W. FOSTER, Jr., & G. P. GANSTER.

Portable Gas Apparatus.

No. 84,941. Patented Dec. 15, 1868.

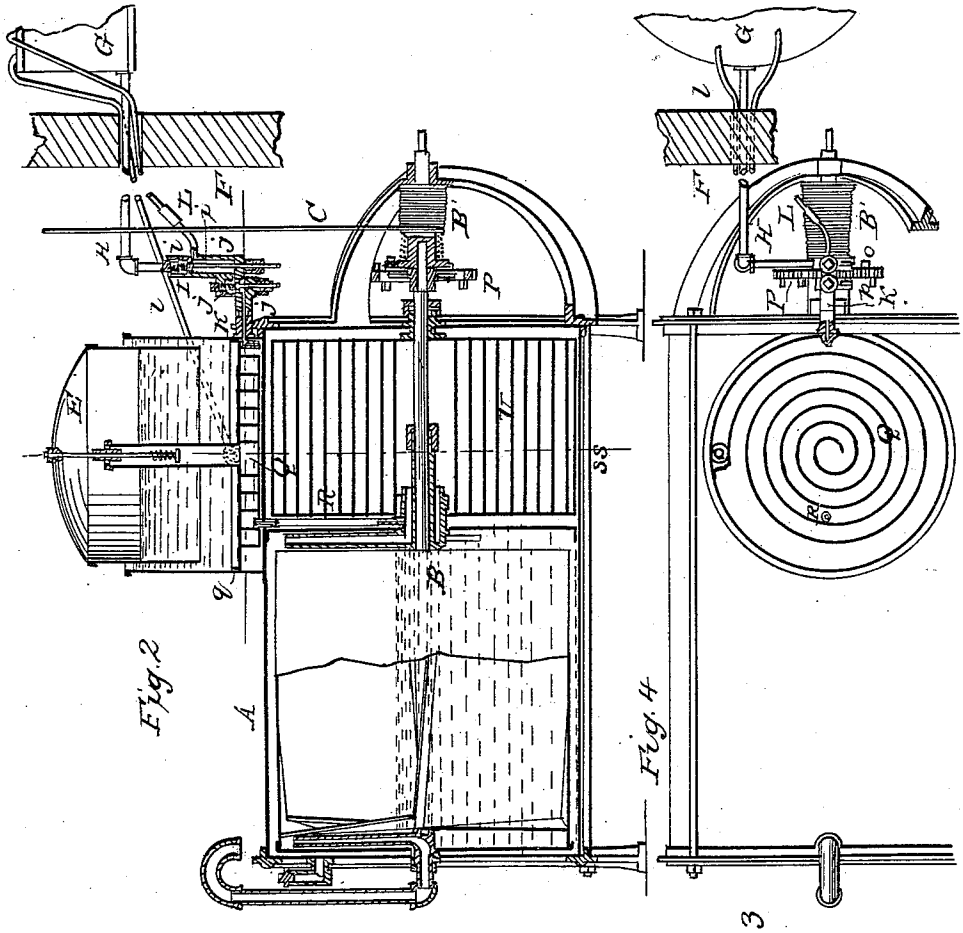

Fig. 2

Fig. 4

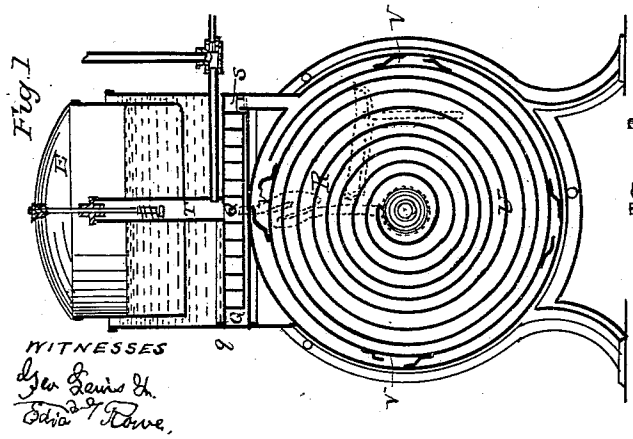

Fig. 1

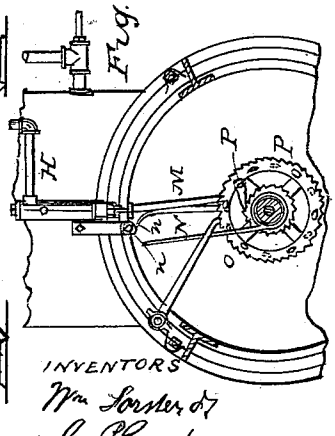

Fig. 3

WITNESSES

Geo. Lewis Jr.

Edwd. F. Rowe.

INVENTORS

Wm. Foster Jr.

Geo. P. Ganster.

UNITED STATES PATENT OFFICE.

WILLIAM FOSTER, JR., AND GEORGE P. GANSTER, OF NEW YORK, N. Y.

IMPROVED PORTABLE GAS APPARATUS.

Specification forming part of Letters Patent No. **84,941**, dated December 15, 1868.

To all whom it may concern:

Be it known that we, WILLIAM FOSTER, Jr., and GEORGE P. GANSTER, of the city and county of New York, and State of New York, have invented certain new and useful Improvements in Portable Gas Apparatus, by which we mean apparatus for manufacturing mixtures of air with vapor of gasoline or analogous combustible vapor; and we do hereby declare that the following is a full and exact description thereof.

Our invention renders it practicable to keep the reservoir or supply of gasoline outside the building, while the vaporizing apparatus is in the cellar or basement, as usual, thus removing a great source of danger and facilitating the obtaining of insurance or reducing the rates of insurance on the building and contents.

We will first describe what we consider the best means of carrying out our invention, and will afterward designate the points which we believe to be new.

The accompanying drawings form a part of this specification.

Figure 1 is a cross-section on line S S in Fig. 2. Fig. 2 is a central longitudinal section. Fig. 3 is an end view of the mechanism for operating the valves, and Fig. 4 is a horizontal section across the upper part.

Similar letters of reference indicate like parts in all the figures.

Tints are employed merely to aid in distinguishing parts, and do not imply differences of material.

The material of all the principal parts may be iron and steel. The pipes may be iron or vulcanized rubber. The valves and springs may be hard brass.

A is the main casing or exterior of the apparatus, constructed in any approved manner, and provided with a suitable induction or aperture to receive the air. B is a shaft mounted in bearings in the line of the center of the cylindrical case A and turned by the tension of the cord C, which, being wound upon the windlass B′ on the portion of the shaft B outside of the casing A, is led up over the pulleys *c c* and operated by a weight, D, connected, either directly or through the intervention of pulleys, in any approved manner. The windlass B′ is provided with the ordinary appliances, by which the weight may be wound up, the cord C being wound upon the windlass B′. E is a small gasometer floating in water, glycerine, or other fluid, to equalize the pressure of the gas, and maintain its flow during the brief period of winding. All these parts, as also the blowing apparatus in one extremity of the casing A, may be of the ordinary construction and arrangement.

The descent of the weight D pulls the cord C and turns the shaft B and its connections, and thus induces a flow of air through the vaporizing apparatus and gasometer E and conduit or gas-pipe *e* leading to burners. (Not represented.) When the burners are shut off, and the escape of gas is consequently stopped, the action of the apparatus is arrested, and in proportion as the burners are let on and the gas consumed, so the weight D descends and the shaft B revolves.

G is a reservoir which may be capable of holding from a few gallons up to a barrel or more of gasoline or other volatile hydrocarbon liquid. It is mounted outside of the wall F of the building, and may be protected from severe changes of temperature by a suitable box or other covering. We propose in most cases to cover it with earth. The liquid is conveyed through the pipe H to a valve-chamber, I, having a poppet-valve, *i*, and a spring, *i′*, arranged as represented. The poppet-valve *i* controls the communication between this valve-chamber I and the measuring-chamber J directly below. There is a valve, *j*, and a spring, *j′*, by the aid of which the communication is controlled between the measuring-chamber J and the pipe K, which leads to the interior of the vaporizing-case A. By alternately opening and closing the valves *i* and *j*, the measuring-chamber J is alternately filled and emptied. A pipe, L, communicates between the upper part of the measuring-chamber J and the top of the reservoir G, so that air, or a mixture of air and vapor from the top of the reservoir, may flow through the pipe L into the measuring-chamber as the latter is emptied, and take the place of the gasoline which flows out, and the same gaseous material may flow back through the pipe L as the measuring-chamber J is again filled. A

pipe, *l*, maintains a communication between the upper part of the reservoir G and the interior of the case A, so as to insure a uniformity of pressure, however high the pressure of the gas may be maintained. This we term our "equalizing-pipe." We operate the valves *ij* by lifting on the lower ends of their stems by levers actuated by the revolution of the shaft B.

M is a bent lever, turning on the center *m*, and struck at its lower end by the cams or spurs *o* on one side of the wheel P, which is fixed on the shaft B and is compelled to rotate therewith. At each revolution of the shaft B the lever M is moved and released eight times, or such other number as may be desired, determined by increasing or diminishing the number of the cams *o*. Each action of the cam *o* against the lever M induces a lifting of the valve *i*. The moment the cam *o* has passed the valve *i* is depressed by the action of the spring *i'*, and the lever M is thereby returned to its original position. The valve *j* is operated by a corresponding lever, N, turning on a pivot, *n*, and operated by cams *p*, fixed on the opposite side of the wheel P. The cams or spurs *p* must be equal in number to the cams *o*, and must be so placed relatively to the lever N that they shall lift the valve *j* and hold it open only during the interval while the valve *i* is closed. The gasoline, thus regularly and accurately measured through the measuring-chamber J, flows through the pipe K into a shallow circular chamber, Q, and remains spread over the whole bottom thereof to the depth of one-fourth of an inch, more or less, flowing down through the pipe R as fast as the quantity exceeds that depth. A spiral partition, *q*, is so fixed in this chamber that the gas or mixture of vapor and air rising from the vaporizer below through the pipe S, is compelled to flow a long distance through the spiral passage thereby formed, in traversing over the freshly-received gasoline before it can rise through the pipe T into the gasometer E. The spiral partition *q* should fit tightly to the upper wall of the chamber Q, but should be open at the bottom to the height of a sixteenth of an inch, more or less, thus allowing the gasoline to flow freely in all directions across the bottom of the chamber Q, while compelling the gas to traverse the circuitous route described. This provision exposes the out-going gas to the freshly-received gasoline in a more thorough manner than any expedient for the purpose which we have before known. The gasoline, after parting with some of its freshest or most volatile vapor in the chamber Q, descends through the pipe R and enters the center or axis of the spiral vaporizer U, which is carried on the revolving-shaft B. The air from the blowing end of the apparatus is received also in the center of this spiral U. Both move together outward through the extended passage formed by the spiral, but the air moves much the fastest. The arrangement keeps all the surfaces wetted with the gasoline, and the air circulating over it is very favorably presented for taking up the vapor, or, in other words, evaporating the gasoline. The air issues from the exterior of the spiral highly charged with the vapor of gasoline, while the latter is nearly or quite all evaporated in the journey. The spiral chamber thus provided in the wheel U is of sufficient length and width to present a sufficient surface, so that the whole, or very nearly the whole, of the gasoline is evaporated in its slow journey from the center to its periphery. What little remains unevaporated drops to the bottom of the inclosing-casing and is removed therefrom by a small vessel, V, which is carried on the rotating portion of the apparatus, and dips up the unevaporated gasoline and pours it into the water in the ordinary blowing-chamber. (Not represented.)

The active evaporation in this kind of apparatus induces severe cold. The reduction of temperature, in addition to its other well-known effects, induces a deposit of moisture from the air. In our apparatus the first effect of evaporization, resulting simply in lowering the temperature of the air in and near the axis of the evaporizer, does not actually deposit moisture, but only lowers the temperature of the air to the "dew-point." In the interior of the apparatus the cold becomes more intense, the air being lowered in temperature all the way through spiral U. As soon as it begins to deposit water upon the surfaces the gasoline becomes thereby diluted or contaminated; but it will be observed that the water thus mingled with the gasoline does not mingle with the freshly-received gasoline, but with only that small quantity which is nearly ready to be discharged. We attach much importance to this feature of our apparatus. The air received at the center has the temperature of the external atmosphere, usually moderately high, (it being within the building,) or, say, 60° Fahrenheit. The constant reception of air at this temperature keeps the axis of the apparatus warm.

Our apparatus is not necessarily confined to what is known in commerce as "gasoline." We wish it understood that wherever the term "gasoline" appears in this specification it is intended to mean either gasoline or any other hydrocarbon or suitable volatile fluid for the production of combustible vapor.

Some of the advantages due to certain features of our invention may be separately enumerated, as follows:

First, by reason of the separation of our reservoir G from the evaporating apparatus and its adjuncts, and connecting the same by pipes supplying it as it is consumed, and storing in the apparatus only the very small quantity exposed on the evaporating-surfaces, we are able to very efficiently insure against a great source of danger by placing the reser-

voir G outside of the walls of the building. In cases of fire the presence of large quantities of gasoline in the gas apparatus frequently turns the scales and decides the destruction of the building. Our tank outside may burn or explode with much less danger to the establishment than when any quantity of gasoline is kept in or about the apparatus.

Second, by reason of the employment of the measuring-chamber J with the valves *j* and *i*, and means for opening and closing them alternately, as represented, we are able to regulate the quantity of gasoline or analogous liquid received from the tank or reservoir, whether near or at any distance, and while the surface of the gasoline may be at greatly-varying levels with almost or quite absolute uniformity, the quantity of gasoline received being proportional to the number of revolutions of the blower and vaporizer, whether the revolutions be fast or slow, and whether the reservoir be newly filled or nearly empty.

Third, by reason of the combination of the above features we are able to more successfully and with more perfection realize the advantages of both, and to produce an organized machine adapted to operate under all conditions. A machine adapted for one hundred burners will operate with perfect success with one burner, and thus all labor of attendance and adjustment is dispensed with, while the risk of great destruction in case of fire, and the rate of insurance, are diminished.

Fourth, by means of the employment of the equalizing-pipe *l* leading from the vaporizer or adjacent gas-main to the top of the reservoir G, we are able to insure an absolute uniformity of pressure on the surface in the reservoir with that on the surface in the vaporizing apparatus and its adjuncts, and thus to neutralize absolutely, and to make of no effect the pressure of the gas in retarding the entrance of the gasoline.

Fifth, by reason of the vent-pipe leading from the top of the measuring-chamber J to the top of the reservoir G, we are able to provide a proper vent for the chamber J, in filling and emptying, without any escape of gasoline vapor into the external atmosphere.

Sixth, by reason of the fact that our revolving evaporator is spiral, as represented, and receives the gasoline at the center and discharges it at the periphery, while the air is exposed throughout the entire channel to the wetted surfaces, either with or without the employment of "excelsior" or other analagous fibrous material to increase the extent of surface, we are able to insure a very extended and uniform presentation of the air to the wetted surfaces, and also to dispose of the water of condensation due to the cooling of the air as the evaporation proceeds without mingling it with the freshly-received gasoline, more effectually than by any construction previously known to us.

Seventh, by reason of the fact that our spiral passage, provided by the spiral partition *q* in the chamber Q, is constructed and arranged as represented, it follows that the gasoline is allowed to float freely over the whole bottom, passing under the spiral partition freely, while the gas is compelled to traverse circuitously, and by the presenting of the gas in this chamber and leading it through the spiral immediately before its discharge from the apparatus we insure more affectual presentation of gas to the freshly-received gasoline than any construction before known to us, and the charging of it to the highest practicable extent.

Eighth, by reason of the employment of our dipping-vessel V, arranged as represented relatively to the other parts, we are able to remove the unevaporated remains of the gasoline, and both the water originally in the gasoline and the water deposited or mingled therewith by condensation of moisture in the air during the evaporizing process, and to dispose of it without allowing it to accumulate and disturb the action of the apparatus under any conditions.

Having now fully described our invention, what we claim as new in vapor and air or portable gas apparatus, and desire to secure by Letters Patent, is as follows:

1. Supplying the vaporizing apparatus with gasoline, only as fast as it is evaporated, through small pipes from a reservoir at a distance, and preferably outside the building, substantially as and for the purposes herein set forth.

2. The measuring-vessel J, and valves *j i*, in combination with the gas apparatus A B and its adjuncts, and with a suitable reservoir for the volatile fluid, and arranged to operate relatively thereto substantially as and for the purposes herein set forth.

3. In combination with the separation of the reservoir from the evaporating apparatus, as described, the measuring of the requisite quantity of volatile fluid for the manufacture of gas as it is consumed at the burners by means of an intermediate measuring device, substantially as and for the purposes herein set forth.

4. The equalizing-pipe *l*, transmitting the pressure of the gas to the surface of the gasoline in the distant reservoir, as and for the purposes herein set forth.

5. The vent-pipe, arranged as represented relatively to the measuring-chamber J and reservoir G, for the purposes herein set forth.

6. The spiral evaporator U, in a chamber adjoining that containing the meter-wheel, constructed and operating as and with the advantages herein set forth.

7. The spiral chamber Q *q*, the receiving and discharging passages for the gasoline, and the receiving and discharging passages for the air, arranged relatively to each other and to the other parts of the apparatus so as to spread the gasoline and present the gas thereto after its manufacture in the revolving vaporizer and

immediately before its discharge from the apparatus, all substantially as and for the purposes herein set forth.

8. Dipping out and removing the remains of the gasoline and the water of condensation, and preventing it from accumulating or in any wise mingling with the freshly-received gasoline, substantially in the manner and for the purposes herein set forth.

In testimony whereof we have hereunto set our names in presence of two subscribing witnesses.

WM. FOSTER, JR.
GEO. P. GANSTER.

Witnesses:
GEO. LEWIS, Jr.,
E. F. BACON.