(No Model.) 4 Sheets—Sheet 1.

M. VÉLEZ.

RANGE GAS GENERATOR.

No. 589,486. Patented Sept. 7, 1897.

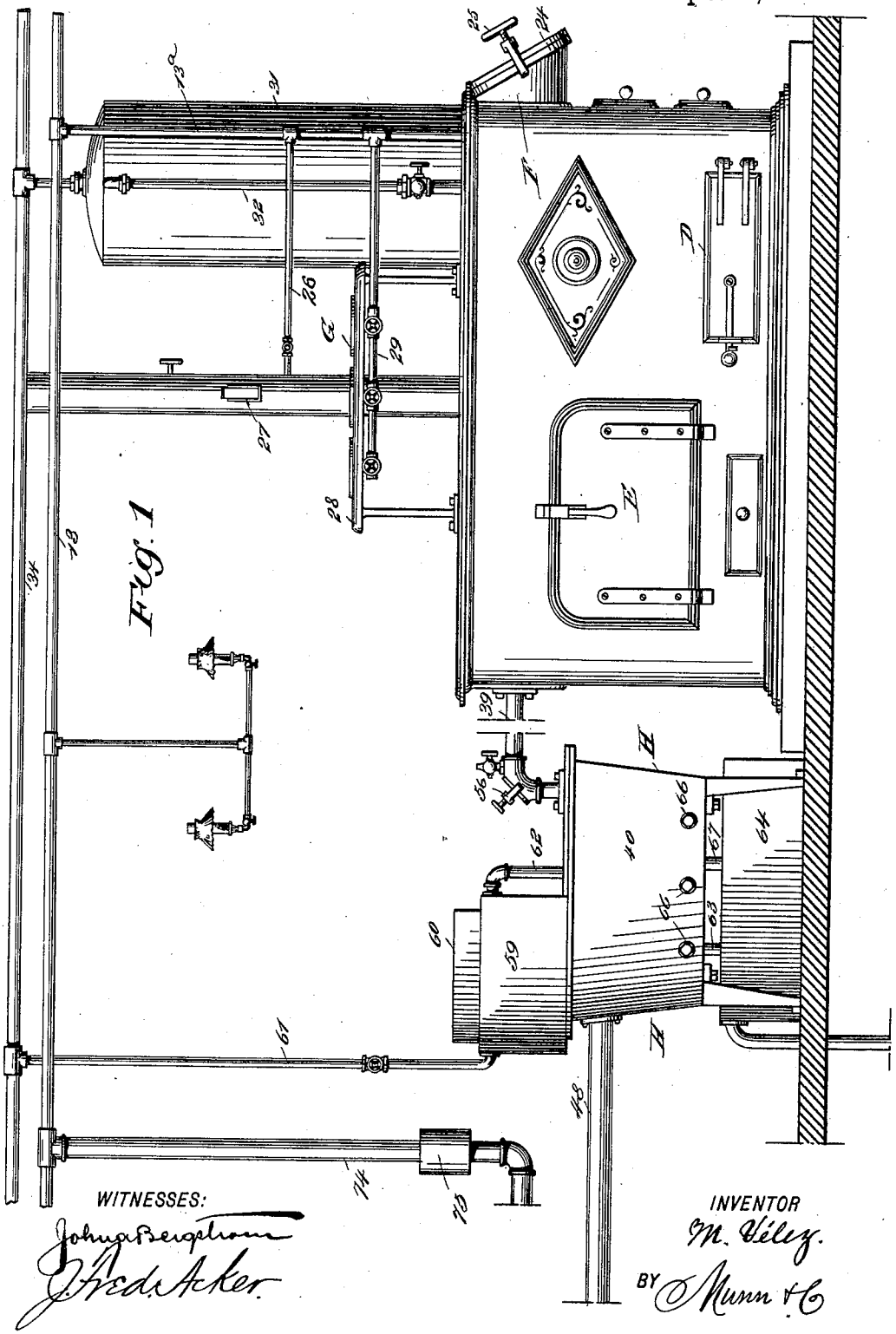


Fig. 1.

WITNESSES:

John A. Bergstrom

J. Fred. Acker.

INVENTOR

M. Vélez.

BY Munn & Co

ATTORNEYS.

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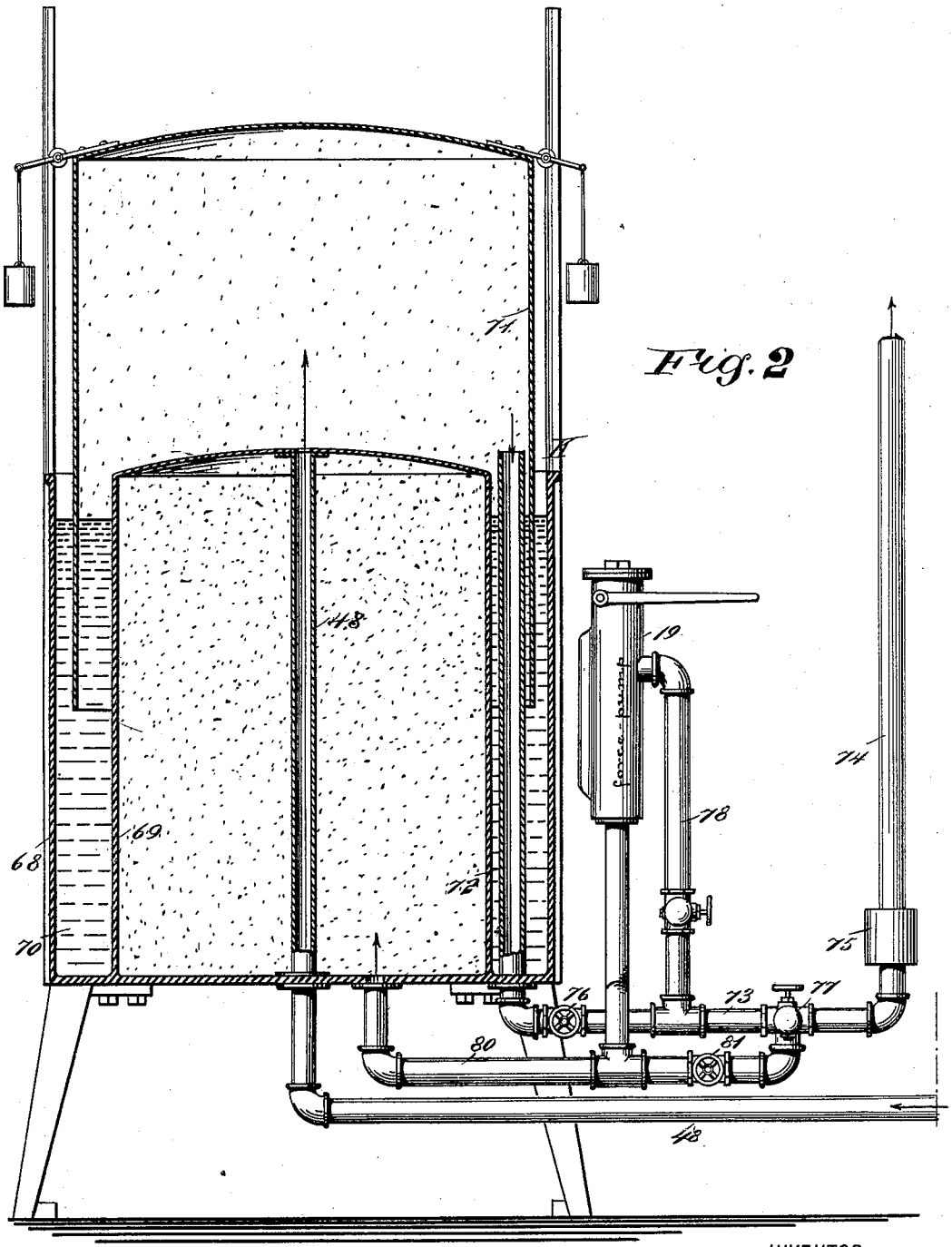


FIG. 2

WITNESSES:

John A. Bergstrom

Fred. Acker.

INVENTOR

M. Vélez.

BY Munn & Co

ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

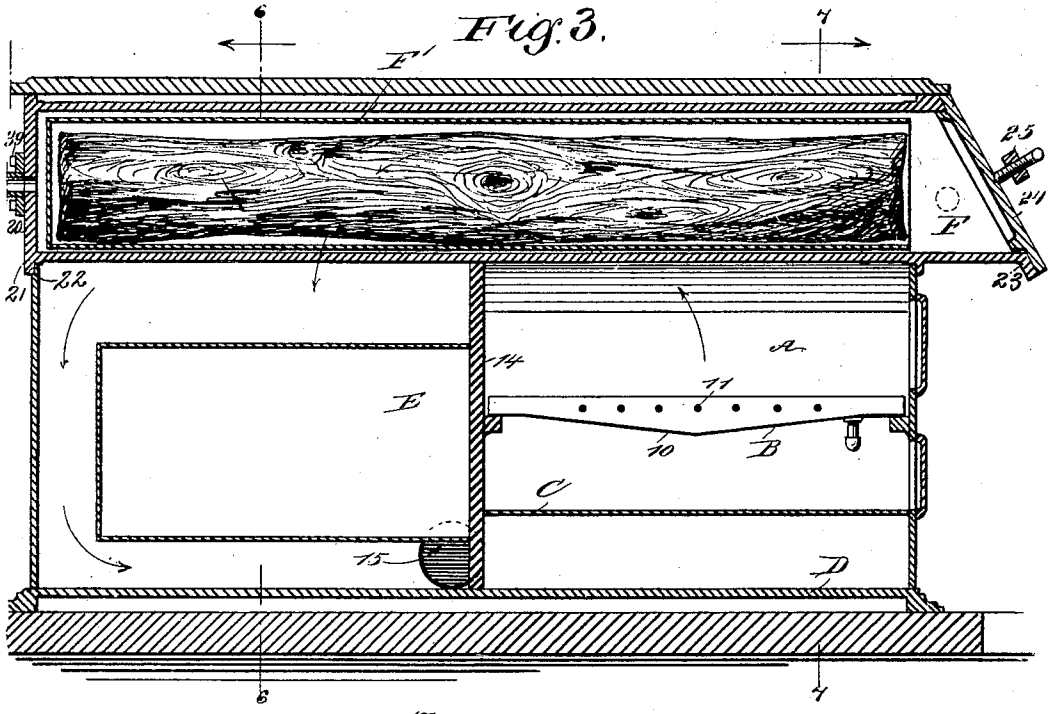
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M. VÉLEZ.

RANGE GAS GENERATOR.

No. 589,486. Patented Sept. 7, 1897.

Fig. 3.



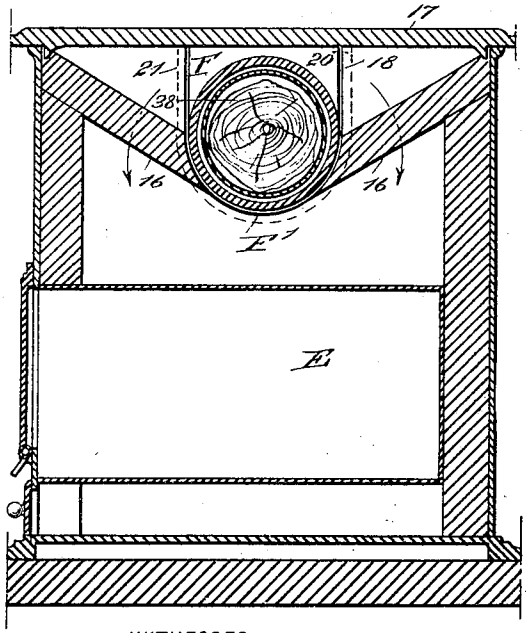


Fig. 4.

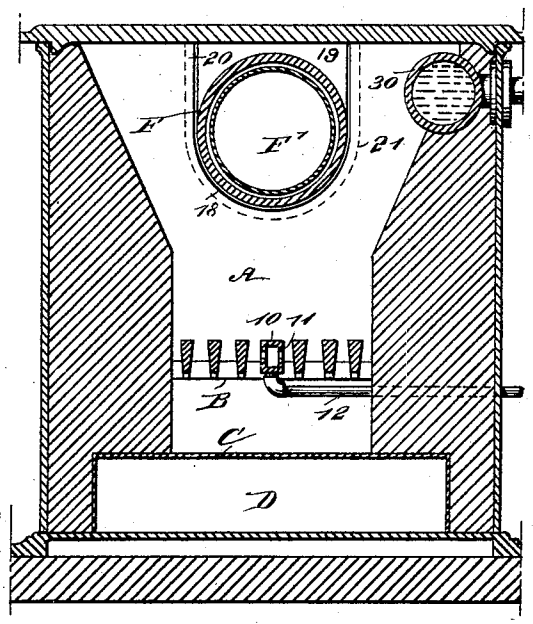


Fig. 5.

WITNESSES:

John A. Bergstrom

J. F. de Ackerman

INVENTOR

M. Vélez.

BY Munn & Co

ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 4.

M. VÉLEZ.

RANGE GAS GENERATOR.

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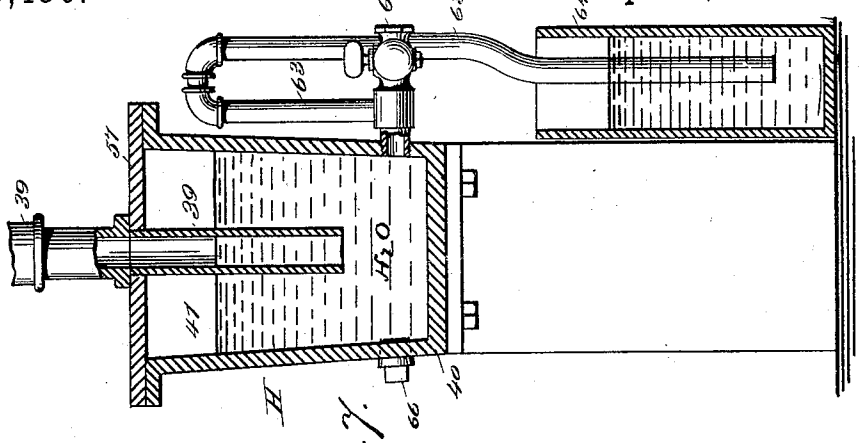


Fig. 7.

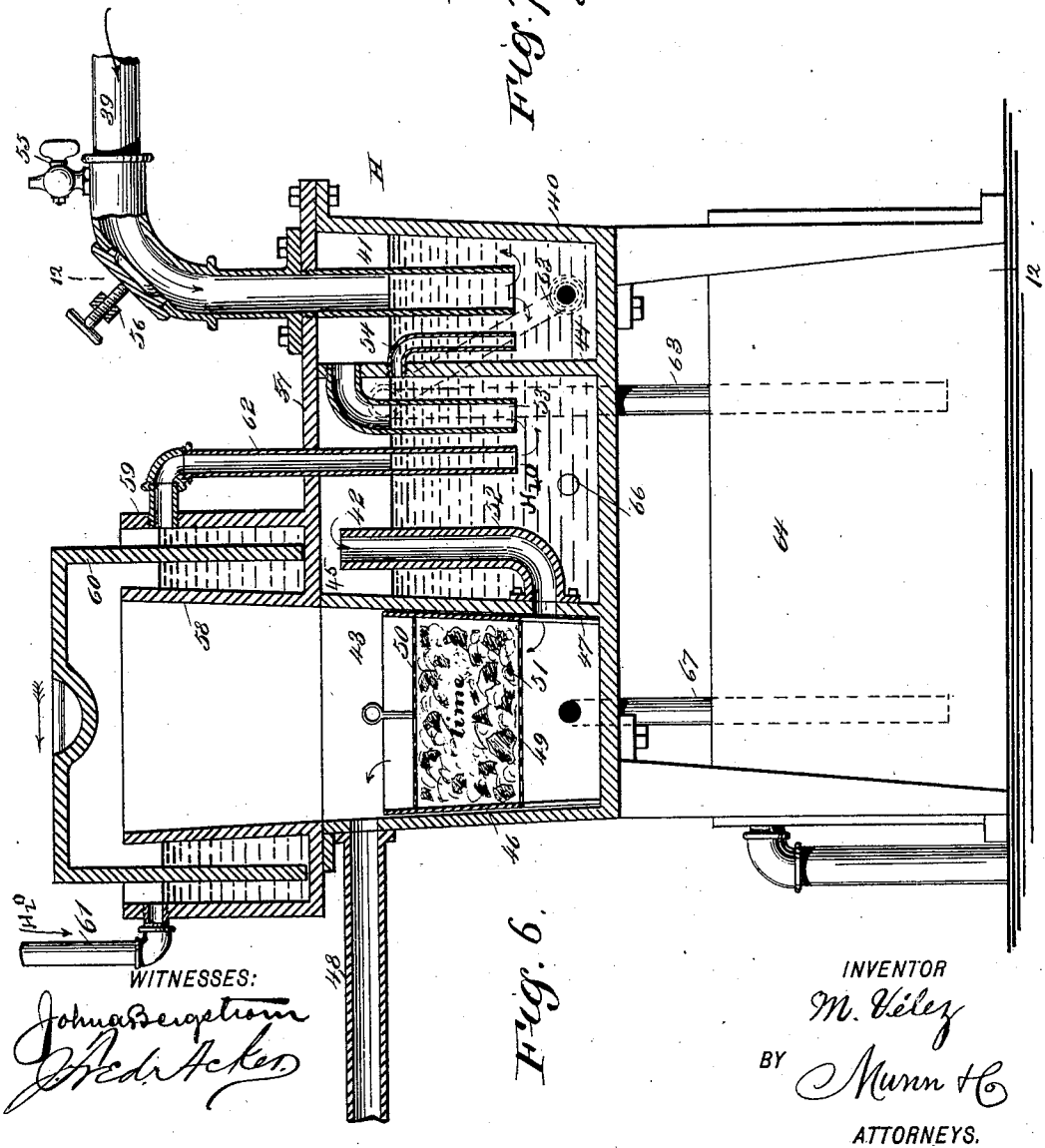


Fig. 6.

WITNESSES:

John A. Seigstrom

Fred. Ackers

INVENTOR

M. Vélez

BY Munn & Co

ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

MIGUEL VÉLEZ, OF NEW YORK, N. Y.

RANGE GAS-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 589,486, dated September 7, 1897.

Application filed November 16, 1894. Serial No. 528,977. (No model.)

To all whom it may concern:

Be it known that I, MIGUEL VÉLEZ, a citizen of Peru, South America, at present residing at New York city, in the county and State of New York, have invented a new and Improved Range Gas-Generator, of which the following is a full, clear, and exact description.

My invention relates to a gas plant especially adapted for the generating of wood-gas or gas from vegetable matter, the object of the invention being to provide an apparatus capable of being used as a range in public and in private buildings and to so construct this range that while it is being employed for cooking purposes, for example, hydrogen gas may be generated derived from wood or other vegetable substances, such as leaves, straw, corncobs, sawdust, &c., as well as from any kind of vegetable sweepings.

The prime object of the invention is to provide a means whereby the gas generated may be used not only for heating and cooking purposes, but likewise for illuminating purposes, thus enabling a person by the use of such a plant to generate gas in sufficient quantities while using the range for ordinary purposes, to enable the gas generated to be used for heating or cooking purposes when the range is no longer fired or hot enough for cooking, and likewise enabling a person to illuminate a dwelling with the gas so generated.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a front elevation of the improved range containing the retort and likewise a front elevation of the gas-purifier connected with the retort. Fig. 2 is a vertical section through a gasometer, illustrating in side elevation the devices for producing pressure in the gasometer. Fig. 3 is a vertical longitudinal section through the body portion of the range and likewise a longitudinal section through the retort. Fig. 4 is a transverse vertical section taken substantially on the line 6 6 of Fig. 3, and Fig. 5 is a similar section taken substantially on the line 7 7 of Fig. 3. Fig. 6 is a longitudinal vertical section through the purifier or washer for the gas; and Fig. 7 is a transverse vertical section through the said purifier, taken substantially on the line 12 12 of Fig. 6.

In carrying out the invention the range is provided with a fire-box A of any desired dimensions, and the said fire-box contains a grate B, and one of the bars—the center bar 10, preferably—is provided with openings 11, usually made in the sides thereof, and this center bar of the grate is connected by a pipe 12 with a branch 13^a of the gas-service pipe 13, whereby the gas may be employed to assist in producing a fire or in rendering the fire more or less intense.

The usual ash-pit C is located beneath the grate, and beneath the ash-pit a warming-closet D is usually placed.

A transverse partition 14 divides the range into two compartments, and in one of these compartments the fire-box, ash-pit, and warming-oven are located, while in the other compartment the oven proper, E, is placed, ample room being provided around the oven for the circulation of hot air. The waste products of combustion are carried off through a smoke-pipe 15, which enters the range in the oven-compartment at the back of and below the oven, as shown best in Fig. 3.

Over the oven E a series of reversely-arched baffle-partitions 16 are formed, as shown in Fig. 4, and these partitions are preferably made of fire-brick and extend from the sides of the range downwardly and inwardly toward the center, being spaced at their opposing ends a suitable distance apart, and the said inner ends are concaved or suitably shaped to meet around or engage with the exterior of a retort F, which retort is preferably circular in cross-section.

The retort F is adapted to extend from end to end of the range and is placed in position after the top 17 of the range has been removed, and the locating of the retort may be expeditiously and conveniently accomplished, as shown in Figs. 4 and 5, in which it will be observed that at both the front and back ends of the range a recess 18 is made in the upper edge, the recess being practically

rectangular except at the bottom, where it is rendered cylindrical, and at the rear end of the retort a plate 19 is secured or made integral therewith, having a rabbet 20 upon its inner face, whereby a flange 21 is exteriorly formed. The rabbet-section 20 of the said plate enters the recess 18, neatly fitting therein, while the flange 21 enters a depression 22 in the outer face of the range, as clearly shown in Fig. 3, and the retort is then prevented from turning, especially as a similar plate 23 is formed upon the retort near its opposite end, being adapted to enter the recess 18 at the opposite end of the range and a depression 22^a, likewise located at this end.

The plate 23 with its rabbet portion constitutes virtually a collar upon the retort, while the extreme end plate 19 serves as a closing-plate for that end of the retort. The end of the retort near what may be termed its "front plate" 19 extends beyond the front end of the range, as shown in Fig. 1, and is beveled, preferably, in a downwardly direction and is closed by a cap 24, held in place by a clamp 25, or the equivalent thereof, as is shown in Figs. 1 and 3. Thus it will be observed that the retort while having a bearing at the ends of the range has likewise a bearing upon the baffle-partitions 16, and the main partition 14 of the range is cut away in order to receive the retort, as shown in Fig. 3.

The retort therefore extends over the space above the oven and likewise across the fire-pot, and the products of combustion from the fire-pot pass around the retort and into the several compartments above the oven made by reason of the baffle-partitions 16. Under this construction the progress of the heated products of combustion is retarded and the retort is given the full benefit of the heat generated. The products of combustion after passing around the oven, as shown in Fig. 3, pass out through the smoke-pipe 15. The path of travel of the gases is first upward in the fire-box A in front of the partition 14, then over the retort F and longitudinally thereof to the rear of the partition 14, and finally along the baffle-partitions 16 and around the oven E to the smoke-pipe 15.

It is sometimes desirable to have a forced-draft in the smoke-pipe, and to that end a branch 26 is carried from the branch 13^a, for example, of the gas-service pipe 13 into the smoke-pipe and is made to terminate in a jet or a burner of any description. The smoke-pipe is provided with an opening covered by a door 27, which door may be a sliding door, as illustrated, and when it is necessary to force a draft this door is opened and the gas is lighted within the pipe, the door being afterward closed.

As heretofore stated, it is designed that the gas generated while the range is being used in the ordinary manner may afterward be employed for cooking purposes when there is no fire in the range. To that end a frame or table 28 is located either upon the range at the back or at one side or at any desired point, the said frame or table being fitted with any desired number of burners or made in the shape of any well-known form of gas-stove used for culinary purposes, the said gas-stove being designated in its entirety as G and is shown in Fig. 1, the burners of the stove being connected by a suitable valved pipe 29 with the aforesaid branch supply-pipe 13^a or with any convenient service-pipe.

The range may be provided with a water-back 30, preferably in the form of a cylinder, conveniently placed within the fire-pot, Fig. 5, and connected in the usual manner with a water-tank 31, the said water-tank being provided with a gage-glass 32.

If in practice it is found desirable, hot water may be drawn directly from the water-back through the medium of a faucet. (Not shown.) The pipe supplying water to the water-tank is designated as 34 and is best shown in Fig. 1.

The retort is adapted to contain a receiver F'. This receiver is usually made of sheet metal, sheet-iron being preferred, and is of like cross-section as the retort. It is closed at one of its ends. The opposite or open end of the receiver may be closed when desired by means of a suitable cap. (Not shown.)

The wood 38 or any vegetable material employed for making the gas is placed in the receiver F'. The receiver-cap is then placed in position and the cap-plate 24 of the retort is removed. The receiver is then placed therein, its sealed end being located adjacent to the normally-closed end of the retort, as shown in Fig. 5. The cap of the receiver is then taken off and the cap of the retort placed in position. When it is necessary to remove the receiver and again charge the retort, the receiver will be exceedingly hot, especially if there is fire in the range. Therefore after the cap of the retort is removed the cap of the receiver, which cap will be cool, may be quickly fastened upon the receiver and the latter drawn out from the retort without injury to the operator or danger of burning the hands.

The gas generated in the receiver will pass out at the open end thereof into the retort at the front, and the gas will then pass to the rear of the retort, being highly heated in so doing, and will find an escape from the retort through a pipe 39, connected with the back of the retort, as shown in the drawings. This conducting-pipe 39 is connected with a combined washer and purifier H. (Shown in side elevation in Fig. 1 and in detail in Figs. 6 and 7.) This combined washer and purifier consists of a metal box 40, and said box is divided into three compartments, designated, respectively, as 41, 42, and 43, the division being made by two upright partitions 44 and 45. The compartments 41 and 42 are adapted for washing the gas, and therefore contain liquid, water being the liquid preferably used, and the compartment 43 is adapted for purifying the gas. To that end a receptacle 46 of box-like construction is provided with legs 47, and this re-

ceptacle is made to enter an inlet-feed in the compartment 43, its legs resting upon the bottom of the compartment, but the top of the receptacle does not extend to the top of the compartment, as shown in Fig. 6. In fact, it is below a discharge or offtake pipe 48, which leads into the upper portion of this compartment contained in the main box 40. The receptacle 46 is provided with a strainer-bottom 49 and with a strainer-top 50, the latter being removable, and between the bottom and top the said receptacle is filled with a mixture 51 of waste and lime, for example, or other material capable of purifying a gas when passed through it.

A pipe 52 connects with the purifying-compartment 43 below the bottom of the purifying-receptacle, as shown in Fig. 6, and this pipe extends upward in the adjoining washing-compartment 42 to a point near the top thereof. A second pipe 53 is contained in the washing-compartment 42, extending from a point near the bottom of this compartment at the side opposite that at which the pipe 52 is located, and the said pipe 53 communicates with the washing-compartment 41 at a point near the top, passing through the partition 44.

The equalizing-pipe 54, adapted to equalize the level of water in both the washing-compartments, is contained in the compartment 41 and communicates with the compartment 42 through the partition 44 and at a point below the upper end of the said pipe 53. The pipes 53 and 52 are adapted to conduct the gas after it is washed into the purifying-compartment 43 in order that it may be passed through the purifying material.

The gas that is generated in the retort passes therefrom through the conducting-pipe 39, as heretofore stated, and this pipe is carried in a gas-tight manner downward into what may be termed the "first" washing-compartment 41. This pipe outside of the purifier is provided with a petcock 55 and with a removable cap 56, the latter forming a means for cleaning the pipe should it become foul.

Water is applied to the washing-compartments in the following manner, there being a constant circulation of water through these compartments: The box-body 40 of the purifier and washer is closed by a cover 57, which effectually seals the upper ends of the two washing-compartments; but the said cover is provided with an opening communicating with the purifying-compartment 43, and this opening is surrounded by a collar or sleeve 58, forming, virtually, a continuation of the said purifying-compartment, and the said collar or sleeve 58 in its turn is surrounded by a tank 59 of much greater diameter and preferably constituting an integral portion of the top of the purifier and washer, as shown in Fig. 6. The top of this tank-section 59 is open, but a substantially dish-cap 60 is made to close the upper end of the opening in the cover communicating with the purifying-compartment, the sides of the dish-cap entering the space between the tank 59 and the collar 58. Water is supplied to the said space between the tank and collar by means of a water-service pipe 61, the pipe entering the tank near the top, and at the opposide side of the tank, at a point about level with that at which the water enters the tank, an overflow-pipe 62 is introduced into the tank, and this overflow-pipe extends downward, for example, into the second washing-compartment 42, stopping short of the bottom, and the water finds its level in the next compartment, passing through the equalizing-pipe 54.

The washing-compartment 41 is provided with an overflow-pipe 63, which enters said compartment at a point near the bottom, and this overflow-pipe is carried upward, as shown in Fig. 7, to a point which establishes the level of the water in the two washing-compartments, the pipe being then returned downward and made to enter a drip-box 64, located at one side of the purifier and washer. This drip box or pan may be connected with any offtake desirable, and in said box or pan the tar from the gas will collect.

The washing-compartments may be quickly emptied when desirable through the medium of a cock 65, which may form a continuation of the overflow 63 where it connects with the washing-compartment, and plugs 66 may be placed at or near the bottom of all of the compartments in order that access may be had to them for cleaning or for draining purposes. A drip-pipe 67 is made to enter the lower portion of the purifying-compartment 43 of the purifier and washer, and it also enters the drip-pan 64 in order that any moisture deposited in this compartment by the gas may be quickly removed.

It will be observed that should the pressure of gas in the purifying-compartment be such as to force the gas past the conducting-pipe 48, communicating with it, the dish-cover 60 will effectually prevent any escape of the gas, compelling it to return to the said conducting-pipe as the only means of exit.

The gas after being washed and purified is passed to the gasometer K, which is shown in detail in Fig. 2, and from this gasometer the gas is drawn and conducted to burners to be used either for heating, cooking, or for illuminating purposes, the gas being used without carburation.

The gasometer is constructed in substantially the usual manner, comprising a body 68, and within this body a dome 69 is erected, a space intervening the side wall of the body and the corresponding surface of the dome, which space 70 is filled with water, as shown in the said Fig. 2. In this space the usual movable dome 71 is located, the water serving as a seal for its lower open end. The conducting-pipe 48 enters the fixed dome 69 at the bottom and passes through this dome and out at the top, whereby the gas in its purified state is made to enter the movable dome.

A stand-pipe 72 is entered at the bottom of the body in the space between the fixed

dome and the side wall of the body, and this stand-pipe is made to extend upward above the water-line in the space 70 and into that portion of the movable dome containing the gas. The stand-pipe is connected by a branch pipe 73 with the main service-pipe 74, and this pipe is provided with a governor 75 to regulate the pressure, the governor being of any description.

A valve 76 is located in the branch pipe 72 near the gasometer, and a valve 77 is placed in the said branch pipe near its connection with the main or supply pipe 74 and between the gasometer and the governor. Between the two valves 76 and 77 a valved pipe 78 is carried upward from the branch pipe 73 and connected with a force-pump 79, and the said force-pump is also connected with a pipe 80, which pipe enters the fixed dome 69 at the bottom and is likewise in connection with the pipe 73 at or near the valve 77, the pipe 80 being provided with a valve 81 between its connection with the dome and its connection with the pipe 73.

The valve 76 being opened and likewise the valve in the pipe 78 and the valves 77 and 81 closed, upon working the pump 79 the gas will be drawn from the movable dome and compressed in the fixed dome, whereupon by closing the valve 76 and the valve in the pump-pipe 78 and opening the valves 77 and 81 the compressed gas in the fixed dome will flow through the pipe 80 to the pipe 73 and from the latter pipe through the governor into the main supply-pipe 74.

Wood-gas has been made heretofore in various ways, but I am not aware that wood-gas has been heretofore used for illuminating purposes.

In order to effect an illumination, it is necessary that the gas should be burned in the presence of and in a manner to substantially impinge upon a mantle or its equivalent prepared with mineral salts and oxids or refractory earth, the said material having the property of producing light by means of incandescence caused by a strong heating flame. By thus burning wood-gas without mixing it with air prior to combustion I obtain a light which is much superior to that produced by coal or water gas when formed in the ordinary way.

The plant herein described for generating gas may be made of any desired size and may have capacity for producing gas for illuminating with a number of burners, varying, for example, from five to fifty.

The ordinary form of the apparatus is constructed to produce gas while, for example, the range is being used also for other purposes sufficient to feed from twenty to twenty-five burners during a period of about five hours.

If an apparatus of the above capacity is worked for about ten hours daily it will consume about one hundred pounds of wood used as fuel in the furnace and can at the same time convert in the retort through distillation about one hundred and fifty pounds of wood or any other vegetable matter into charcoal. The distillation of these one hundred and fifty pounds of wood can be made by loading the retort about four times, calculating four hours for the distillation of the first load and two hours for each of the other loads. The one hundred and fifty pounds of wood can produce from seven hundred to seven hundred and fifty cubic feet of hydrogen gas, about fifty pounds of fine-grade charcoal, and three or four gallons of pyroligneous acid, which contains wood-tar, acetate of lime, pyroxylic spirit, acetic acid, &c.

The one hundred pounds of wood consumed in the furnace as fuel for cooking in ten hours may cost about ten or fifteen cents, calculating the value of a cord of wood weighing five thousand pounds at the rate of from five dollars to seven dollars and fifty cents, and from this expenditure, besides heating the retort for the production of gas, there is also obtained hot water and the calefaction of ovens and stoves. According to the same calculation the one hundred pounds of wood for the distillation of the gas will cost at the utmost twenty-two and a half cents, which, added to the fifteen cents, the value of the fuel of the furnace, will make the total of thirty-seven and a half cents.

Calculating the value of the fifty pounds of charcoal at one cent per pound, making fifty cents, and that the value of the seven hundred and fifty cubic feet of hydrogen gas is worth thirty-seven and a half cents, which is the equivalent of fifty cents per thousand cubic feet of gas, which is less than one-half the price paid in many cities, it results that the expense involved by the purchase of the two hundred and fifty pounds of wood will amount to thirty-seven and a half cents and their product to eighty-seven and a half cents, to say nothing of the value of the pyroligneous acid, which can be easily sold at about ten cents per gallon, giving thus a net profit of fifty cents, besides the important advantages of obtaining a means of cooking and obtaining hot water or steam and a sure and independent illumination at about one-half the price of coal-gas.

Each incandescent burner of wood-gas will give a light of an intensity equal to fifty candles, which is more than double the intensity of burners of coal-gas and of the Edison incandescent lamp.

In order to obtain a good light, the gas must be supplied to the burner at not less than a three-inch pressure, and any suitable gage may be employed to determine the pressure.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the range and the retort therein, of the gasometer connected to the retort, said gasometer comprising the body adapted to be filled with water, the fixed dome

within the body, the movable body between the body and the fixed dome, the gas-inlet pipe constructed to discharge gas into the movable dome, the gas-outlet pipe connected to the interior of the movable dome and to the main service-pipe, a valved branch pipe leading from the outlet-pipe to the interior of the fixed dome, and a pump connected to the outlet-pipe and to the branch pipe between the body of the gasometer and the connection of the branch-pipe with the outlet-pipe, as and for the purpose set forth.

2. The combination, with a range or an equivalent cooking or heating device, of a retort contained therein, adapted for the generation of gas from wood or vegetable substances, a purifier and washing device connected with the said retort, the said purifier and washing device being provided with water-receiving compartments and a gas-purifying compartment, the said compartments being connected and provided with conductors for the gas, a purifying-box located in the purifying-compartment, having a reticulated bottom and a substantially open top, being adapted to contain lime and waste, or other gas-purifying material, a water seal located over the purifying-compartment, a water-feed entering the said seal and supplying water therefrom to the water-compartments, an overflow leading from the water-compartment, and a drip-pan adapted to receive the overflow, and a receiver for the gas, connected with the purifying-chamber of the purifying and washing device, substantially as and for the purpose specified.

3. In an apparatus for the manufacture of gas, a purifier, a water-tank forming a water seal for the purifier, a washer, an overflow for discharging the water from the water seal into the washer, and a drip-pan for receiving the overflow from the washer, substantially as described.

MIGUEL VÉLEZ.

Witnesses:
J. FRED ACKER,
FRANK D. PAGLIUCHI.