



SYSTEM FOR MONITORING OF GAS SUPPLY AND METHOD OF OPERATION THEREOF

FIELD OF THE INVENTION

5 The present invention is concerned with a system for monitoring of gas supply in a gas distribution system, and a method of operation thereof. The present invention is also concerned with a system of maintaining a gas distribution system.

10 BACKGROUND OF THE INVENTION

There are different types of gas distribution systems suited to meet different needs. One particular type of gas distribution system is to transport liquefied gas contained in cylinders to consumption units. In conventional operation, the cylinders are to be checked, and if needed replaced, regularly in order to ensure a constant or uninterrupted supply of gas to the consumption units. However, maintaining a constant supply of gas is not always realistic because the consumption of gas can fluctuate drastically for vast different reasons. If the gas cylinders are not checked often enough or if there is drastic increase in gas usage, interruption of gas supply will result and this can cause tremendous inconvenience and economical loss. Such a gas distribution system may be a system to distribute petroleum gas to eateries. If there is a sudden increase in gas consumption due to an unexpected increase in customer orders and the cylinder-containing liquefied petroleum gas cannot meet the increase in gas consumption, and the cylinders are not replaced in time, complaints from angry customers will result.

The present invention seeks to provide an improved gas system distribution system, or at least to provide a useful alternative to the general public.

30 SUMMARY OF THE INVENTION

According to a first aspect of the present invention, there is provided a system for monitoring supply of liquid petroleum gas, comprising (a) at least a



first source of liquid petroleum gas, (b) a vaporizer, (c) a first piping assembly connecting the first source of liquid petroleum gas and the vaporizer, (d) a third piping assembly connecting the vaporizer and appliance of end user, (e) pressure sensors arranged to detect gas pressure in the system, and (f) a control panel connected to the pressure sensors and adapted to perform one or more predetermined actions in response to signals received, the signals corresponding to pressure detected in a respective locations in the system, wherein the predetermined actions include an action of generating a message to be sent to a designated electronic device supervised by an attendant. With this system, there is no need to maintain a schedule to check the status of the gas sources. When for example the level of gas sources is running low, the attendant will be notified automatically.

Preferably, the first source of liquid petroleum gas may be contained in one or more cylinders situated in a first chamber. The system may comprise a second source of liquid petroleum gas contained in one or more cylinders situated in a second chamber. The second source of liquid petroleum gas serves a backup or secondary supply of liquid petroleum gas such that the attendant will be given time to attend the replacement of empty cylinders in the first chamber when the first source of liquid petroleum gas is running low.

The system may comprise a second piping assembly connecting the second source of liquid petroleum gas and the vaporizer.

In one embodiment, the system may generally comprise means for controlling which of the first and second sources of liquid petroleum gas is to be utilized.

The system may comprise piping from the first source of liquid petroleum gas and piping from the second source of liquid petroleum gas both of which pass through a manifold controlling which of the first and second sources of liquid petroleum gas is to be utilized. The manifold may be configured such that when one of the sources of liquid petroleum gas is

running low or becomes empty supply of gas will be switched to the other source of liquid petroleum gas automatically. In other words, the manifold acts as means for auto-changing from an empty cylinder to a full cylinder.

5 In one embodiment, the pressure sensors may include a first pressure sensor arranged to detect pressure in the first piping assembly and a second pressure sensor arranged to detect pressure in the second piping assembly. The pressure sensors may include a third pressure sensor arranged to detect gas pressure between the control means and the vaporizer. The pressure
10 sensors may include a fourth pressure sensor arranged to detect gas pressure in the third piping assembly. The provision of multiple pressure sensors in the system allows detection of pressure condition at different locations in the system.

15 Suitably, the system may comprise a plurality of pressure gauges for indicating pressure detected by the pressure sensors. In a specific embodiment, the pressure gauges may include a first pressure gauge, a second pressure gauge, a third pressure gauge, and a fourth and a fifth pressure gauge, configured to display reading of pressure detected by the first
20 pressure sensor, the second pressure sensor, the third pressure sensor, and the fourth pressure sensor, respectively. It is to be understood that the pressure sensors and the pressure gauges may exist as single, integral or separate devices or as pressure switches. However, in other embodiments the pressure sensors and the pressure gauges may exist as separate devices, and
25 they may be organized in a single location such that manual checking of pressure status or operation status of different locations in the system can be conducted conveniently in one location if needed. The pressure gauges may, for example, be arranged at a location remote from the sources of liquid petroleum gas. Yet in other embodiments, each pressure sensor may be
30 coupled with a pressure gauge to detect and indicate pressure at a respective location.

In a preferred embodiment, the control panel may be arranged at a location remote from the sources of liquid petroleum gas.

5 Preferably, the system may be configured to output an alert message to the electronic device when at least one of the following conditions has taken place:

- (a) pressure detected by the first pressure sensor falls below 40psi;
- (b) pressure detected by the second pressure sensor falls below 40psi;
- 10 (c) pressure detected by the third pressure sensor falls below 30psi; and
- (d) pressure detected by the fourth pressure sensor falls below 12psi or 16psi.

15 These different pressures may be detected by the five pressure gauges described above.

The message may be in the form of a text or SMS message to be sent to a cellular phone supervised by an attendant. With the use of such system, the attendant can be alerted of any pressure status or operation status instantly.

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In one embodiment, the control panel may be configured to generate a message when power supply to an electrical power consumption unit (e.g. the control panel, the vaporizer) is interrupted.

25 According to a second aspect of the present invention, there is provided a system for monitoring delivery of gas, comprising (a) at least a first source of liquefied gas and a second source of liquefied gas, (b) a vaporizer, (c) a first piping assembly connecting the first source of liquefied gas and the vaporizer, (d) a second piping assembly connecting the second source of liquefied gas and the vaporizer, (e) a third piping assembly connecting the vaporizer and appliance of end user, (f) means for controlling which of the first and second sources of liquefied gas is to be utilized, (g) a plurality of pressure switches coupled with the piping assemblies at different locations thereof for detecting

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pressure and sending respective signals corresponding to the detected pressure or condition, and (h) a control panel connected to the pressure switches and adapted to perform one or more predetermined actions in response to the signals or the detected pressure, wherein the predetermined actions include an action of generating a message for delivery to a predetermined electronic device supervised by an attendant.

According to a third aspect of the present invention, there is provided a method of monitoring delivery of cylinder-containing liquefied gas in a gas distribution system to gas consumption units and maintaining the gas distribution system, comprising the steps of (a) detecting gas pressure or operation status in at least one location of the gas distribution system by one or more pressure sensors and/or operation status checking means, (b) processing data of the detected gas pressure as to whether the detected pressure being within predetermined acceptable parameters or whether the detected operation status being within acceptable condition, (c) generating one or more messages to be sent to an electronic device supervised by an attendant when the detected pressure not being within predetermined acceptable parameters or the detected operation status not being within acceptable condition, and (d) attending to problems causing the detected pressure not being within predetermined acceptable parameters or the detected operation status not being within acceptable condition, and (e) restoring the gas distributing system to operational condition. The gas distribution system may be a liquid petroleum gas distribution system.

According to a fourth aspect of the present invention, there is provided a system for monitoring supply of gas, comprising (a) at least a first source of gas, (b) means for facilitating movement of gas supply, (c) a first piping assembly connecting the first source of gas and the gas movement facilitation means, (d) a third piping assembly connecting the gas movement facilitation means and appliance of end user, (e) pressure sensors arranged to detect gas pressure in the system, and (f) a control panel connected to the pressure sensors and adapted to perform one or more predetermined actions in

response to signals received, the signals corresponding to pressure detected in a respective locations in the system, wherein the predetermined actions include an action of generating a message to be sent to a designated electronic device supervised by an attendant.

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According to a fifth aspect of the present invention, there is provided a system for monitoring delivery of gas, comprising (a) at least a first source of liquefied gas and a second source of liquefied gas, (b) means for facilitating movement of gas supply, (c) a first piping assembly connecting the first source of liquefied gas and the gas movement facilitation means, (d) a second piping assembly connecting the second source of liquefied gas and the gas movement facilitation means, (e) a third piping assembly connecting the gas movement facilitation means and appliance of end user, (f) means for controlling which of the first and second sources of liquefied gas is to be utilized, (g) a plurality of pressure switches coupled with the piping assemblies at different locations thereof for detecting pressure and sending respective signals corresponding to the detected pressure or condition, and (h) a control panel connected to the pressure switches and adapted to perform one or more predetermined actions in response to the signals or the detected pressure, wherein the predetermined actions include an action of generating a message for delivery to a predetermined electronic device supervised by an attendant.

According to a sixth aspect of the present invention, there is provided a method of monitoring delivery of cylinder-containing gas in a gas distribution system to gas consumption units and maintaining the gas distribution system, comprising the steps of (a) detecting gas pressure or operation status in at least one location of the gas distribution system by one or more pressure sensors and/or operation status checking means, (b) processing data of the detected gas pressure as to whether the detected pressure being within predetermined acceptable parameters or whether the detected operation status being within acceptable condition, (c) generating one or more messages to be sent to an electronic device supervised by an attendant when the detected pressure not being within predetermined acceptable parameters or the

detected operation status not being within acceptable condition, and (d) attending to problems causing the detected pressure not being within predetermined acceptable parameters or the detected operation status not being within acceptable condition, and (e) restoring the gas distributing system to operational condition. The gas distribution system may be a liquid petroleum gas distribution system.

BRIEF DESCRIPTION OF DRAWINGS

Embodiments of the present invention will now be described by way of non-limiting example and with reference to the accompanying drawings, in which:-

- 5 Figure 1 is a schematic diagram showing an embodiment of a gas distribution system according to the present invention; and
Figure 2 is a schematic diagram showing a control panel that may be used in the gas distribution system of Figure 1.

10 DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

Figure 1 is a schematic diagram illustrating an embodiment of a liquefied petroleum gas (LPG) distribution system generally designated 2.

- 15 The system 2 comprises a first source of LPG 4 contained in three cylinders situated in a first chamber, a second source of LPG 6 contained also in three cylinders situated in a second chamber, and a vaporizer 8 for vaporizing LPG from the gas sources 4, 6 or facilitating movement gas in the system 2. The first source of LPG 4 and the vaporizer 8 are connected by a
20 first piping assembly 10 for transporting the LPG to the vaporizer 8. The second source of LPG 6 and the vaporizer 8 are connected by a second piping assembly 12 for transporting the LPG to the vaporizer 8. A manifold 14 connects pipings from the first and second sources of LPG 4, 6. The manifold serves to effect auto changing of gas supply from a gas cylinder that is empty
25 or running low to a full gas cylinder. In other words, the manifold 14 acts as a gate to control which of the first and second sources of LPG 4, 6 is to be utilized or transported to the vaporizer 8. It is to be understood that piping connecting the manifold 14 and the vaporizer 8 is shared by both the first and second piping assemblies 10, 12. In this embodiment, the capacity of each
30 cylinder is 50Kg. It is to be noted that the meaning of "liquefied" can be a matter of degree in that the term "liquefied gas" encompasses gases that are compressed for ease of storage.

The first source of LPG 4 serves as a primary fuel supply while the second source of LPG 6 serves as a backup supply.

5 The system 2 comprises a third piping assembly 36 connecting the vaporizer 8 and appliances in consumption units 16 such as kitchen and indoor dining area.

10 In this embodiment, four pressure sensors are provided and are coupled with the piping assemblies to detect gas pressure in the system. The locations of the pressure sensors are illustrated in Figure 1 by the thicker lines meeting the thinner lines and they are designated 18, 20, 22, 24. Five pressure indicators or gauges 26, 28, 30, 32, 34 are connected to the pressure sensors 18, 20, 22, 24, as shown on the left hand side in Figure 1.

15 The pressure gauge 28, labeled as PS4, is preset at 40psi. The pressure gauge 28 seeks to indicate pressure of the first source of LPG 4 from the first chamber. When pressure detected at the location in the piping assembly 10 between the first source of LPG 4 and the manifold 14 reaches 40psi or above, the pressure gauge 28 is configured to output a signal to a control panel 38 (to be explained later in the description). This happens when
20 the first chamber is in full operational status or has just replaced with full gas cylinders.

25 The pressure gauge 26, labeled as PS5, is also preset at 40psi. This pressure gauge 26 seeks to indicate liquid pressure of the second source of LPG 6 from the second chamber. When pressure detected at the location in the piping assembly between the second source of LPG 6 and the manifold 14 reaches 40psi or above, the pressure gauge 26 is similarly configured to output a signal to the control panel 38. This happens when the second chamber is in
30 full operational status or has just been replaced with full gas cylinders.

The pressure gauge 34, labeled as PS3 is preset at a pressure level of 30psi. The pressure gauge PS3 34 seeks to indicate gas pressure in the

5 piping assemblies 10, 12 between the manifold 14 and the vaporizer 8, or more accurately in the piping assembly (10 or 12) between the gas source (4 or 6) which is being utilized and the vaporizer 8. When pressure detected at the location falls below 30psi, the pressure gauge 34 is configured to output a signal to the control panel 38. This happens when gas level in the running chamber is operating at a low level or at less than 25% fullness. When pressure detected at the location falls below 20psi, the function of auto-changing of the manifold will kick in and change over the supply of gas from the empty cylinder to the full cylinder. At normal operational condition, the default pressure at the location is typically above 30psi.

15 The pressure gauges 30, 32, labeled as PS1 and PS2, are preset at 16psi and 12psi, respectively. These pressure gauges seek to indicate gas pressure in the piping assembly 36 downstream of the vaporizer or between the vaporizer and appliance of end user. When pressure detected at the location falls below 16psi, the pressure gauge 30 is configured to output a signal to the control panel 38. This happens when there is a malfunctioning in the system 2, for example when the vaporizer 8 is choking. On the other hand, when pressure detected at the location rises above 16psi, the pressure gauge is configured to output a different signal to the control panel 38. This happens when operation of the system 2 has restored, for example when choking of the vaporizer 8 has cleared. At normal operational condition, the default pressure at the location typically ranges from 17 to 20psi. It is to be understood that the vapor pressure at the third piping assembly is lower while the liquid pressure at the first and second piping assemblies are higher.

30 When pressure detected at the location falls below 12psi, the pressure gauge 32 is configured to output a signal to the control panel 38. This happens when there is a major malfunctioning or breakdown in the system 2, for example when one or more components (e.g. vaporizer 8) are not functioning. On the other hand, when pressure detected at the location rises above 12psi, the pressure gauge is configured to output a another signal to the control panel

38. This happens when the major malfunctioning in the system 2 no longer exists, for example the vaporizer 8 has resumed functioning to a limited extent.

As it can be understood from the above, different signals will be generated and sent to the control panel 38 under different circumstances. The control panel serves as a single device to collect all these signals for processing. The control panel acts as an alarm panel and will generate predetermined messages in response to the signal received. A skilled person in the art will have no difficulties in adapting and transforming conventional control panels to ones usable for the present invention.

Figure 2 illustrates a front view of a particular embodiment of the control panel (or alarm panel) 38 according to the present invention. The text in the figure is what a user would see in a real life control panel and is retained for illustrative purpose. The control panel 38 is arranged in a convenient location for maintenance of the system. The control panel 38 is provided with a number of inlets for connection to the pressure gauges 26, 28, 30, 32, 34. Specifically, the pressure gauges 26, 28, 30, 32, 34 are connected to the control panel 38 at different zones therein.

The control panel 38 is configured to generate messages to be sent to an electronic device in a remote location. In this embodiment, the messages are sent wirelessly via an antenna to a cellular phone or digital handheld device supervised by an attendant on duty.

In this embodiment, the pressure gauge PS1 30 is connected to zone 1 in the control panel. When for example the vaporizer 8 chokes, while the vaporizer can still convert LPG to vapor gas to a certain extent the supply of the vapor gas will be weaker due to the choking. Under this circumstances, the signal sent to zone 1 of the control panel 38 will cause the control panel 38 to generate a predetermined message associated with zone 1, e.g. "Outlet: ABC restaurant, Vaporizer choking". From the time when the vaporizer chokes until the time when there is system wide breakdown, there is typically about two

hours. On receipt of the message by the attendant at the digital handheld device, the attendant can dispatch serviceman to repair the system 2 and service the vaporizer 8.

5 The pressure gauge PS1 30 is also connected to zone 2 in the control panel 38. When for example the vaporizer has resumed functional, the signal sent to zone 2 will cause the control panel 38 to generate a predetermined message associated zone 2, e.g. "Outlet: ABC restaurant, Vaporizer choking cleared".

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 The pressure gauge PS2 32 is connected to zone 3 in the control panel 38. When for example there is a system wide breakdown, the signal sent to zone 3 will cause the control panel 38 to generate a predetermined message associated zone 3, e.g. "Gas system break down". When there is system wide
15 breakdown, the time until the entire system being non-performing will be shorter. On receipt of the message by the attendant at the digital handheld device, the attendant can arrange serviceman to repair the system on a more urgent basis.

20 The pressure gauge PS2 32 is connected to zone 4 in the control panel 38. When the system has been repaired, the signal sent to zone 4 will cause the control panel 38 to generate a predetermined message associated zone 4, e.g. "Gas system running".

25 It can thus be understood from the above that which predetermined message is sent to the designated handheld device is determined by which pressure gauge is connected with which zone in the control panel 38 and a particular signal received by the control panel 38. Each zone in the control panel 38 is preset or pre-programmed with a designated message. The
30 predetermined message sent to and received by the handheld device reflects the conditions (e.g. pressure, operation status) of the system 2.

The system 2 is configured such that when the operating chamber or the operating gas source (4, 6) is running low on gas, zone 5 in the control panel 38 will receive a signal from the pressure gauge PS3 34 and the control panel 38 is then caused to generate a message be sent to the handheld device, e.g. Outlet: ABC Restaurant, Gas running low". On receipt of this message, the attendant can arrange serviceman to replace the operating cylinders with full cylinders although there is no urgency as the non-operating chamber can serve as a backup supply of gas. In this embodiment, the supply of gas will automatically switch to a first chamber to the other chamber when the first chamber becomes empty. This is achieved by causing the manifold 14 to close the gate from the first chamber and open the gate to the other chamber. The pressure gauge PS3 34 is also connected to zone 6. When there is switch from the first chamber to the other chamber, the pressure gauge PS3 sends a signal to zone 6 which causes the control panel 38 to generate a predetermined message associated zone 6, e.g. "Outlet: ABC Restaurant, Gas supply change over". On receipt of the message by the attendant at the digital handheld device, the attendant can arrange serviceman to replenish the first chamber with full cylinders.

As explained above, when the chambers are replenished with full cylinders, the pressure will resume to 40psi or above. The pressure gauge PS4 28 is connected to zone 7 and the pressure gauge PS5 26 is connected to zone 8. When the first chamber is replenished with full cylinders by on-site serviceman, the pressure gauge PS4 28 will send a signal to zone 7 causing the control panel 38 to generate a predetermined message associated zone 7, e.g. "Outlet: ABC Restaurant, First chamber gas full". On receipt of the message by the attendant at the digital handheld device, the attendant can have an updated status of the first chamber. The attendant can then remove this task from the to-do list. Similarly, when the second chamber is replenished with full cylinders by on-site serviceman, the pressure gauge PS5 26 will send a signal to zone 8 causing the control panel to generate a predetermined message associated zone 8, e.g. "Outlet: ABC Restaurant, Second chamber gas full".

In the above embodiment, while the pressure sensors and the pressure gauges are explained in separate devices or concepts, they may exist in integral devices or discrete pressure switches for detecting pressure and sending signal in response to the detected pressure.

The above embodiment is configured such that when either or both chambers are replenished with full cylinders, the attendant will automatically receive a message in the handheld device showing action that has just been performed by the serviceman. This can assist the monitoring, prioritizing and accomplishing of outstanding tasks in an efficient manner. However, in an alternative embodiment the system may be provided with semi-automatic input means. The semi-automatic input means may include a left button located next to the first chamber connected to zone 7 and a right button located next to the second chamber connected to zone 8. When the serviceman has finished replenishing the first chamber with full cylinders, the serviceman will press the left button once sending a signal to zone 7 which caused the control panel to communicate with the handheld device. Similarly, when the serviceman has finished replenishing the second chamber with full cylinders, the serviceman will press the right button once sending a signal to zone 8 which causes the control panel to communicate with the handheld device.

Monitoring the operation of the gas supply system includes not only supervision of gas pressure from the cylinders but also checking of other operation status. In this embodiment, multiple components (e.g. vaporizer 8, control panel 38) are powered by electricity from an isolator (not shown in figures). The isolator is also connected to the control panel 38. In the event that there is a power failure, the vaporizer 8 will not work and supply of gas will gradually cease. At such instance the isolator will send a signal to the control panel which then generates a predetermined message to the handheld device, e.g. "Outlet: ABC Restaurant, Power failure".

When power supply to the isolator has resumed, the isolator will send a signal to the control device which then generates a predetermined message to the handheld device, e.g. "Outlet: ABC Restaurant, Power back to normal".

5 Although the control panel 38 is powered by an external power source, it also has a backup battery supply. The control panel 38 is configured to send a message e.g. "Battery failure" to the handheld device when the battery is no longer working. When the battery has been replaced, the control panel 38 is configured to send a message e.g. "Battery back to normal" to the handheld
10 device.

From the above described scenario, it can be understood that an attendant can monitor a gas supply system remotely. In fact, one attendant can monitor multiple gas supply systems all with one handheld device. In other
15 embodiments, multiple handheld devices may be connected to the system or systems such that multiple personnel can be advised of status of various operating conditions of the system(s). On receipt of message indicating for example pressure status or operation status of gas supply system(s), the attendant can have an overview of general working condition of the system(s)
20 and priorities tasks to be performed and delegate manpower accordingly. With a system in according to the present invention, minimal manpower is needed to provide reliable supply of gas.

It is to be noted that the system 2 is also provided with a number of
25 other devices at various locations. These devices include for example pressure indicators (PIs), pressure safety relief valves, manual emergency shut valves, auto changeover valve, one way valves, stop valves, solenoid valves, gas detectors, alarm signals, flexible hoses, flexible hoses with pig tail, weather proof insulator, pressure switch valves (PSVs), regulators,
30 over pressure protection devices (OPD) knockout pot, etc. These devices are indicated in the Figure 1 either as symbols or labels or both. A skilled person on reading Figure 1 as engineering drawing will be able to understand the role

of these devices in the context of the present invention. For reason of clarity and brevity, the role of these devices is not explained herein.

It should be understood that certain features of the invention, which are, for clarity, described in the content of a separate embodiments, may be provided in combination in a single embodiment. Conversely, various features of the invention which are, for brevity, described in the content of a single embodiment, may be provided separately or in any appropriate sub-combinations. It is to be noted that certain features of the embodiments are illustrated by way of non-limiting examples. For example, in certain embodiments the system may be adapted to transport non-LPG gas. In other embodiments, the vaporizer may broadly serve to facilitate movement of gas in the system and serves as a pump. Yet in other embodiments, the handheld device may take the form of a portable computer. Alternatively, the device for monitoring the pressure status or operation status on the system may exist in a centre or an office in a remote location. Similarly, the text messages illustrated in above examples may instead take the form of email messages sent to a pre-designated email account.

Claims:

1. A system for monitoring supply of liquid petroleum gas, comprising:-
 - (a) a first source of liquid petroleum gas;
 - (b) a second source of liquid petroleum gas;
 - 5 (c) a vaporizer;
 - (d) a first piping assembly connecting the first source of liquid petroleum gas and and the vaporizer;
 - (e) a second piping assembly connecting the second source of liquid petroleum gas and the vaporizer;
 - 10 (f) a third piping assembly connecting the vaporizer and appliance of end user;
 - (g) pressure sensors arranged to detect gas pressure in the system;
 - (h) a control panel connected to the pressure sensors and adapted to perform one or more predetermined actions in response to signals received, the signals corresponding to pressure detected in
15 respective locations in the system, the predetermined actions include an action of generating a message to be sent to a designated electronic device supervised by an attendant;wherein piping from the first source of liquid petroleum gas and piping
20 from the second source of liquid petroleum gas pass through means for controlling which of the first and second sources of liquid petroleum gas is to be utilized.
2. A system as claimed in Claim 1, wherein the first source of liquid
25 petroleum gas is contained in one or more cylinders in a first chamber.
3. A system as claimed in Claim 1, wherein the second source of liquid petroleum gas is contained in one or more cylinders in a second chamber.
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4. A system as claimed in Claim 3, comprising a second piping assembly connecting the second source of liquid petroleum gas and the vaporizer.

5. A system as claimed in Claim 1, wherein said control means is in the form of a manifold.
- 5 6. A system as claimed in Claim 1, wherein said control means is configured to allow supply of liquid petroleum gas from one of the gas sources when the other gas source is running low.
- 10 7. A system as claimed in Claim 1, wherein the pressure sensors include a first pressure sensor arranged to detect pressure in the first piping assembly and a second pressure sensor arranged to detect pressure in the second piping assembly.
- 15 8. A system as claimed in Claim 7, wherein the pressure sensors include a third pressure sensor arranged to detect pressure between the control means and the vaporizer.
- 20 9. A system as claimed in Claim 8, wherein the pressure sensors include a fourth pressure sensor arranged to detect gas pressure in the third piping assembly.
- 25 10. A system as claimed in Claim 9, comprising a plurality of pressure gauges for indicating pressure detected by the pressure sensors.
- 30 11. A system as claimed in Claim 10, wherein the pressure gauges include a first pressure gauge, a second pressure gauge, a third pressure gauge, and a fourth and a fifth pressure gauge, configured to display reading of pressure detected by the first pressure sensor, the second pressure sensor, the third pressure sensor, and the fourth pressure sensor, respectively.
12. A system as claimed in Claim 10, wherein the pressure gauges and the pressure sensors exist as integral devices or as pressure switches.

13. A system as claimed in Claim 10, wherein the pressure gauges are arranged at a location remote from the sources of liquid petroleum gas.
14. A system as claimed in Claim 1, wherein the control panel is arranged at a location remote from the sources of liquid petroleum gas.
15. A system as claimed in Claim 1, wherein the control panel is configured to output an alert message to the electronic device when at least one of the following conditions has taken place:
- (a) pressure detected by the first pressure sensor falls below 40psi;
 - (b) pressure detected by the second pressure sensor falls below 40psi;
 - (c) pressure detected by the third pressure sensor falls below 30psi; and
 - (d) pressure detected by the fourth pressure sensor falls below 12psi or 16psi.
16. A system as claimed in Claim 15, wherein the message is in the form of a text or SMS message to be sent to a cellular phone supervised by an attendant.
17. A system as claimed in Claim 1, wherein the control panel is configured to generate a message when power supply to an electrical power consumption unit in the system is interrupted.
18. A system for monitoring delivery of gas, comprising:-
- (a) a first source of liquid petroleum gas;
 - (b) a second source of liquid petroleum gas;
 - (c) a vaporizer;
 - (d) a first piping assembly connecting the first source of liquid petroleum gas and the vaporizer;
 - (e) a second piping assembly connecting the second source of liquid petroleum gas and the vaporizer;

- (f) a third piping assembly connecting the vaporizer and appliance of end user;
 - (i) pressure sensors arranged to detect gas pressure in the system;
 - (g) a control panel connected to the pressure sensors and adapted to perform one or more predetermined actions in response to signals received, the signals corresponding to pressure detected in respective locations in the system, the predetermined actions include an action of generating a message to be sent to a designated electronic device supervised by an attendant;
- wherein piping from the first source of liquid petroleum gas and piping from the second source of liquid petroleum gas pass through means for controlling which of the first and second sources of liquid petroleum is to be utilized;
- wherein the pressure sensors include a first pressure sensor arranged to detect pressure in the first piping assembly and a second pressure sensor arranged to detect pressure in the second piping assembly;
- wherein the pressure sensors include a third pressure sensor arranged to detect pressure between the control means and the vaporizer; and
- wherein the pressure sensors include a fourth pressure sensor arranged to detect gas pressure in the third piping assembly.

19. A system for monitoring delivery of gas, comprising:-

- (a) a first source of liquid petroleum gas;
- (b) a second source of liquid petroleum gas;
- (c) a vaporizer;
- (d) a first piping assembly connecting the first source of liquid petroleum gas and the vaporizer;
- (e) a second piping assembly connecting the second source of liquid petroleum gas and the vaporizer;
- (f) a third piping assembly connecting the vaporizer and appliance of end user;
- (g) pressure sensors arranged to detect gas pressure in the system;

(h) a control panel connected to the pressure sensors and adapted to perform one or more predetermined actions in response to signals received, the signals corresponding to pressure detected in respective locations in the system, the predetermined actions include an action of generating a message to be sent to a designated electronic device supervised by an attendant;

wherein piping from the first source of liquid petroleum gas and piping from the second source of liquid petroleum gas pass through means for controlling which of the first and second sources of liquid petroleum is to be utilized;

wherein the pressure sensors include a first pressure sensor arranged to detect pressure in the first piping assembly and a second pressure sensor arranged to detect pressure in the second piping assembly;

wherein the pressure sensors include a third pressure sensor arranged to detect pressure between the control means and the vaporizer;

wherein the pressure sensors include a fourth pressure sensor arranged to detect gas pressure in the third piping assembly; and

wherein the control panel is configured to output an alert message to the electronic device when at least one of the following conditions has taken place:

- (i) pressure detected by the first pressure sensor falls below 40psi;
- (ii) pressure detected by the second pressure sensor falls below 40psi;
- (iii) pressure detected by the third pressure sensor falls below 30psi; and
- (iv) pressure detected by the fourth pressure sensor falls below 12psi or 16psi.

20. A method of monitoring delivery of liquid petroleum gas using a system as claimed in one of Claims 1-19.

21. A method of monitoring delivery of cylinder-containing liquefied gas in a gas distribution system to gas consumption units and maintaining the gas distribution system, comprising the steps of:

- 5 (a) detecting gas pressure or operation status in at least one location of the gas distribution system by one or more pressure sensors and/or operation status checking means;
- 10 (b) processing data of the detected gas pressure as to whether the detected pressure being within predetermined acceptable parameters or whether the detected operation status being within acceptable condition;
- (c) generating one or more messages to be sent to an electronic device supervised by an attendant when the detected pressure not being within predetermined acceptable parameters or the detected operation status not being within acceptable condition;
- 15 (d) attending to problems causing the detected pressure not being within predetermined acceptable parameters or the detected operation status not being within acceptable condition; and
- (e) restoring the gas distributing system to operational condition.