

May 29, 1934.

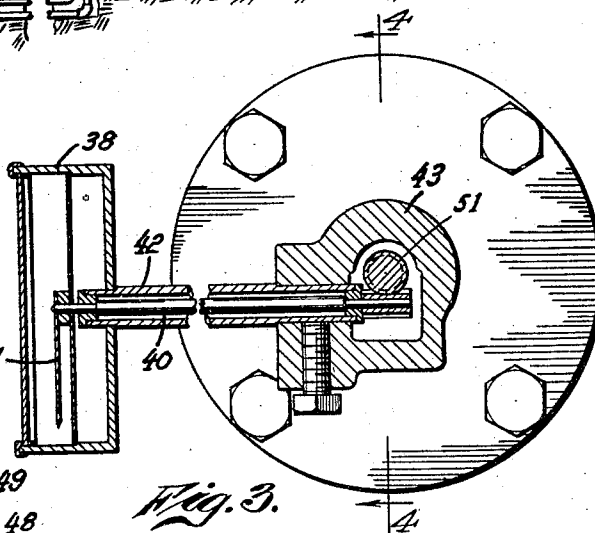
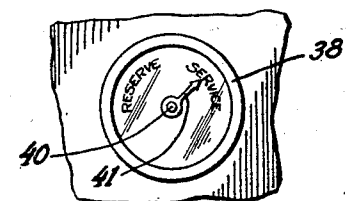
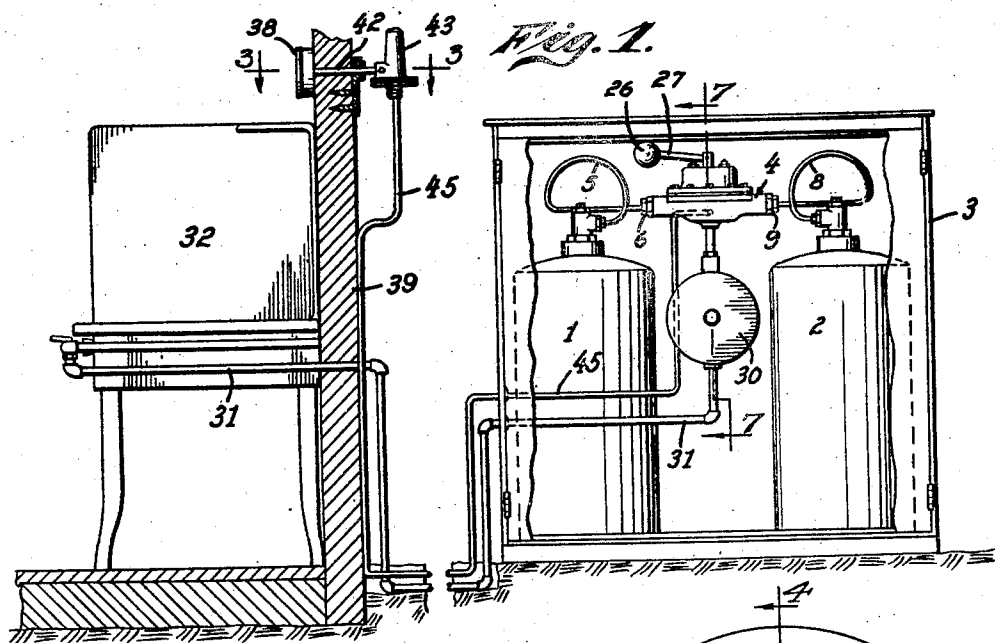
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1,960,466

GAS DISTRIBUTING APPARATUS

Filed May 27, 1930

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

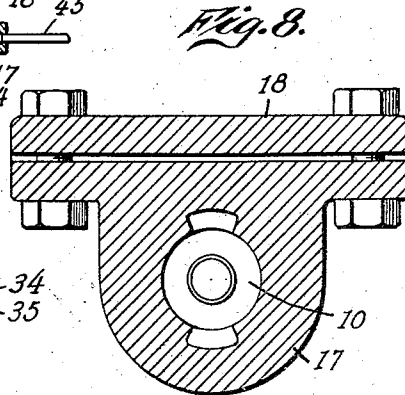
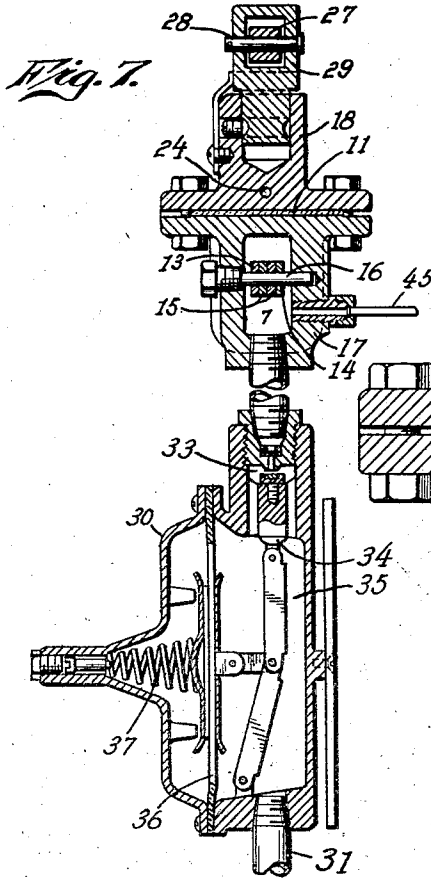


Fig. 5.

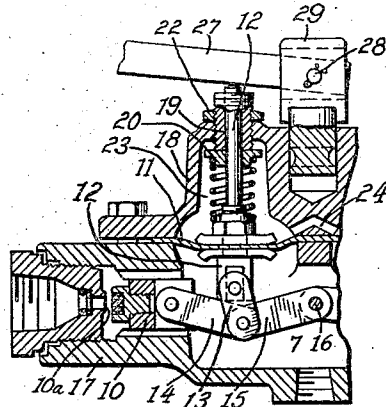
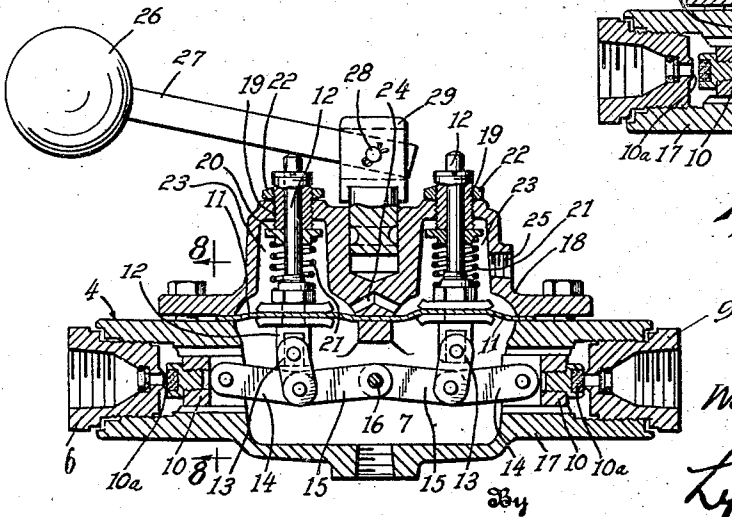


Fig. 6.

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UNITED STATES PATENT OFFICE

1,960,466

GAS DISTRIBUTING APPARATUS

Walter I. Thrall, Alhambra, Calif., assignor, by
mesne assignments, to Reliance Regulator
Corporation, Los Angeles, Calif., a corporation
of California

Application May 27, 1930, Serial No. 456,145

5 Claims. (Cl. 50—26)

This invention relates to a gas plant and while features of the invention may be applied in gas plants of any capacity or for any purpose, it is intended to have its greatest usefulness when applied to small isolated gas plants such as may be employed for supplying a relatively small quantity of gas at a uniform pressure. While such gas could be used for any purpose whatever, in the accompanying specification the invention is described as applied to a small gas plant of this type for supplying gas for household use, for example, in a cook stove.

The general object of the invention is to provide a gas plant having different sources of supply delivering gas at a common point and having means for effecting the drawing of gas from one of the sources of supply until that source of supply fails or becomes reduced and then automatically drawing the gas from the other source of supply; also to provide a plant of this type with means for insuring the delivery of gas at a substantially uniform pressure in the service line.

A further object of the invention is to provide means for indicating automatically which source of supply is being drawn upon by the service pipe.

The invention is capable of practical use in small household plants in which liquefied gas is provided in reservoirs or "bottles" capable of sustaining high pressure. One of the objects of the invention is to provide means to co-operate with two such bottles to enable either bottle to be placed in service and at the same time to automatically supply the gas from the other bottle when the bottle being used is incapable of maintaining the necessary pressure in the service pipe.

Small plants of this kind may be employed in cold climates, with the gas "bottles" located outside of the building in which the gas is employed, and one of the objects of the invention is to provide simple means for indicating at the delivery point of the gas supply whether the plant is operating on the regular service bottle or on the reserve or last bottle. This gives opportunity for another reserve bottle to be connected up in the plant.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combinations of parts to be described hereinafter, all of which contribute to produce an efficient gas plant.

A preferred embodiment of the invention is

described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawings:

Figure 1 is a view of a diagrammatic nature illustrating in side elevation, a gas plant embodied the invention and illustrating the same connected up to a cook stove in a building removed a short distance from the location of the bottles. In this view, a part of the cabinet of the apparatus is broken away, and certain parts are shown in cross-section.

Figure 2 is a front elevation of an indicator which may be located over a stove or at another point where gas is consumed for indicating whether the supply of gas is coming from the regular service bottle or whether it is coming from the reserve supply.

Figure 3 is a horizontal section taken about on the line 3—3 of Figure 1 but upon an enlarged scale. Portions of this view are broken away. This view illustrates details of the indicator and the means for controlling the same. This section is also indicated at the line 3—3 of Figure 4.

Figure 4 is a vertical section taken about on the line 4—4 of Figure 3 and further illustrating details of the indicator operating means.

Figure 5 is a longitudinal vertical section taken through the pressure regulating means which receives gas from either of the sources of supply. This view shows the parts in the normal operating relation during which the first source of supply or service bottle is still at a relatively high pressure and supplying gas to the receiver.

Figure 6 is a view similar to Figure 5 but showing only the left-hand of the figure, and this view illustrates the parts in the relation which they have if the pressure from the service supply or reservoir has dropped below the critical pressure at which the gas receiver normally operates.

Figure 7 is a vertical section taken about on the line 7—7 of Figure 1 and particularly illustrating the location and general construction of a secondary regulator which co-operates with the other parts of the invention in their operation.

Figure 8 is a cross-section taken on the line 8—8 of Figure 5 but upon an enlarged scale and particularly illustrating the guide for one of the valve closures, together with the means for admitting the gas past the valve closure from the inlet into the receiver.

Before proceeding to a detailed description of the invention, it should be stated that the invention enables two or more sources of gas to be employed for delivering gas at service pressure to a point of consumption and as usually practiced would involve the use of one or more containers or gas "bottles" carrying liquified gas which vaporizes and passes to pressure regulating means. The invention enables either one of the gas supplies or bottles to supply the gas for consumption, and when the gas in one bottle is substantially consumed, the apparatus automatically supplies the gas from the other bottle, or secondary source.

While the invention can be applied in situations where it is necessary to insure a uniform supply of gas at the point of consumption, it is particularly useful when applied in small gas plants such as may be employed for supplying gas for household purposes. In practice such a plant would include two or more gas "bottles" carrying liquified gas, and these "bottles" or containers are capable of sustaining a high internal pressure. According to the invention these bottles are connected up to pressure reducing and regulating means that insures the delivery of the gas at a substantially uniform service pressure in spite of the great variations in pressure that may occur in the reservoirs or "bottles" from which the gas is being taken.

The apparatus preferably includes an indicator which automatically indicates whether the gas is being drawn from the regular service reservoir or bottle, or from the reserve bottle which supplies the gas after the first service bottle has been substantially exhausted. The apparatus is so arranged that, although pressure is employed to control the indicator, there is no pressure device located within the building where the gas is being consumed.

Referring more particularly to the parts and especially to Figure 1, 1 and 2 represent two sources of gas, for example, two gas "bottles" carrying liquified gas. These bottles may be set up alongside of each other in a suitable housing or cabinet 3. In practicing the invention I provide between these bottles pressure reducing means 4 which is preferably constructed as illustrated in Figures 5 and 6. From the bottle 1, which for the purpose of illustration we will consider the primary or service bottle, a pipe 5 conducts the gas to one side of the pressure regulating means where it connects to an inlet 6. From this inlet the gas may pass into a receiver or receiving chamber 7 within the pressure regulating device 4. In other words, this receiver is preferably common to both of the bottles and may receive gas from either of them alone or both of them simultaneously. A similar connecting pipe 8 connects to the bottle 2 and delivers gas to its corresponding inlet 9. The inlets 6 and 9 have pressure regulating valves corresponding to them which are preferably of like construction. One of these valves will be now described.

Each valve comprises a movable closure 10 the position of which is regulated by the pressure existing in the receiver 7. In the present instance this is accomplished by providing a diaphragm 11 co-operating with the valve closure and provided with a stem 12 the lower end of which is located below the diaphragm and connects by a link 13 to a toggle joint formed between toggle levers 14 and 15, the former of which is pivotally attached to the

valve closure 10 and the latter of which is anchored on a fixed cross-pin 16. This cross-pin 16 is located on the central vertical axis of the regulating device and is a common anchorage for the toggle levers of both valves.

The receiving chamber 7 is preferably formed in a body or casing 17 surmounted by a removable bonnet 18 carrying means for guiding the stems 12, which means may include a bushing 19 and a collar 20 that forms a seat for a coil spring 21 that thrusts down upon the diaphragm. The bushing 19 is adjustable so as to enable the pressure of the spring against the diaphragm to be regulated.

The threaded bushing 19 may be provided with a check-nut 22 for locking it in any position in which it is set.

Each side has a chamber 23, and these chambers communicate with each other through a passage 24 and are vented to the atmosphere at 25.

In using the apparatus the two springs 21 are preferably adjusted so that their corresponding diaphragms will rise at substantially the same pressure existing in the receiver 7.

In order to enable either one of these valves to be set to operate at a higher receiver pressure than the other valve, I provide means for loading either valve to the exclusion of the other and this means is preferably constructed so that the "load" can be transferred when desired from one valve to the other. This "load" can be of any desired form but in the present instance it preferably consists of a weight 26 mounted on an arm 27 attached to a horizontal pivot pin 28 located in a swiveled head 29 mounted in the bonnet to swivel between the two stems 12.

Figure 5 illustrates this device with its parts in the position which they have in normal operation, the left valve closure 10 being slightly "cracked" and permitting gas to flow from the service reservoir 1 into the receiver 7. In practice, when the left-hand stem 12 is loaded in this way, the pressure existing in the receiver may be normally about 5 pounds per square inch and maintains the diaphragm 11 of the weighted stem in a raised position. If the pressure drops slightly, the diaphragm moves down slightly and moves the left-hand valve 10 further off its seat 10*, thereby admitting an increased flow of gas, which will raise the pressure in the receiver.

In spite of the use of a regulating valve of this character that is automatic in its operation to deliver gas to the receiver and maintain the same full of gas at a normal operating pressure, it is very difficult where the pressure of the gas in the bottle varies greatly, as it does in practice, to maintain this receiver pressure constant enough to enable it to be used in a gas burner. For this reason I prefer to provide a pressure regulating device 30 (see Figure 1) which is connected in the service pipe 31 that supplies gas to the gas consuming device, for example, a cook-stove 32, located in the building adjacent to which the gas bottles are set up.

This pressure regulating device 30 may have any desired construction but is preferably the common form illustrated in Figure 7, that is to say, it has an automatically controlled inlet 33 with a regulating valve closure 34 automatically controlled by the pressure in a receiver or pressure chamber 35. This valve is controlled by a

diaphragm 36 exposed to the pressure within the chamber 35 and pressed inwardly by a coil spring 37. This regulator is fundamentally of the same construction as the duplex type of regulating valve illustrated in Figure 5:

Means is provided for indicating within the building where the stove 32 is located, the pressure existing in the receiver 7, and the pressure indicated apprises the user of the apparatus as to whether the gas is being supplied from the service bottle 1 or the reserve bottle 2. For this purpose I provide an indicator 38 which is preferably located on the face of the wall 39 of the building, adjacent to the stove. This indicator is preferably operated by a rotatable spindle 40 that carries its pointer 41, said spindle being mounted in a tubular housing 42 that extends horizontally through the wall of the building. The outer end of this spindle is actuated in any suitable manner through the agency of a pressure controlled device 43. This device is preferably constructed as indicated in Figure 4, comprising a pressure chamber 44 connected by a pipe 45 with the receiver 7, and the chamber 44 is divided by a flexible diaphragm 46 having a stem 47 that is guided in the bonnet 48 of the device. The stem 47 is pressed downwardly by a coil spring 49 and the stem is formed with circumferential grooves to give it the effect of a rack 50. The teeth of this circumferential rack 50 mesh with a pinion 51 that is rigid with the spindle 40.

The spring 49 is adjusted by means of an adjusting plug 52 that is threaded into the upper end of the bonnet 48. The spring should be set to such a force that it will be compressed by the normal pressure in the receiver 7 when the plant is operating on the primary or service bottle 1; but when the plant is operating on the reduced pressure that exists in the receiver when the plant is operating on the secondary reservoir 2, the spring 49 will extend itself and thereby cause a rotation of the spindle 40. This will move the pointer of the indicator from the word "Service" over to the word "Reserve."

In the operation of the apparatus, when the weight 26 is set on the left-hand bottle 1, or service bottle, the valve closure 10 will be "cracked" off the seat 10^a when gas is being consumed, thereby permitting flow from the service bottle 1 into the receiver 7 and maintaining any desired normal operating pressure, for example, 5 pounds per square inch. The springs 21 may be set to maintain, for example, 2½ to 3 pounds in the receiver 7 when not loaded by the weight 26.

With this arrangement it will be evident that a pressure of approximately 5 pounds in the receiver will keep the right-hand valve closure 10 tight on its seat, as indicated in Figure 5, and no gas will be drawn from the secondary or reserve reservoir 2.

If the conditions become such that the service bottle 1 will not maintain the normal operating pressure in the receiver 7, then the weight 26, in conjunction with the spring 21, will cause the diaphragm to move down to the depressed position in which it is indicated in Figure 6. After this occurs there will be no more immediate regulation of the pressure in the receiver, but the gas will be permitted to flow freely from the bottle 1. If this should occur by reason of rapid consumption of gas, after which the gas was shut off, the pressure in the receiver might rise again sufficiently to press up the

diaphragm 11 under the weight 26 and raise the weight and restore the parts to their normal operating relation indicated in Figure 5. If, however, the gas from the service bottle 1 is all consumed so that the pressure in the receiver 7 cannot be caused to rise again by gas from this bottle, then when the pressure drops to about 2½ or 3 pounds, according to the "set" of the spring 21, the valve closure 10 corresponding to the bottle 2 will "crack" and admit gas to the receiver from the reserve bottle 2. This will deliver gas to the pressure regulator 30 at approximately 2½ to 3 pounds, and this pressure regulator 30 will continue to supply gas to the service pipe at substantially the same pressure as before.

As soon as the pressure falls in the receiver from the normal service bottle operating pressure of 5 pounds to the reserve bottle operating pressure of about 2½ to 3 pounds, then the change in pressure at the pressure actuated device 43 will actuate the indicator to throw the pointer 41 over to the word "Reserve". The user of the apparatus will thereby be notified that it is time to disconnect the exhausted bottle 1 and substitute a new bottle. As soon as the new bottle is connected in place, the gas service man who delivers the new bottle simply moves the "load" over to the stem 12 at the right which transfers the service to bottle 2. This bottle 2 then becomes the service bottle, and the new bottle on the left will become the reserve bottle.

It should be understood that the pressures referred to as normally existing in the receiver 7 are merely stated by way of example; it is only necessary that the normal operating pressure in the receiver on the primary bottle or service bottle 1 should be slightly greater than that which exists when operating on the reserve bottle. This difference is merely great enough to insure operation of the indicator by the pressure controlled device 43. In practice it will be found that the pressures stated will give a very satisfactory operation.

The connections, including the pipes 5 and 8, are, of course, interchangeable and permit the substitution of a new full gas bottle by merely detaching the couplings and connecting up the new bottle to the pressure regulating means 4 as described.

It is understood that the embodiment of the invention described herein is only one of the many embodiments this invention may take, and I do not wish to be limited in the practice of the invention, nor in the claims, to the particular embodiment set forth.

What I claim is:

1. A pressure regulating means for an illuminating gas plant having two sources of supply of gas under pressure, which comprises a casing having a gas receiving chamber and inlet passages for connection with said sources of supply of gas, valve means for each of said inlets, each valve means including a movable valve closure for regulating the inflow of gas from one of the inlets to the gas receiving chamber, a spring-pressed diaphragm for each valve closure, means for connecting each diaphragm to its valve closure for regulating the operation of the same to open the closure only when the pressure of the gas in the gas receiving chamber is below a determined value, a stem connected with each diaphragm extending through the casing, and a manually transferrable loading means capable of engaging either stem enabling

a corresponding diaphragm and its valve closure means to open only at an increased pressure and enabling the pressure of gas in the receiver to maintain the other valve closure normally in its closed position.

2. A pressure regulating means for an illuminating gas plant having two sources of supply of gas under pressure, comprising a pressure regulating valve for each source of supply of gas, a common gas receiving chamber for the gas passing through such valves, each valve means being provided with a diaphragm connected for controlling the valve means, said diaphragm being actuated by the pressure of gas in the gas receiving zone and including means for setting the same to open the corresponding valve means only when the pressure in the gas receiving chamber falls below a predetermined value, a stem connected with each diaphragm extending through the casing, and a supplemental diaphragm loading member manually movable for connection separately with either of such stems to effect a raising of the pressure in the gas receiving chamber at which the diaphragm connected with such stem will open its corresponding valve means.

3. A pressure regulating means for an illuminating gas plant having two sources of supply of gas under pressure, which comprises a casing having a gas receiving chamber and inlets thereto for separate connection with the different sources of gas supply, a regulating valve for each inlet, each valve having a diaphragm connected to control the same, which diaphragm is acted upon by the pressure of gas in the gas receiving chamber, means for yieldingly engaging each diaphragm and adjustable to vary the pressure of gas at which such diaphragms may permit their corresponding valves to open, said latter means of each valve being adjusted to permit both valves to open at substantially the same pressure of gas in the gas receiving chamber, a stem connected with each diaphragm extend-

ing through the casing and a supplemental load manually transferrable to either stem to cause the valve corresponding to the diaphragm connected to such stem to open only when an increased pressure exists in the gas receiving chamber.

4. A gas regulating means for connecting two sources of illuminating gas to a common gas delivery line comprising a casing having a gas receiving chamber and gas inlets for connection with different supplies of gas, an outlet for the gas chamber for connection with the gas delivery line, a valve closure for each inlet, each valve closure being connected with a diaphragm for operating the same, said diaphragms being each controlled by the pressure of gas in the gas receiving chamber, spring means connected with said diaphragms to permit the opening of said valves only when the pressure of gas in the gas receiving chamber falls below a predetermined value, each diaphragm being connected with a stem extending exteriorly of the casing, and a pivotally mounted weight manually transferrable to engage either stem to provide an increased load on its corresponding diaphragm while the position of said pivotal load indicates the inlet connection thereby effected.

5. A pressure regulating means for an illuminating gas plant having two sources of gas supply under pressure, which comprises a casing having a gas receiving chamber and inlets communicating therewith for connection with the two sources of supply of gas, a valve for each inlet to said gas receiving chamber, each including a movable valve closure, a spring pressed diaphragm for each valve closure, a toggle connection between each diaphragm and its valve closure, each diaphragm having a stem extending exterior of the casing, and a supplemental loading means for the diaphragms movable into cooperation with either stem.

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