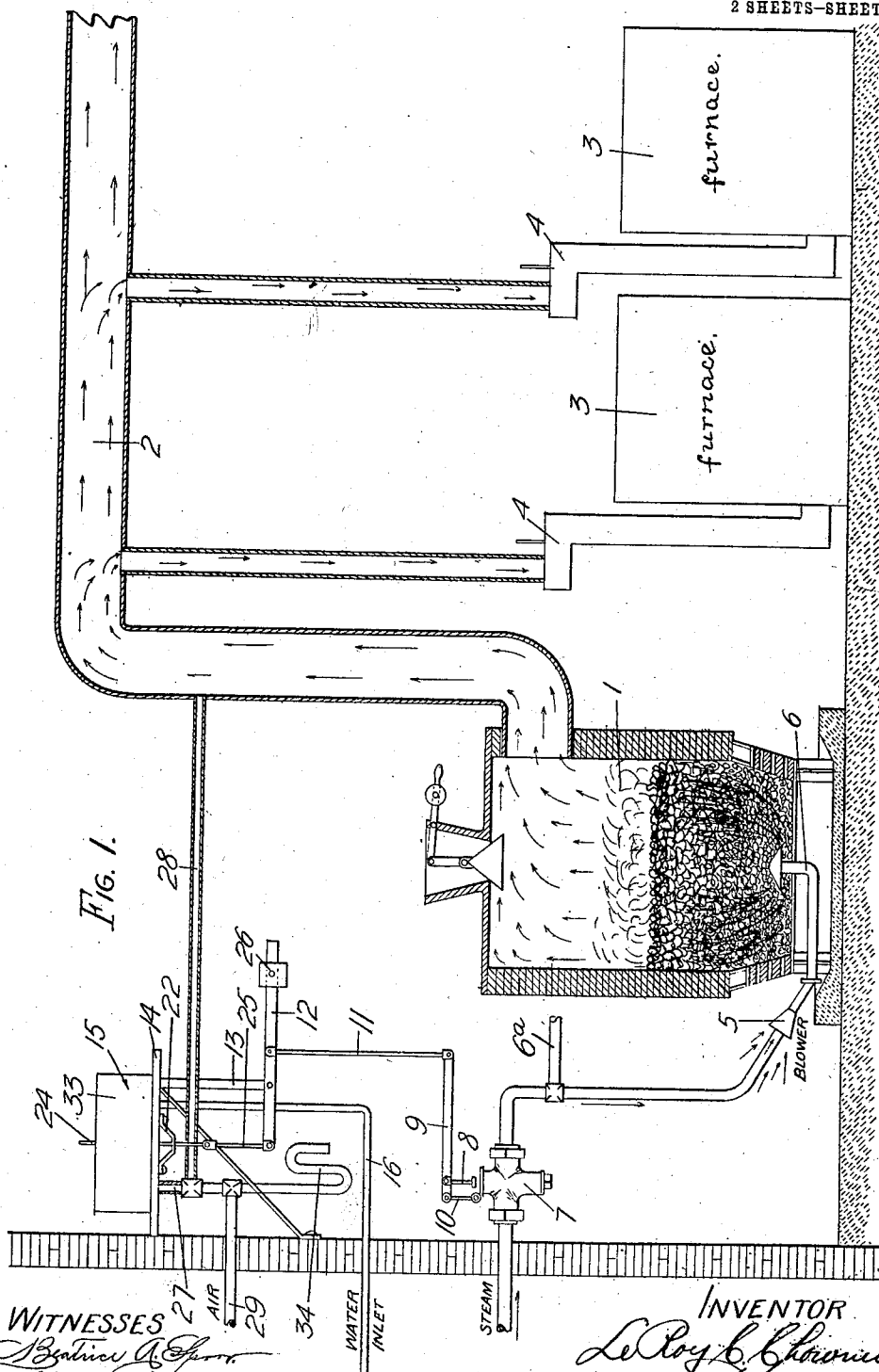


LE ROY C. CHOWNING.
 METHOD OF REGULATING GENERATION IN GAS PRODUCERS AND APPARATUS THEREFOR.
 APPLICATION FILED JAN. 25, 1913.
 1,066,252. Patented July 1, 1913.

2 SHEETS-SHEET 1.

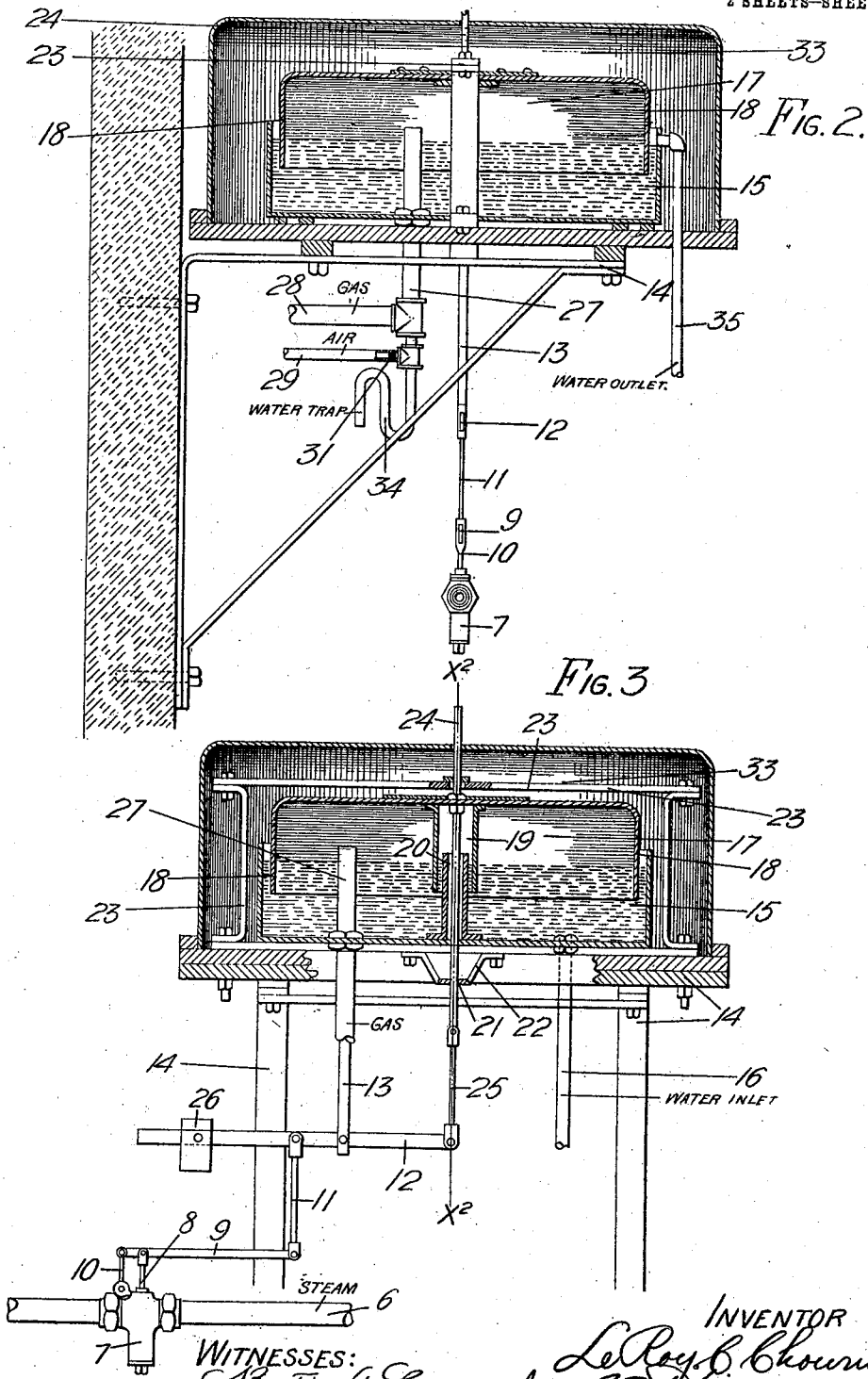


WITNESSES
Bartholomew & Co.
Albert J. Tracy

INVENTOR
Le Roy C. Chowning
 by *T. W. Morsey*
 ATTORNEY

LE ROY C. CHOWNING.
 METHOD OF REGULATING GENERATION IN GAS PRODUCERS AND APPARATUS THEREFOR.
 APPLICATION FILED JAN. 26, 1913.
 1,066,252. Patented July 1, 1913.

2 SHEETS—SHEET 2.



INVENTOR
Le Roy C. Chowning
 by *T. W. Moore*
 ATTORNEY.

WITNESSES:
Ernest A. Green
Albert L. Frey

UNITED STATES PATENT OFFICE.

LE ROY C. CHOWNING, OF CORNING, NEW YORK, ASSIGNOR OF TWENTY-SIX ONE-HUNDREDTHS TO ALANSON B. HOUGHTON AND TWENTY-SIX ONE-HUNDREDTHS TO ARTHUR A. HOUGHTON, BOTH OF CORNING, NEW YORK.

METHOD OF REGULATING GENERATION IN GAS-PRODUCERS AND APPARATUS THEREFOR.

1,066,252.

Specification of Letters Patent.

Patented July 1, 1913.

Application filed January 25, 1913. Serial No. 744,256.

To all whom it may concern:

Be it known that I, LE ROY C. CHOWNING, a citizen of the United States of America, and a resident of Corning, New York, have invented certain new and useful improvements in the Method of Regulating Generation in Gas-Producers and Apparatus Therefor, of which the following is a specification.

In the use of producer gases for firing furnaces, variation of pressure in the gas mains is occasioned by the charging or lack of charging of the producers. It has heretofore been the practice to attempt to compensate for the drop of pressure thus produced in the mains by the regulation of the feeding valves at the several furnaces fed from the producers, but in practice where a number of furnaces are fed through the same pipe line from any producer or connected group thereof, a change in the valve of one furnace reacts back upon the pressure at the other furnaces, thus disturbing the equilibrium that should exist. Inasmuch as with many types of furnaces now in use for different purposes, close and equal temperature regulation, which in turn is dependent upon the gas pressure is necessary, the method of regulating to compensate for variation in the rate of gas generation, by individual valves for each furnace is not practicable, and my present invention has for its object to obviate the objections above pointed out by maintaining uniform the pressure in the main fed by the producer and supplying the furnace. Thus the pressure of the gas generated by the producer is maintained constant, and the valves at the several furnaces are only used to properly distribute the gas so produced among the several furnaces or for increasing or decreasing the amount of gas so supplied thereto to compensate for a variation of the heat units of the gas as produced. By maintaining the uniform pressure in the mains supplied by the producer, the interaction of the furnace valves upon each other is prevented, in that any variation of consumption at one furnace is immediately compensated for by a variation in the rate of generation of the producer. This I accomplish by feeding the steam and air fed to the producer through a steam-injector,

the action of which is regulated by controlling the amount of steam passed there-through by a valve controlled by the pressure in the gas main fed by the producer. My preferred construction for accomplishing this comprises a diaphragm to one side of which the pressure from the gas producer main is communicated, and which, by its movement controls the steam valve of the injector. Inasmuch, however, as the gases, the pressure of which it is desired to regulate in industrial work, generally carry unfixed hydrocarbons which, on cooling, tend to deposit and clog and otherwise impair the action of the apparatus, I prefer to transmit the pressure of the gas to the diaphragm, not by admitting the producer gas to one side thereof, but through the intermediary of a fluid piston which may consist of clean gases, such as atmospheric air. This may be accomplished by filling the pipe communicating with the gas main and with the diaphragm with atmospheric air. It is advisable, moreover, to introduce a uniform but limited quantity of such air adjacent to the diaphragm and to permit it to slowly flow back into the main against the pressure therein. By these means any leakage of the diaphragm is rendered negligible, and diffusion of the air and the gas is prevented, whereby any entrance of producer gas into the pipe between the gas main and the diaphragm, which would otherwise clog such pipe, is obviated.

My invention therefore consists in a method of maintaining uniform the pressure generated in a producer by varying the amount of steam and air admitted to the producer due to variations in the pressure of the gas produced thereby, which variation may be produced through the instrumentality of a fluid piston, and in the construction, arrangement and combination of the several parts whereby the results above described are obtained.

Referring to the accompanying drawings in which corresponding parts are designated by corresponding marks of reference—Figure 1 is a diagrammatic view of a producer having my invention applied thereto. Fig. 2 is a fragmental view of the diaphragm pressure regulator and the valve-controlling connections thereof, partly in section on line

$x^2 - x^2$ of Fig. 3. Fig. 3 is a vertical section showing the same parts as Fig. 2, the line of section being at right angles to that of Fig. 2.

5 The producer 1 may be of any approved construction in which a mass of ignited fuel has fed thereto a mixture of steam and air, which, in passing through the fuel therein, absorbs therefrom some of the carbon and
10 hydrogen contents of the fuel, and it is not necessary to describe such a producer in detail as they are well known. In the drawings, I have shown such a producer as feeding through the main 2, a plurality of furnaces 3, each of which is provided with its
15 individual controlling valve 4. It will be noted that a variation in the position of any one of these valves causes variation in the demand on the main, and thus the opening
20 of one valve due to a decrease of pressure in such main causes a further decrease of pressure therein due to the increased outflow therefrom, thus reacting back upon the other
25 valves and necessitating adjustment thereof. To avoid this is the object of this invention.

As shown the steam and air is fed to the producer through a steam injector 5, the steam induction pipe 6 of which terminates in a suitable nozzle adapted to force the air
30 below the charge of the producer. The amount of steam fed to the injector is regulated by a piston valve 7, preferably of the balanced type to facilitate its ease of working, the piston rod 8 of which is connected
35 by a floating lever 9 having one end carried by the link 10 and having its opposite end connected by the link 11 to the lever 12. The lever 12 is supported in a pendant
40 bracket 13 from a frame work 14 which supports a tank 15 having fluid induction pipe 16. Within the tank is contained a bell 17 having dependent sides 18 extending
45 below the normal fluid level in the tank, the bell having centrally mounted thereon and depending therefrom a sleeve 19 practically of the same length as the height of the depending
50 sides. This sleeve surrounds a corresponding sleeve 20 fast to and rising from the central portion of the bottom of the tank to above the normal liquid level therein.

Contained within the sleeves 19 and 20 and working in a central opening in the bottom of the tank and in a guide 21 formed
55 by brackets 22 depending from the frame work 14, and in a guide formed by a frame work 23 above the tank, is a guide rod 24 which passes through and is secured to the center of the bell and has its lower end
60 connected by a link 25 with one end of the lever 12. This rod serves to guide the bell 17 in its up and down movement and a counter-weight 26 is placed upon the lever to regulate the pressure necessary to actuate the
65 diaphragm formed by the bell. A pipe 27

enters the tank from the bottom thereof and terminates therein above the normal liquid level thereof, this pipe being connected by a pipe 28 to the gas main. This pipe is of small size in diameter relative to the gas
70 main and merely serves to transmit the pressure in the main to the under side of the diaphragm formed by the bell.

As above constructed, it will be seen that a variation of pressure in the gas main produced by any cause, either by the variation
75 of production in the gas, or the return of consumption thereof in the furnaces, will be transmitted to the underside of the diaphragm formed by the bell and will disturb the pre-existing equilibrium established by the counter-weight and will thus cause a
80 movement of the steam valve and thus a variation in the amount of steam permitted to pass therethrough to the injector and thus a variation in the amount of steam and
85 air fed to the fuel for the production of steam and gas, whereby the pressure in the main will be maintained constant.

So far as has been described, my invention
90 contemplates the movement of the diaphragm directly by the producer gas, but this is objectionable in that such gas is frequently "unclean" and carries tars and
95 hydrocarbons which deposit upon the cooling thereof. Such gases in entering the pipes 27 and 28 will be trapped and held there, and upon their temperature being reduced will deposit their unfixed constituents, destroying the free transfer of pressure
100 from the main to the diaphragm. To prevent this I propose to maintain within the regulating line, that is to say in the pipe 27 between the diaphragm and the gas main
105 through the latter of which the heated gas is constantly passing, a piston of a stable gas, such for instance as atmospheric air or one of the fixed gases, and for this purpose lead into the vertical connection pipe 27, a pipe
110 29 through which atmospheric air, etc., may be introduced to fill the regulating pipe line, and thus prevent the entrance therein of the producer of gas. It is further desirable in order to prevent the loss of this atmospheric
115 air by leakage or diffusion to permit a steady and uniform flow of atmospheric air, etc., through the pipe 28 and this may be accomplished by connecting to the air induction pipe 27 a suitable source of compressed air through which a minute quantity
120 of air may be uniformly fed. In practice I have found that with a main of six feet in diameter, sufficient air for the purpose above set forth may be introduced through an aperture of .05 inch at 20 pounds pressure.
125 An air induction pipe 29, having a feed aperture 31 is accordingly shown for this purpose. This results in constantly maintaining the air piston in the regulator line and in a slight out-flow therefrom 13

against such pressure as may exist in the gas main, forcing back any gas which attempts to enter the regulator line and preventing diffusion of such gas in such line. The air that flows out burns with imperfect combustion in the gas main and does not affect the gas supply. It will be noted that with this slight introduction of air in the regulator line that the pressure at the diaphragm is still dependent upon the pressure in the main, in that the back pressure existing is a function of the gas pressure in the gas main, which pressure determines the out-flow of the air and thus the pressure existing at the diaphragm.

In practice several producer units may feed a single main, and in such case my invention may be applied thereto by taking branches from the steam induction pipe 6, as is shown at 6^a in Fig. 1, whereby a single steam valve controls the steam flow to the injectors of the several producers.

In order to protect the diaphragm regulator, I inclose the tank and bell thereof in a cover 33. For the purpose of maintaining constant the water level in the tank I apply a water seal 34 to the base of the vertical inlet pipe 27, which thus serves as an additional overflow pipe for the tank in case the usual water outlet pipe 35 becomes clogged and is located at the side of the tank at a point where the water is to be maintained at a constant level.

Having thus described my invention what I claim and desire to secure by Letters Patent is:—

1. The hereinbefore described process of regulating the feed of steam and air to a producer by variation in the pressure of the

gas generated therein through the instrumentality of a steam valve controlled by the generated pressure, which consists in interposing between the valve and the pressure of the producer a fluid piston of atmospheric air.

2. The hereinbefore described process of regulating the feed of steam and air of a gas producer by variation of the pressure generated in the producer, through the instrumentality of a diaphragm valve, which consists in subjecting the diaphragm valve to a pressure of clean air which is dependent upon the pressure of the generated gases of the producer and in feeding a constant but limited quantity of clean gases adjacent to the diaphragm.

3. The combination with a producer, a steam-operated air injector therefor, a gas main fed by the producer, a diaphragm controlling the flow of steam to the injector, and a connection between one side of the diaphragm and the main, the said connection containing atmospheric air.

4. The combination with a producer, a steam-operated air injector therefor, a gas main fed by the producer, a diaphragm controlling the flow of steam to the injector, and a connection between one side of the diaphragm and the main, and means for feeding a limited amount of air under pressure to the said connection.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

LE ROY C. CHOWNING.

Witnesses:

BEATRICE A. SPORR,
ALBERT L. KREY.