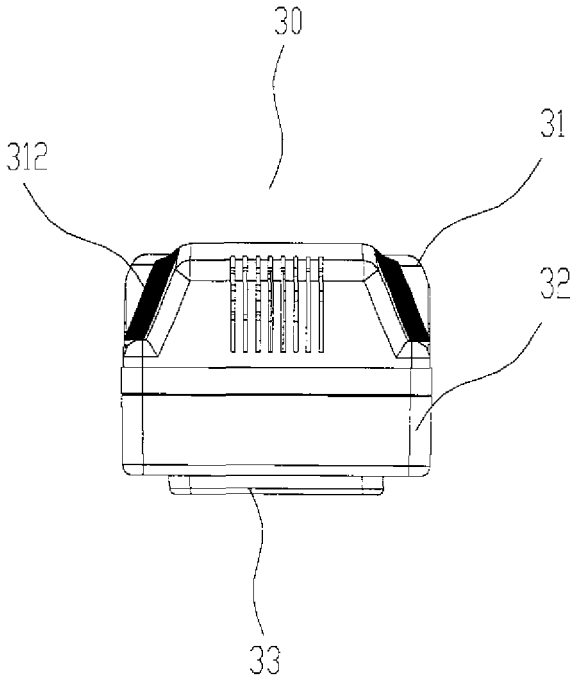

Figure 8

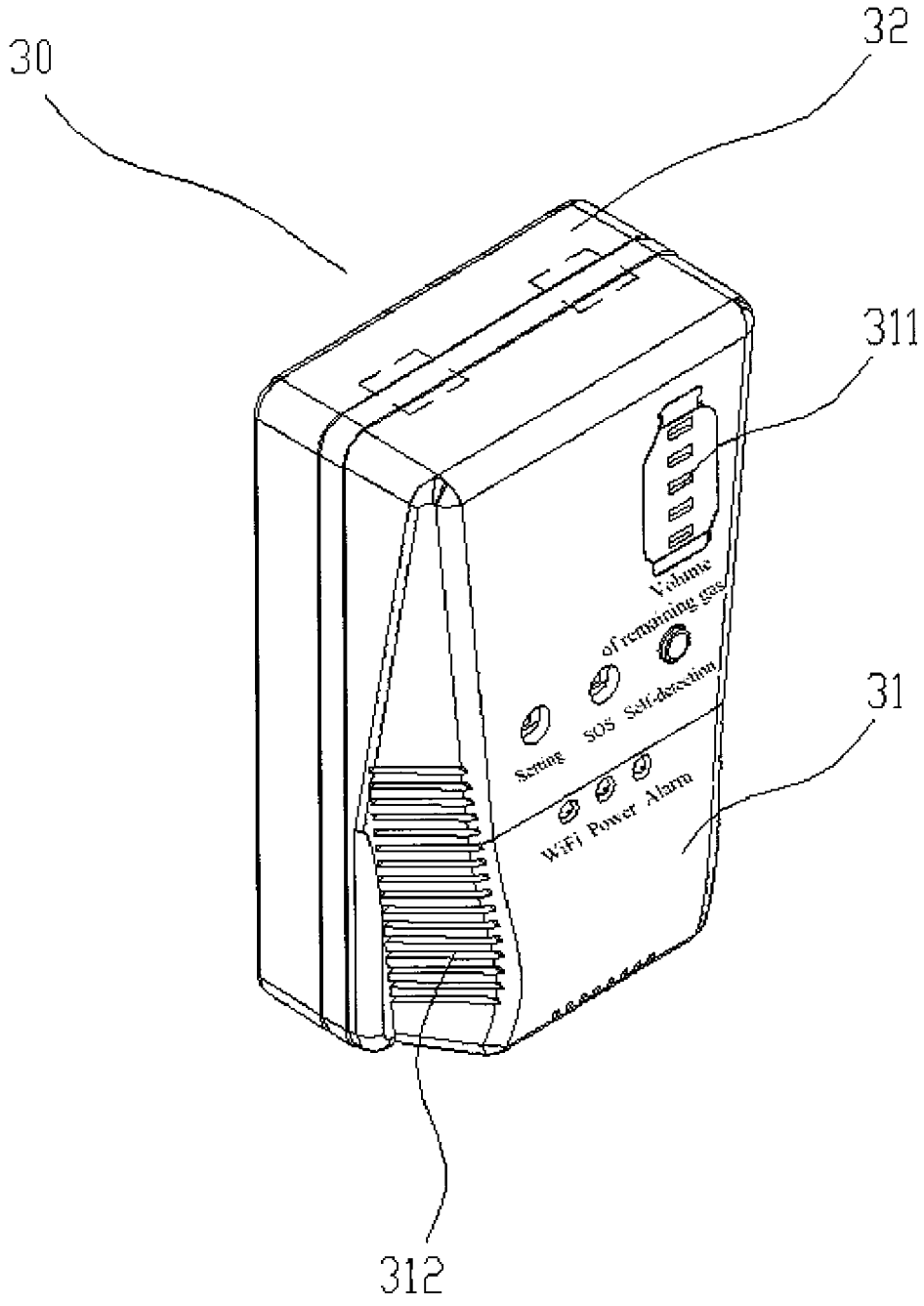
30
32
311
31
312
Volume
of remaining gas
Self-detection
SOS
Setting
WiFi Power Alarm

Figure 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/075924

A. CLASSIFICATION OF SUBJECT MATTER

F17C 13/02 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F17C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS, SIPOABS, CNKI: 气瓶, 气罐, 重量, 质量, 压力传感器, 检测, 监测, 显示; bottle, cylinder, weight+, display+, screen

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 205299057 U (JIANGSU HUAYUE SPECIAL EQUIPMENT CO., LTD.), 08 June 2016 (08.06.2016), description, paragraphs 0015-0025, and figure 1	1-14
X	CN 204099902 U (FUJIAN YINFENG STEM CELLS ENGINEERING CO., LTD.), 14 January 2015 (14.01.2015), description, paragraphs 0018-0024, and figures 1-5	1-14
A	JP 2009156539 A (TOYO GASMETER CO.), 16 July 2009 (16.07.2009), entire document	1-14
A	WO 2013041823 A1 (LINDE AG et al.), 28 March 2013 (28.03.2013), entire document	1-14
A	CN 104633438 A (XIANGYANG CITY XIANGZHOU DISTRICT NO. 4 HIGH SCHOOL), 20 May 2015 (20.05.2015), entire document	1-14

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 June 2017	28 July 2017

Name and mailing address of the ISA	Authorized officer
State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	GONG, Jianhong Telephone No. (86-10) 62085265

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2017/075924

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 205299057 U	08 June 2016	None	
CN 204099902 U	14 January 2015	None	
JP 2009156539 A	16 July 2009	None	
WO 2013041823 A1	28 March 2013	GB 201116409 D0	02 November 2011
CN 104633438 A	20 May 2015	None	

Form PCT/ISA/210 (patent family annex) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 201621214445 **[0001]**
- CN 201621214541 **[0001]**