Gallaher Jr & Smith,

Gas Purifier,

No. 13,904, Patented Dec. 11, 1855.

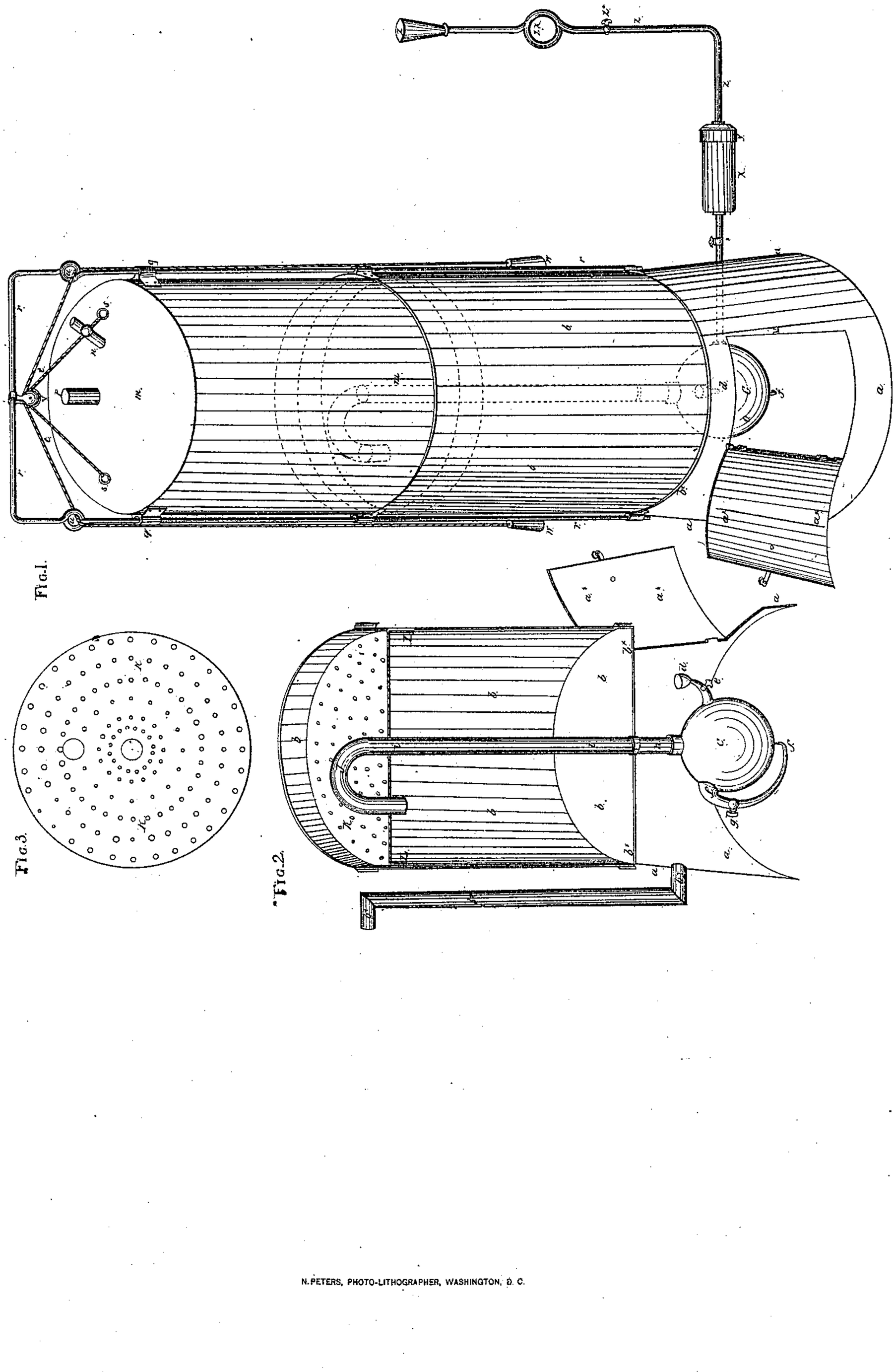

Fig. 1.

Fig. 3.

Fig. 2.

UNITED STATES PATENT OFFICE.

JOHN S. GALLAHER, JR., AND JOHN W. SMITH, OF WASHINGTON, DISTRICT OF COLUMBIA.

GAS APPARATUS.

Specification of Letters Patent No. 13,904, dated December 11, 1855.

To all whom it may concern:

Be it known that we, JOHN S. GALLAHER, Junior, and JOHN W. SMITH, of Washington city, in the District of Columbia, have invented and made certain new and useful Improvements in Apparatus for Producing Gas for Illuminating Purposes, which apparatus we term the "Self-Generating and Self-Purifying Apparatus;" and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of the apparatus complete, *a*, *a*, *a*, *a*, being the fire place part, or heating apartment, with the door *a* a**, thrown open, exposing partly to view the retort C; *b*, *b*, *b*, *b*, the water tank or purifying vessel; *b*× *b*× the bottom of tank, which bottom forms the roof of the heating apartment. The fire place and the tank form one combined apparatus on the outer vessel. C is the globular retort with supply pipe *d*, and stop cock or key *e*. *f* is the jet tube with stop cock *g*; *h*, the throat with the goose neck conduit or flow pipe *i i* J. *m*, *m* is the cap or gas receiver, with an air exhaust tube and stop cock *n o*, and a connection throat tube *p*. *q q* are loop sockets or slides working on rods or a framing *r*, *r*, *r*, *r*. *s*, *s* are rings or hooks to the top of the cap, or receiver, to which are attached elevating cord *t*, *t*, *t*, *t*, *t*, working over guide places *u*, *u*, and through an elevating pulley *v*, *v*. *w*, *w* are balance weights. X is a cylindrical branch retort, with detachable cap *y*, and connected to a feed or supply coil pipe *z*, *z*, *z*, *z*. & is a small connection or conduit pipe, with a stop cock on a cut off *.

Fig. 2 is a vertical sectional view of the combination fire or heating apartment, with the door *a* a** thrown open, exposing in full the globular retort C, arranged and combined with the water tank *b*, *b*, and the floating strainer or purifier *k*, *k*. This diagram Fig. 2 is intended to represent a semi or half perspective sectional view taken vertically in order to show the position of the perforated strainer *k*, *k* and its rim L, L, and at the same time exposing the retort C, and pipe *i i* passing upward through the tank bottom *b b*× *b b*× and the strainer *k*, *k*.

Fig. 3 shows the floating strainer detached from the tank or reservoir.

Description.

To enable others to be skilled in the construction and application of our improvements we will describe the same as follows:

First is formed a combination apparatus having a fire place or heating apartment *a*, *a*, *a*, *a*, and a water tank or reservoir or purifying vessel *b*, *b*, *b*, *b*, of any suitable metal and of any desired form, that shown in Fig. 1 being deemed the simplest and cheapest. This water tank must be perfectly tight, and its bottom be fire proof. The part forming the fire place must have a suitable door *a* a** and also a provision for escape of smoke, as at *b*×, *b*×, *b*×, Fig. 2. Through the center of the bottom *b*×, *b*×, passes a vertical tube or flow pipe *i*, *i*, of one or more inches bore, and the upper end of this pipe is bent or curved or turned downward in form of what may be termed a goose neck J, Fig. 2, and as indicated by dotted lines in Fig. 1. This flow pipe must be attached securely through the bottom of the water tank *b*× *b*× *b*, *b*, *b*, *b*, the lower end passing through the bottom of the tank, and so formed with a screw thread that there may be attached thereto the throat or connection *h* of a retort C, which is formed in a globular shape, as represented in Figs. 1, 2. This retort C, may be formed of any suitable cast metal, and for a very large apparatus need not be over ten inches diameter. This retort C, is formed with a spout or feed pipe *d*, having a stop cock or key *e*, and a gas jet pipe *f f*, and key *g*, *g*. The retort C, is to be attached securely and tight to the lower end of the flow pipe *i*, *i* and elevated sufficiently from the ground, so as to admit of a small furnace or suitable fire to be applied.

To the outside of the water tank *b*, *b*, *b*, *b* are attached vertical rods or a suitable framing *r r r r*, which is designed to sustain or support the cap or receiver *m*, *m*, which is made of any suitable sheet metal, and it is better to raise the top in dome like form for strength. On the top of the receiver there is an air exhaust pipe *n*, having a stop cock or key *o*. There may be also on the top a connection supply or flow conduit pipe *p*, to which may be attached a flexible tube,

so as to yield readily to the rising and depression of the receiver, or the communication with the gasometer or receiver may be made in any suitable manner. The cap or receiver is arranged with weights, *w*, *w*, attached to cords *t*, *t*, *t*, *t*, working over pulleys and guides *u*, *u*, *v*, so as to be movable up and down, or to elevate with increase of gas, and to depress or sink down within the water tank as the supply of gas diminishes, as is the case with all gasometers. This cap *m*, *m*, should be constructed something smaller in diameter than the tank, so as to move up and down within the tank *b*, *b*, *b*, *b*, freely. This cap or receiver may be of any suitable depth, and the lower end thereof always to be sufficiently within the water so as not to permit the escape or loss of gas. In addition to this cap is used a floating perforated strainer, shown in Fig. 3. This strainer is used within the tank, and has a rim of wood or metal or cork, or of any suitable light, buoyant material, so as to float the perforated disk surface *k*, *k*, above the water sufficiently, say one or two inches. The punctures or perforations need not be very small, say about one fourth of an inch in size, the roughened sides of the punctures to be upward, and upon this surface is sprinkled a mixture of quick lime and fullers' earth, say about a fourth or half an inch in depth, or in mass. This mixture is the purifying medium or the filtrating agent.

The water tank may be filled with water to within about twelve inches of the top edge, or merely sufficiently so as not to rise up within the goose neck as the receiver is depressed within the water tank. It must be observed that the strainer *k*, *k* fits within the receiver rather loosely, so as not to be acted on by the receiver, but to remain floating above the surface of the water. The water tank or reservoir may have a stop cock or faucet device, so as to draw off the impure water when desired.

In combination with the retort C, and main apparatus is employed a horizontally arranged cylindrical branch retort X, having a detachable cap *y*, with coiled feed or supply pipe *z*, *z*, *z*, *z*, and a conduit pipe with stop cock or key *. The cap *y* is detached when the retort is to be cleansed.

The operation of our apparatus is as follows, viz: In the production of gas for illuminating purposes a variety of modes or processes have been resorted to, requiring, generally a complexity of machinery or various apparatus, but as yet in other modes than ours the object sought after has not been perfectly attained, nor are any of the several processes in use reduced to the simplicity that ours is, and attended consequently with cheapness and general utility in their application. It is not however here deemed essential to point out the distinguishing features possessed by other modes than ours. We will simply state that by our process illuminating gas can be generated from any resinous, fatty, or oily matter instantaneously and direct from the retort, and purified at the same instant without passing through series of baths or distinct mechanical devices. The apparatus being completed for use the water tank *b b b b* is filled with the proper quantity of water, and the perforated strainer Fig. 3 is arranged in place, the cap or receiver *m m* adjusted within the tank, and in order to cause the receiver to sink within the tank the air is exhausted through the escape pipe *n*, the stop cock or key *o*, being kept open. When the cap or receiver is sufficiently depressed, the key or stop cock is turned to close the vent, in order to prevent the escape of the gas. This being done, the cylindrical or branch retort X, being entirely empty and being arranged within a furnace or fire place of any ordinary chimney, or made to be applicable to any cooking stove or portable furnace, is then subjected to a high degree of heat, fire being applied underneath the retort, which, attaining a red heat, may be charged with liquid oily or fatty matter, which is poured or fed into the mouth of the feed pipe. The pipe being provided with a key or stop cock *z** and coil *z x*, enables the liquid matter to flow slowly and to drip in small drops or volumes into the retort X, and coming suddenly in contact with the heated internal surface gas is instantly evolved, and being set free passes through the conduit pipe (the stop cock or key * being open) into the main retort C, containing quick lime in a small quantity, which is also subjected to heat in order to diffuse it, so that the gaseous matter may mingle with the diffused fumes of lime and thus in part be purified or divested of the fatty impurities, which are absorbed or decomposed by the diffused lime, and ascending upward through the vertical flow pipe *i*, *i*, issues out of the goose neck *j*, Fig. 2, the end of which passes downward through the perforated floating strainer *k*, *k*, which being above the surface of the water affords a space between the water and its surface, wherein the gas accumulates in volume, and thence presses or forces upward through the lime and fullers' earth mixture, and thus the gas is most effectually purified and rendered free to a very great extent, of the unpleasant odor incident to gaseous matter, beside being entirely freed of the residuum of carbonaceous particles, without being passed through baths or washed, as is required in other modes and processes.

It may be well enough to remark that if the gas is desired to be of a portable nature and for ordinary domestic purposes the

fying gas, what we claim as new and original with ourselves and desire to secure by Letters Patent of the United States is as follows, viz:

Disclaiming all and every part of our apparatus taken individually, we claim solely the arrangement of the said parts, and specifically of the retort X, with Hookes' blowpipe C, combined with the furnace *a*, *a*, *a*, *a*, the water reservoir *b*, *b*, *b*, the strainer *k*, *k*, the receiver *m*, *m*, in the manner as specified, and for the purpose of constituting a compact and portable gas generating and purifying apparatus.

JOHN S. GALLAHER, JUNIOR. [L. S.]
JOHN W. SMITH. [L. S.]

Witnesses:
J. HEPBURN,
GEO. H. LOMBARD.

branch retort X, and coiled pipe *z*, and conduit may be detached from the main or globular retort C, which alone may be used with the fire or heating chamber *a*, *a*, *a*, *a*, and thus the whole apparatus made very compact and portable.

It must be observed that the liability of the gas to recede or flow backward through the coil pipe *z x* is entirely obviated by the use of a stop cock or key *z**, which is esential to prevent the pressure of the gas from forcing the liquid out of the feed pipe *z*, *z*. Again, too, in charging the retorts X, and C, care must be observed that no moisture or water be within the pipes, and before pouring in the liquid matter all such difficulty of generating steam is obviated, as the heating of the retorts will expel all moisture, observing that the keys or stop cocks are open to enable the expelling of the accumulated vapor or any accidental production of steam. None of the difficulties cited can occur if due caution also be observed in not filling the water tank too much, so as to force water within the pipes by the accumulated air in the cap or receiver, which might through oversight prevent the successful operation of the apparatus. In the use of the globular retort C, quick lime in small quantity of from one to two tablespoonfuls being sufficient to be deposited within the retort through the neck *h*, after being detached from the pipe *i*, *i*. In heating the lime to diffuse it, the heat of retort C, may attain a red degree or sufficiently only to diffuse the vapor of the lime. Again, in the use of the retort C, the liquid oily or greasy matter is poured through the feed spout or pipe *d*, but in minute quantity, so as not to thoroughly saturate the lime, but instead fall on the side of the retort, and in being evolved thus mingle with the diffused fumes or vapor of the heated lime. Thus the gas is thoroughly distilled and thrown off in a highly concentrated and perfectly pure condition, being divested of all bad acrid odor, and the flame afforded by this gas is entirely free of all carbonaceous sparkles, while the light therefrom is clear, steady and soft.

Owing to the form of the globular retort C it may be used as a self-generating apparatus and the usual fire or heat from wood or coal be dispensed with, for when the receiver is to be recharged or filled again all that is essential is not to exhaust or consume the whole quantity of gas, but reserving some, the stop cock or key *g*, of the jet *f*, *f*, Fig. 2, is turned, when the gas flows out of the end of the jet, and being ignited is used to heat up the retort C, which when heated sufficiently is charged or supplied with the oil or grease through the feed pipe *d*, and in this manner gas is used to produce gas. Thus operated the retort C acts somewhat as a self generating gas apparatus and the process becomes a most simple, expeditious and cheap one by dispensing in a measure with the wood or coal heat or fire. It may be well enough to remark that as this retort C, is to be used as a self-generating vessel it should be made of thin cast metal, so as to heat readily in the application of the jet of gas.

The whole apparatus described and shown must of course be constructed of the proper size to afford the required amount of gas to be consumed. The estimated amount consumed per hour by one gas burner is about two cubic feet, and one burner will emit a light or volume equal to the light afforded by twenty five common wax candles.

In the application of our process we do not confine or limit ourselves to the precise cylindrical form of retort arranged horizontally, but can adapt a retort to any ordinary fire place, stove or furnace, and in the process or mode employed by us a continuous heat or perpetual charging of the retort is not required, but the heating and charging are only resorted to at intervals or when a fresh supply of gas is to be used.

It is essential to observe that in heating and charging the retorts there must not be too much of a flow of the oily or greasy matter, for if too much liquid enters the retorts a degree of ebullition will take place that will counteract the evolving of the gas, and instead of pure gaseous matter a residuum will be the result, greatly endangering the quantity and quality of the gas. The oily fluid or grease must merely drip in small quantity through the feed pipes, and in observing this every particle of the oil or grease is completely digested and nothing but pure gas thrown off, divested of all lamp black or carbonaceous particles.

Gas produced by our process may be retained for any length of time in air-tight vessels, and if necessary made portable.

In the application of our process to light up dwellings and other buildings the ordinary gas fixtures, fittings and burners can be used, dispensing, however, with the meter used with the ordinary mode of using gas.

It is deemed useless here to dwell upon the great utility of our mode of producing illuminating gas for domestic and other purposes. The general features of simplicity and perfect operation of the apparatus, together with the great economy and cleanliness attending the process, show the various advantages in favor of our mode and apparatus over the various other modes or systems of producing gas.

Having described the construction, operation and application of our improved apparatus and process of generating and puri-