May 15, 1951 L. E. HARPER 2,552,783

HOUSED GAS SUPPLY WITH GAS WEIGHING MEANS

Filed Feb. 21, 1947 3 Sheets-Sheet 1

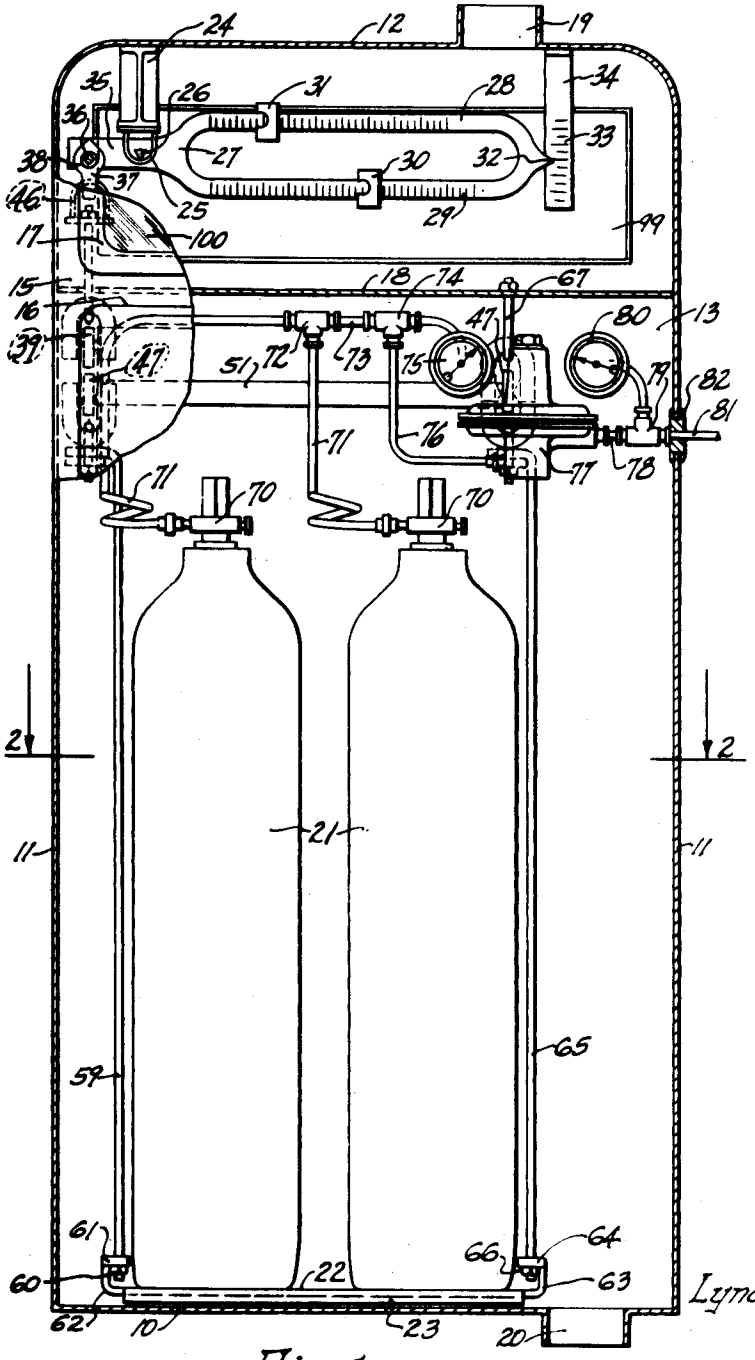


Fig. 1.

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HOUSED GAS SUPPLY WITH GAS WEIGHING MEANS

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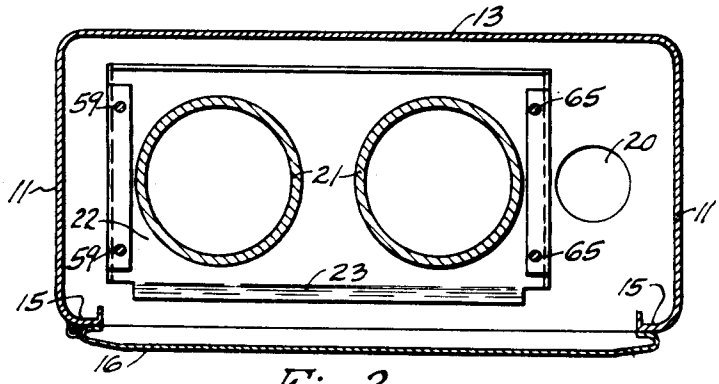


Fig. 2.

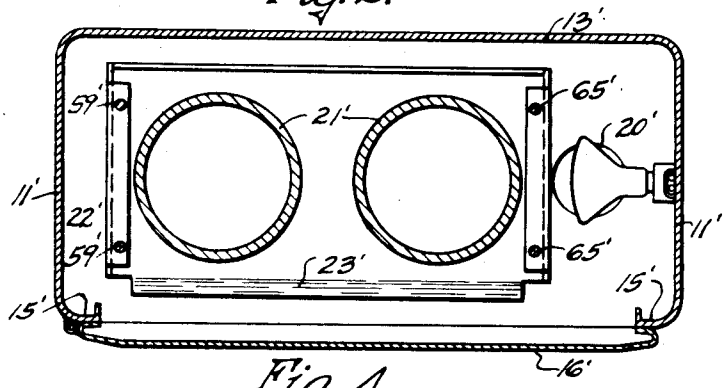


Fig. 4.

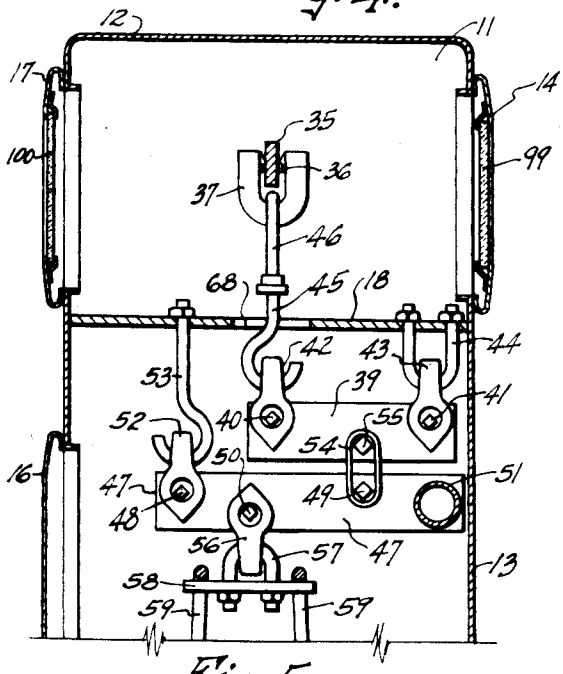


Fig. 5.

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HOUSED GAS SUPPLY WITH GAS WEIGHING MEANS

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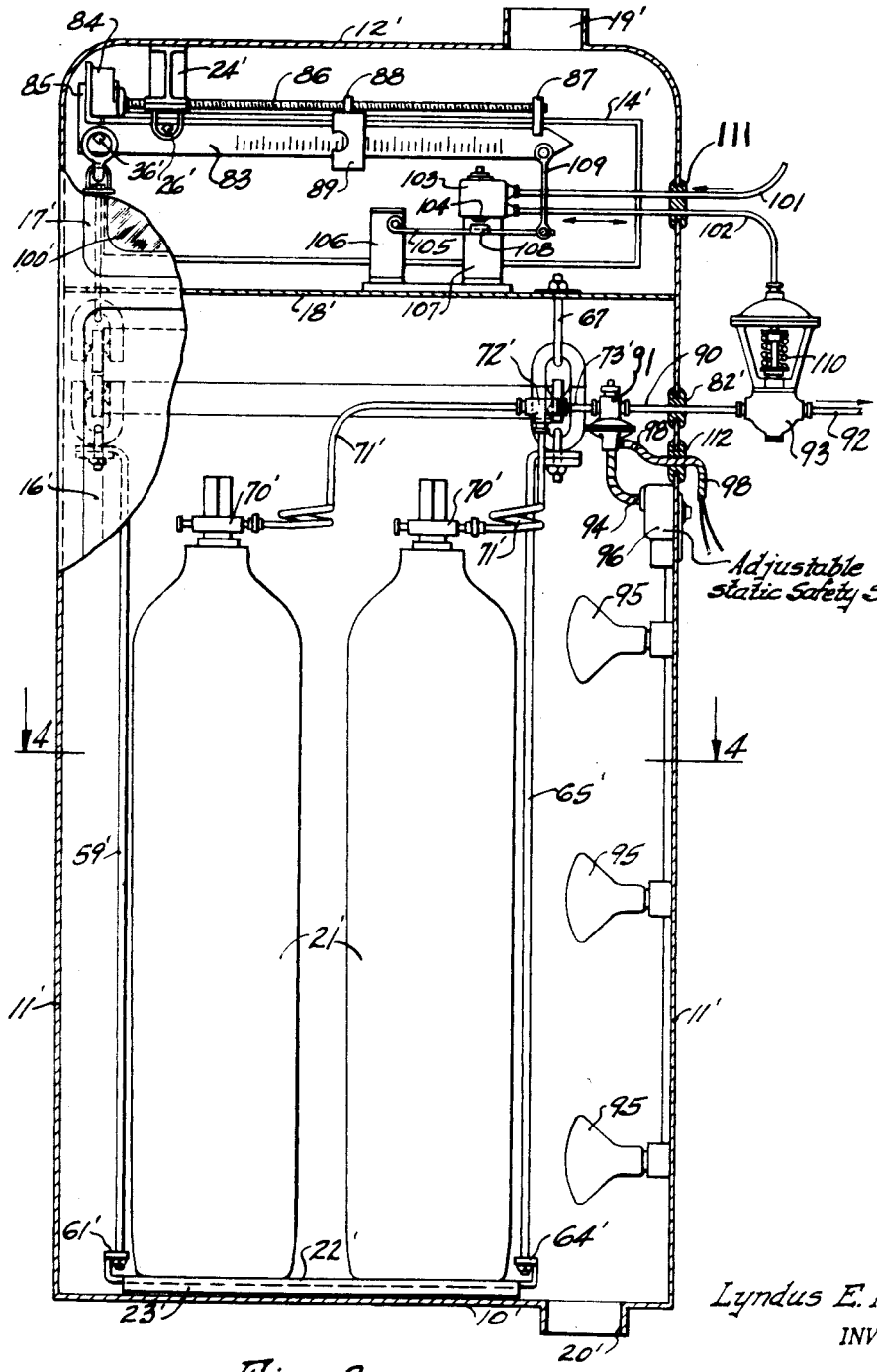


Fig. 3.

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UNITED STATES PATENT OFFICE

2,552,783

HOUSED GAS SUPPLY WITH GAS WEIGHING MEANS

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Application February 21, 1947, Serial No. 730,161

16 Claims. (Cl. 62—1)

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My invention relates to gas supplying means, and particularly to a housed gas supply.

In providing means for supplying gases for various purposes, such as chlorine to a chlorinator, the gas is supplied from cylinders in which it is contained under pressure and the supplying means comprises means for controlling the flow of the gases to some suitable apparatus where the gases are utilized. Many of the gases that are used are very objectionable in their effect on human beings and in some cases are positively harmful.

Such gases as chlorine and ammonia are particularly objectionable and harmful if the same escape into the air in a room, and inasmuch as it is difficult to always provide absolutely tight connections in all of the apparatus, and particularly between the cylinders in which the gases are contained and the conduit means that carries the gases away from the cylinders, these gases frequently escape in such quantity from such cylinders while being used for supplying gases, that they soon become either annoying or dangerous.

It is an important purpose of my invention to provide a housing for cylinders containing such gases, which is provided with suitable venting means whereby any escaping gases can be carried outside of the building in which the containers are being utilized, whether these gases are heavier or lighter than air.

In utilizing gases that are in a compressed or in a liquid form in a cylinder, the passage of the gases through an outlet from the cylinder, with great increase in velocity, causes a cooling action which reduces the rate of flow of the gases due to the fact that the cooling prevents the vaporization of the liquefied gases at a desired rate, even sometimes causing solidification or liquefaction of the gases in the passages, in the case of certain gases, if the temperature of the cylinder and its contents becomes too low.

It is another purpose of my invention to provide a housing that contains such cylinders from which gases are discharged, in which the rate of flow of the gases from the cylinders can be controlled so as to obtain an adequate supply thereof, by providing means for heating the cylinders or the surrounding atmosphere in the housing, to offset this chilling effect. Thus the use of extremely large numbers of cylinders in chlorinators and similar devices can be avoided, such use of a great multiplicity of cylinders having been the only previously known means of assuring an adequate supply, and that has not always been successful.

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My invention is particularly adapted for use in connection with devices in which the cylinders that contain the gases are mounted on weighing apparatus, which is used either to check the amount of gases that are fed from the cylinders in a certain time interval, or to control the flow of gases to some apparatus where the same are utilized. In such weighing apparatus any draft of air or other disturbing elements that might contact the cylinders or the weighing apparatus will cause an inaccuracy, resulting in an adjustment of the controlling means that is not in accordance with the desired purpose of said controlling means. By enclosing the cylinders in a housing along with the weighing means, this is entirely eliminated.

There is a further advantage in providing a housing for apparatus that comprises either weight responsive or other controlling means that may be either manually adjustable or otherwise, and that is that the controlling means can not be disturbed either intentionally or accidentally by anyone who is not authorized or capable of adjusting the same, or in case the controlling means is automatic and interference therewith manually would destroy the advantage of the automatic control.

Another purpose of my invention is to provide in combination with means for controlling the temperature of cylinders containing compressed gases, means responsive to the pressure of the gases that have passed from said cylinders into a conduit for passage out of the housing, which controls the operation of heating means in the housing so as to maintain a desired pressure in said conduit and thus a desired rate of flow of the gases through such conduit. Such controlling means can be, and preferably is, further combined with weight responsive means for controlling the rate of supply of the gas to apparatus to which it may be fed, such as a chlorinator. Preferably, the said pressure responsive means, as well as the weight responsive means, is located in the above referred to housing so as to not be affected by outside influences of any kind.

Another purpose of my invention is to provide in a housing for compressed gas cylinders that contains weighing means, a weighing means of such a character that the cylinders can be readily inserted in the housing without any lifting of the same to any appreciable extent. As such cylinders are ordinarily quite heavy, this is of decided advantage in the handling of such gases.

Other objects and advantages of my invention will appear as the description of the drawings

proceeds. I desire to have it understood, however, that I do not intend to limit myself to the particular details shown or described, except as defined in the claims.

In the drawings:

Fig. 1 is a view partly in vertical section and partly in elevation of my improved housed gas supply apparatus.

Fig. 2 is a section taken on the line 2—2 of Fig. 1.

Fig. 3 is a view similar to Fig. 1 of a modification.

Fig. 4 is a section taken on the line 4—4 of Fig. 3, and

Fig. 5 is a fragmentary sectional view taken at right angles to Fig. 1.

Referring in detail to the drawings, in Figs. 1, 2 and 5 is shown a housing having a bottom wall 10, side walls 11, a top wall 12 and a rear wall 13. The rear wall 13 is provided with an opening in the upper portion thereof which is provided with a suitable closure, such as the door 14, providing access to apparatus in the upper portion of the housing, and having a transparent portion 99. The housing is further provided with a front wall 15, which is provided with doors 16 and 17, the door 16 providing access to the compartment in which the cylinders are located below the transverse partition 18 that divides the housing into an upper and a lower compartment, and the door 17 being in the upper portion of the wall 15 above the partition 18, and having a transparent portion 100.

The top wall 12 is provided with a vent 19 to which any suitable conduits may be connected that lead to the outer air, and the bottom wall 10 is provided with a vent 20 to which any suitable conduits may be connected leading to the outer air. The vent 19 is provided for venting gases lighter than air from the housing and the vent 20 is provided for venting gases heavier than air from the housing. The doors 14, 16 and 17, preferably, have a substantially gas tight fit with the walls in which the same are provided.

In the form of the invention shown in Figs. 1, 2 and 5 a pair of gas cylinders 21 is shown as being mounted on the platform 22 of scales. While a pair of cylinders is shown, obviously the invention is applicable to any number of cylinders. The platform 22 of the scales is, preferably, located adjacent the bottom 10 of the housing so that when the door 16 is opened the cylinders 21 can be readily placed in position thereon. In order to facilitate this the platform 22 is provided with a downwardly inclined lip 23.

While the particular construction of the lever system and mounting of the scales can be varied, a suitable mounting therefor is illustrated in Figs. 1, 2 and 5, a beam 24 being shown as being fixed to the top wall 12 and depending therefrom, from which a U-shaped member 25 depends, on which the fulcrum 26 of a scalebeam 27 is mounted. The scalebeam is shown as being provided with a bifurcated portion having the arms 28 and 29, which are suitably graduated and on which the weights 30 and 31 are adapted to be adjusted. Any suitable means for indicating the balance of the scales may be provided, such as the pointer 32 formed on the end of the beam, which engages a scale 33 provided on a bracket 34 depending from the top wall 12. The short arm 35 of the scalebeam 27 has fulcrum members 36, from which the U-shaped member 37 is hung, said U-shaped member 37 being provided with openings 38 for receiving the fulcrum members.

A short lever 39 is provided with a pair of fulcrum members 40 and 41, which are received in the openings in the U-shaped members 42 and 43, said member 43 being mounted on a U-bolt 44 secured to the partition 18 and depending therefrom, and the member 42 being suspended from a hook-like member 45, which is connected with the U-shaped member 37 adjustably by any suitable means, such as the member 46.

A lever 47 is shown in Fig. 5 as being provided with a plurality of fulcrums 48, 49 and 50, there being a pair of said levers 47 connected by means of a tubular connecting member 51 (see Figs. 1 and 5). A U-shaped member 52 cooperates with the fulcrums 48 to suspend said lever near one end thereof from a hook 53 suspended from the member 18, and a pair of links 54 extending over the fulcrums 55 on the lever 39 and receiving the fulcrums 49, suspend the lever 47 from the lever 39. The fulcrums 50 have a U-shaped member 56 supported thereby and depending therefrom, to which a U-bolt 57 is connected that supports a plate-like member 58, into which the upper ends of a pair of rods 59 are hooked, said rods 59 having screw-threaded ends provided with nuts 60 for securing the same to ears 61 on the upstanding flange 62 on the platform 22.

The opposite upstanding flange 63 is provided with ears 64 through which rod-like members 65 extend, said rod-like members having screw-threaded ends to which the nuts 66 are connected for securing said rods to said ears. The upper ends of the rods are similarly connected to the lever 47 on the opposite end of the tubular member 51 to that to which the rod-like members 59 are connected, but said lever 47 is suspended from the partition 18 by means of a U-bolt 67.

It will be noted from the above that the platform 22 is thus suspended instead of being supported from below, making it possible to place the same close to the bottom wall 10. While a certain leverage system is illustrated between the suspending means for the platform and the scalebeam 27, this can be varied as may be found desirable, the important thing being that the scale platform 22 is suspended from the partition 18 and from the scalebeam 27. The hook-like member 45 extends through a suitable opening 68 in the partition 18.

The cylinders 21 are provided with suitable connecting means 70 for connecting the outlets thereof with the conduits 71, which lead to a T 72 that has a conduit 73 extending therefrom. Another T 74 is provided in the conduit for connecting a pressure gauge 75 therewith and a conduit 76 extends from the T 74 to a pressure reducing valve 77, which is, preferably, of an adjustable type, and said pressure reducing valve has its outlet connected with a conduit 78, which may again be provided with a T 79 for connecting a pressure gauge 80 therewith, from which a conduit 81 extends out through the wall 11, a suitable bushing 82 being provided in said wall for making a fluid tight connection between the conduit 81 and said wall. The conduit 81 may lead to any suitable apparatus, such as a chlorinator, to which the gas from the cylinders 21 is to be supplied.

The weighing means in this form of the invention merely serves as means for checking the amount of gas that has passed from the cylinders 21 and the housing serves principally to prevent escape of gases into the air of the room in which the same is located, and to prevent tampering with the adjustable pressure valve 77 or other-

wise with the connections between the cylinders 21 and the conduits and with the weighing apparatus. Also in this form of the invention the accuracy of the weighing operation is increased by providing the housing, because the lower door 16 can be kept closed while the weights are adjusted through the opening provided by means of the door 17.

If it is desired to control the temperature of the gases in the cylinders, the form of the invention shown in Figs. 3 and 4 is provided. The housing in this form of the invention is substantially the same as that previously described, being provided with a bottom wall 10', side walls 11', top wall 12', the rear wall 13' having the door 14' and the forward wall 15' having the doors 16' and 17', a partition 18' being provided to divide the housing into an upper and a lower compartment. The vents 19' and 20' corresponding to the vents 19 and 20 are also provided and for the same purpose as in the form of the invention shown in Figs. 1 and 2. The platform 22' is provided with an inclined lip 23' and is suspended in a similar manner to the platform 22, the cylinders 21' being mounted on said platform 22'. The scalebeam 83 is provided with a support from the beam 24' by means of the fulcrum 26' and suspends the platform 22' therefrom by means of the fulcrums 36' in a similar manner to that previously described, pairs of rod-like members 59' and 65' suspending the platform 22' from the ears 61' and 64'.

However, the operation of the scales is somewhat different from that in the form of the invention shown in Figs. 1 and 2 and the scales serve a different purpose, in that the same act as controlling means for controlling the flow of gas that is being supplied from the cylinders 21'. In order to accomplish this, a variable speed motor 84 is mounted on an upstanding bracket 85 on the scalebeam and drives a feed screw 86, which is rotatable in a bracket 87. An ear 88 on the weight 89 has screw-threaded connection with the feed screw 86 and it will be obvious that by adjusting the speed of the motor 84 the rate of travel of the weight 89 along the scalebeam can be controlled to advance the same along the scalebeam at a desired rate, for a purpose to be described below.

The cylinders 21' are provided with connecting means 70' connecting the outlets thereof with the conduits 71' and said conduits 71' lead to a T 72' from which the conduit 73' extends, it being obvious that while two cylinders 21' and corresponding connections are shown, the number can be varied as may be found desirable. The conduit 73' leads to a conduit 90 through a pressure controlled switch 91, and said conduit 90 extends through a bushing 82' in the wall 11' and is connected with a gas supply conduit 92 through a pressure controlling valve 93. The pressure actuated switch 91 is of such a character that it will close the circuit in which it is interposed when the pressure of the gas passing through the same drops below a predetermined minimum. Said switch is interposed in one of the conductors of an electrical cord 94 that leads to a plurality of heat lamps 95, or other suitable heating devices, contained within the lower chamber of the housing. The heat lamps or other heating means can be disposed in any desired manner in the housing to obtain the desired heating of the cylinders 21' and the contents thereof or the surrounding atmosphere within the chamber in which said cylinders are located.

Thermostatic means for shutting off the electrical current supplied to the lamps 95 may be provided by interposing an adjustable thermostatic switch 96 in series with the switch 91 as in the cord 94. Any suitable means for supplying electrical current from externally of the housing, such as the cord 98 leading to the switch 91 from externally of the housing, may be provided.

It will accordingly be seen that means is provided for obtaining a suitable flow of gas under uniform pressure from the cylinders 21' to the conduit 90. The rate of supply of gas to any suitable apparatus through the conduit 92 is controlled by means of the pressure controlled valve 93 from the scalebeam 83. The controlling means for said pressure controlled valve comprises an air supply pipe 101, which leads to an air supply pipe 102 through a bleeder valve 103. Said pipe 102 is connected with the air actuated controlling valve 93. The bleeder valve 103 is provided with a bleed opening comprising an orifice in a nozzle 104, the effective size of the orifice being controlled by means of a flap valve mounted on a pivoted lever 105 mounted pivotally on a bracket 106 on the partition 18', the valve 103 being also mounted on a bracket 107 on said partition 18'. The lever 105 that is pivotally mounted on the bracket 106 has a flat faced projection 108 providing said flap valve the spacing of which from the orifice determines the effective size of the orifice and the pressure effective to control the valve 93. The lever 105 is connected at its other end with a link 109 that is in turn connected pivotally with the scalebeam 83.

In operation the weight 89 will travel at a predetermined rate along the scalebeam and this travel will be from right to left so as to compensate for the loss in weight of the cylinders 21' as the gas is being discharged therefrom, provided that the gas is being supplied at a sufficient rate to the conduit 92. In case the supply of gas to the conduit 92 falls short of the desired rate, the weight 89 will travel further to the left than just sufficient to keep the scalebeam balanced and the scalebeam will rise at the end at which the link 109 is connected therewith, engaging the valve stem 104 to cause the bleed opening to be reduced in size, increasing the air pressure on the actuating means in the valve 93, which will tend to open the valve 93 further against the pressure of the spring 110, which would normally keep the valve seated, if no air under pressure were supplied to the valve. If the valve 93 is open too far so as to supply too great a flow of gas to the pipe 92, then the loss in weight of the contents of the cylinders 21' will be greater than that which would keep the scalebeam balanced by means of the weight 89, which will cause the scalebeam to drop at its end to which the link 109 is connected, thus causing the valve having the stem 104 to be opened further and thus opening the bleed opening to a greater extent to reduce the pressure in the pipe 102, which will cause the valve 93 to close to a sufficient extent to adjust the flow of the gas into the pipe 92, so as to balance the scalebeam.

Suitable means may be provided for making the housing fluid tight where the pipes pass through the wall 11' and where the cord 98 passes therethrough, such as the sealing members 111 and 112.

What I claim is:

1. A gas supply apparatus, comprising a housing, a compressed gas container in said housing, means for conducting gas from said container to

the exterior of said housing, and venting pipe connections on said housing, said housing being closed gas tight except for said pipe connections.

2. A gas supply apparatus, comprising a housing, a compressed gas container in said housing, means for conducting gas from said container to the exterior of said housing, said housing having gas tight side walls having openings therein, gas tight closures for all said openings, and venting means for said housing including a vent pipe connection in the top wall thereof, said housing being closed gas tight except for said venting means.

3. A gas supply apparatus, comprising a housing, a compressed gas container in said housing, means for conducting gas from said container to the exterior of said housing, said housing having gas tight side walls having openings therein, gas tight closures for all said openings, and venting means for said housing including a vent pipe connection in the bottom wall thereof, said housing being closed gas tight except for said venting means.

4. A gas supply apparatus, comprising a housing, scales confined entirely within said housing having a platform adjacent the bottom of said housing, weighing mechanism in the upper portion of said housing, and means for suspending said platform from said weighing mechanism, a compressed gas container in said housing below said weighing mechanism and supported on said platform, means for conducting gas from said container to the exterior of said housing, and venting means for said housing, said housing being closed gas tight except for said venting means.

5. A gas supply apparatus, comprising a housing, a compressed gas container in said housing, means for conducting gas from said container to the exterior of said housing, weight responsive means for controlling the flow of gas from said container comprising scales confined entirely within said housing having a platform within said housing on which said container is mounted, and venting means for said housing, said housing being closed except for said venting means.

6. A gas supply apparatus, comprising a housing, a compressed gas container in said housing, means for conducting gas from said container to the exterior of said housing, and means for controlling the temperature of the gas in said container, comprising electrical heating means in said housing externally of said container, and means controlling the operation of said heating means comprising manually adjustable thermostatic switching means responsive to the temperature within said housing and switching means responsive to the pressure of the gas in said conducting means connected in series with said thermostatic means.

7. A gas supply apparatus, comprising a housing, a compressed gas container detachably mounted in said housing, means for conducting gas from said container to the exterior of said housing, means for controlling the temperature of the gas in said container, comprising electrical heating means in said housing externally of said container, and means controlling the operation of said heating means comprising manually adjustable thermostatic switching means responsive to the temperature within said housing and switching means responsive to the pressure of the gas in said conducting means connected in series with said thermostatic means, and venting means for said housing, said housing being gas tight except for said venting means.

8. A gas supply apparatus, comprising a housing, a compressed gas container in said housing, means for conducting gas from said container to the exterior of said housing, weight responsive means, including means for continuously uniformly adjusting the same, and means responsive to the pressure in said conducting means cooperating to control the rate of flow of gas from said container, said pressure responsive means controlling the temperature of the gas in said container, and said weight responsive means controlling the rate of flow of the gas through said conducting means.

9. A gas supply apparatus, comprising a housing, a compressed gas container in said housing, means for conducting gas from said container to the exterior of said housing, weight responsive means and means responsive to the pressure in said conducting means cooperating to control the flow of gas from said container, said pressure responsive means controlling the temperature of the gas in said container, said weight responsive means comprising scales confined entirely within said housing, and venting means for said housing, said housing being closed except for said venting means.

10. A gas supply apparatus comprising a housing, scales confined entirely within said housing, a plurality of compressed gas containers independently detachably mounted in said housing on said scales, conduit means for conducting gas from said containers to the exterior of said housing, and venting means for said housing, said scales having weighing mechanism in the upper portion of said housing and a platform suspended therefrom supporting said containers, said platform being the lowest portion of said scales and lying closely adjacent the bottom of said housing.

11. A gas supply apparatus, comprising a housing, a compressed gas container in said housing, means for conducting gas from said container to the exterior of said housing, a vent pipe connection in the top of said housing and a vent pipe connection in the bottom of said housing, said housing being closed gas tight except for said vent pipe connections.

12. A gas supply apparatus, comprising a housing, scales confined entirely within said housing, a compressed gas container in said housing on said scales, means for conducting gas from said container to the exterior of said housing, a partition dividing said housing into an upper and a lower chamber, said gas container being mounted in said lower chamber, a movable closure for said lower chamber, scale adjusting means in said upper chamber, a movable closure for said upper chamber, and means for conducting gas escaping into said housing away from said housing, said housing being otherwise gas tight when said closures are closed.

13. A gas supply apparatus, comprising a housing, scales confined entirely within said housing having a platform adjacent the bottom of said housing, a plurality of upright rods suspending said platform from said scales at the lower ends thereof, a compressed gas container in said housing supported on said platform, and means for conducting gas from said container to the exterior of said housing.

14. A gas supply apparatus, comprising a housing, scales confined entirely within said housing

having a platform adjacent the bottom of said housing, said platform having a downwardly inclined lip at one edge thereof, a plurality of upright rods suspending said platform from said scales at the lower ends thereof, a compressed gas container in said housing supported on said platform, and means for conducting gas from said container to the exterior of said housing.

15. A gas supply apparatus, comprising a housing, a compressed gas container in said housing, means for conducting gas from said container to the exterior of said housing, a fluid pressure actuated valve in said conducting means, weight responsive means controlling fluid pressure applied to said valve, and means for continuously adjusting said weight responsive means to control the position of said valve and rate of flow of gas through said conducting means.

16. A gas supply apparatus, comprising a housing, a compressed gas container in said housing, means for conducting gas from said container to the exterior of said housing, weight responsive means within said housing comprising a scalebeam, a weight movable along said beam and means for moving said weight along said beam at a uniform rate, a fluid pressure actuated valve externally of said housing controlling rate of flow of gas through said conducting means, and means within said housing actuated by said scalebeam to control the fluid pressure applied to said valve.

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