4 Sheets—Sheet 1.

A. GLACHET.

GAS APPARATUS.

No. 181,934. Patented Sept. 5, 1876.

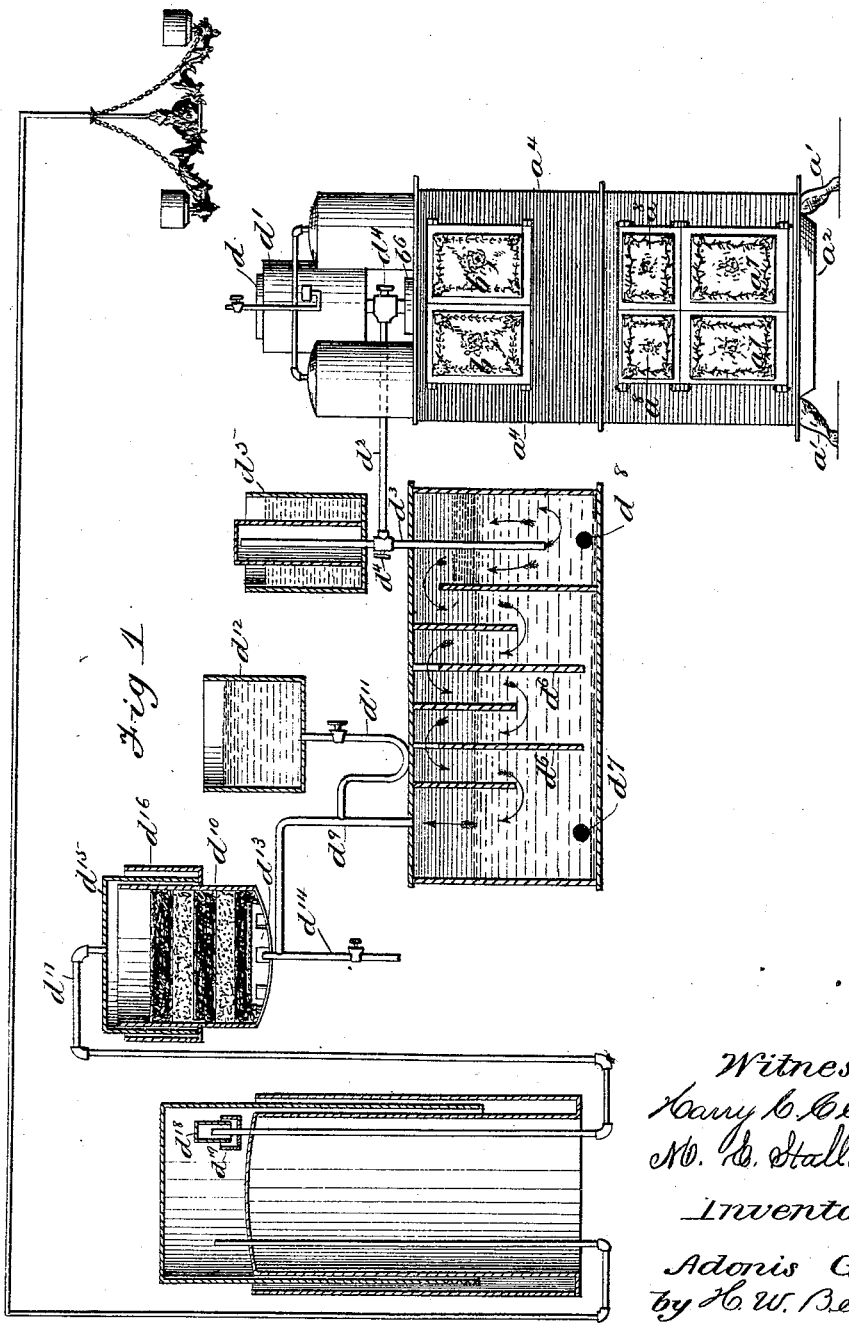

Fig 1.

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Inventor.
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Attys.

4 Sheets—Sheet 2.

A. GLACHET.

GAS APPARATUS.

No. 181,934. Patented Sept. 5, 1876.

Fig 2

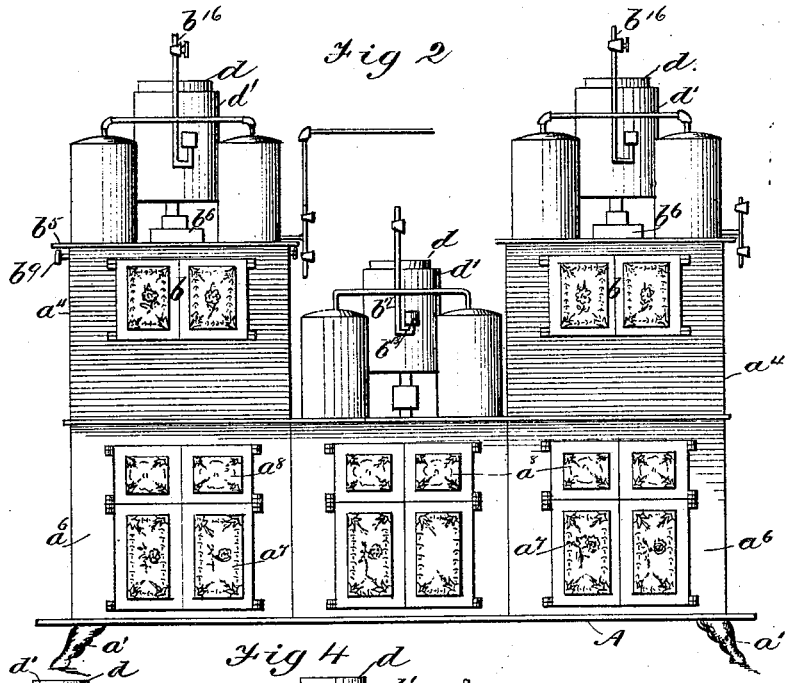


Fig 3

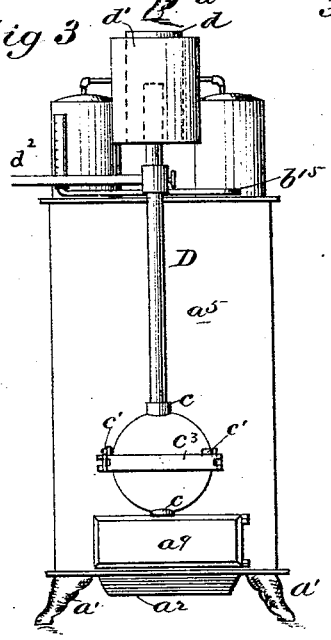
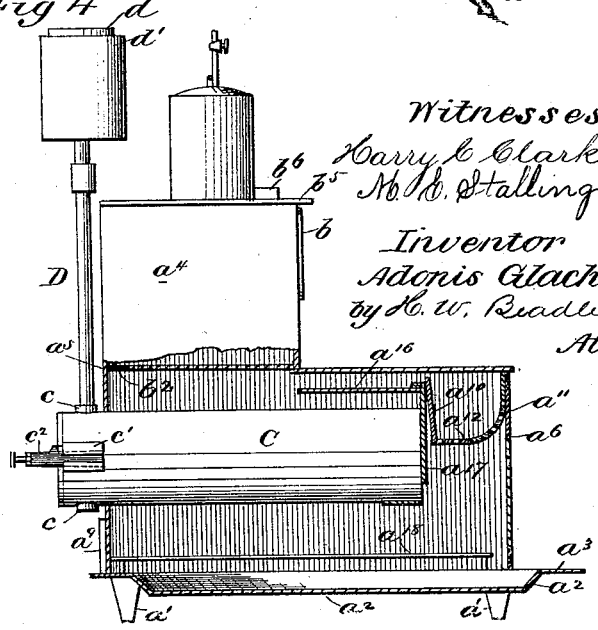


Fig 4



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GAS APPARATUS.

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Fig 5

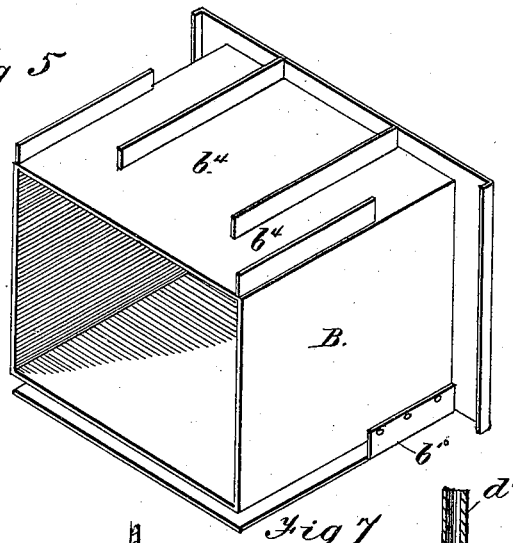


Fig 6

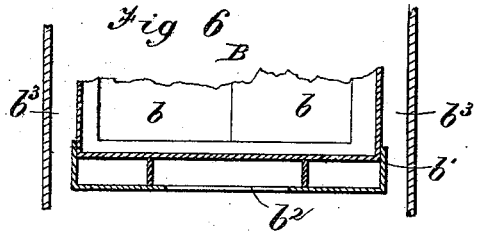


Fig 7

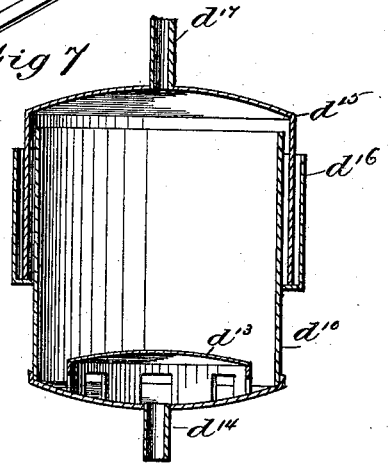


Fig 8

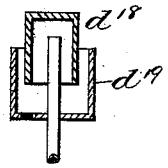


Fig 9

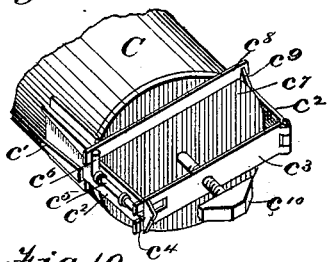


Fig 9a

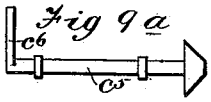
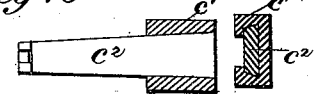


Fig 10



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A. GLACHET.

GAS APPARATUS.

No. 181,934. Patented Sept. 5, 1876.

Fig 11

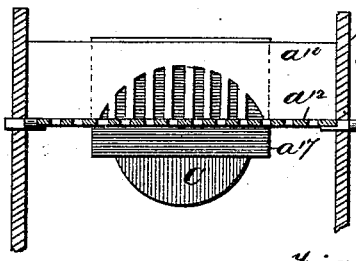


Fig 12

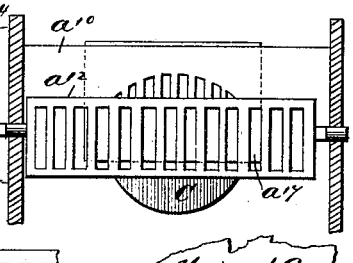


Fig 11 a

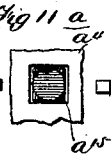


Fig 15

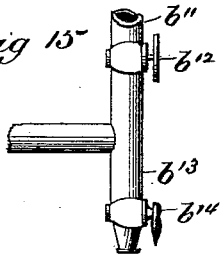


Fig 13

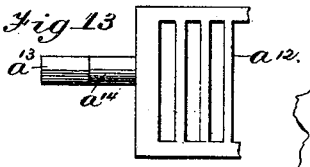


Fig 16

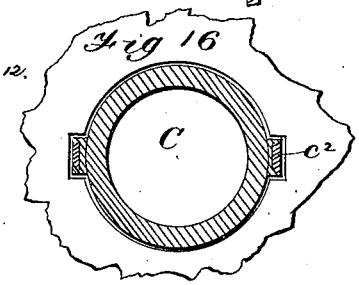


Fig 14

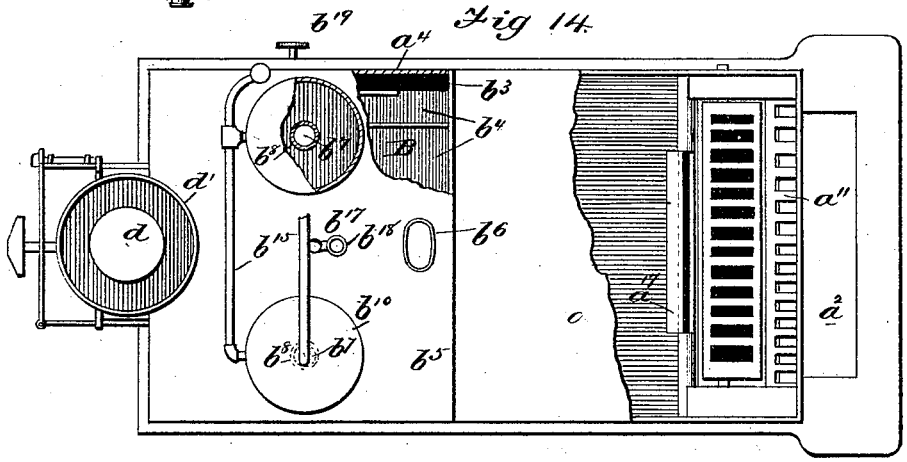
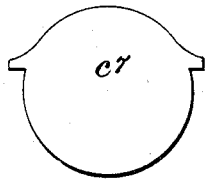


Fig 17.



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Wm. E. Hallings.

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UNITED STATES PATENT OFFICE.

ADONIS GLACHET, OF ALEXANDRIA, VIRGINIA.

IMPROVEMENT IN GAS APPARATUS.

Specification forming part of Letters Patent No. **181,934**, dated September 5, 1876; application filed April 15, 1876.

To all whom it may concern:

Be it known that I, ADONIS GLACHET, of Alexandria, in the county of Alexandria and State of Virginia, have invented new and useful Improvements in Gas Apparatus; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings and to the letters of reference marked thereon.

This invention, which I term the self-working gas apparatus, consists, mainly, first, in certain peculiarities of construction of the retort and its attachments; second, in the employment of a main pipe having an auxiliary portion adapted to give relief when the main passage is clogged, and the legitimate combinations of this with other parts; and, third, in certain general details of construction, which, in connection with the foregoing, will be fully described hereinafter.

In the drawings, Figure 1 represents a side elevation, partially in section, of my improved apparatus; Fig. 2, a front elevation of a modified form of range; Figs. 3 and 4, rear and side elevations of the range. Figs. 5 and 6, views of the removable oven; Fig. 7, a sectional elevation of the second purifying-chamber; Fig. 8, the discharge end of the pipe opening into the gasometer; Fig. 9, a perspective view of the front end of the retort and its fastening devices; Fig. 10, views of one of the retort-ears and its socket-lugs; Figs. 11, 12, and 13, views of the pivoted grate; Fig. 14, plan view of the range with the top partially broken away to show the interior; Fig. 15, an enlarged view of the filling and drawing-off pipe attached to the reservoirs; Fig. 16, view representing the manner of holding the retort in the back plate of the range; Fig. 17, a detached view of the retort-door.

To enable others skilled in the art to make and use my invention, I will now proceed to describe fully its construction and manner of operation.

A, Fig. 4, represents the base-plate of the range, which is supported by any proper legs, a^1 a^1, and provided with a central depressed portion, a^2, which extends in front into the hearth-plate a^3, as shown. a^4 a^4 represent the side plates, of any proper construction, and a^5 and a^6 the front and back plates, each of which is provided with an upper and lower opening, as shown. a^7 a^7, Figs. 1 and 2, represent doors adapted to close the lower opening in the front plate, and a^8 a^8 doors adapted to close the upper opening. a^9, Figs. 3 and 4, represents a door adapted to close the lower opening in the back plate, the upper opening being filled by the outer end of the retort, as shown. a^{10}, Figs. 4, 11, and 12, represents a division-plate, having central perforations or slots, as shown, which forms the rear wall of the upper fire-box. a^{11}, Figs. 4 and 14, represents a vertically-sliding grate, forming the front side and a portion of the bottom of the fire-box; and a^{12}, Figs. 4, 11, and 12, a pivoted grate, forming the remaining portion of the bottom of the fire-box. This portion of the grate is supported at its end by shafts located upon one side of its longitudinal center line, as shown, which have their bearing ends provided with a rectangular portion, a^{13}, Fig. 13, and a circular portion, a^{14}, as shown.

a^{15}, Fig. 11, represents the socket-bearings of the shafts, which are provided with a rectangular outline corresponding with the rectangular portion of the shaft. The grate itself is adapted to move slightly in a longitudinal direction, so that either the rectangular or circular portion of the shafts may rest in the socket-bearings, according as it is desired to rigidly hold the grate or permit it to drop to throw down the coal.

a^{16}, Fig. 4, represents a division-plate, extending in a horizontal direction from the upper edge of the back wall of the fire-pot, which forms, in connection with the front top plate, the upper flue of the stove.

a^{17}, Figs. 4, 11, 12, and 14, represents a removable guard-plate, adapted to be inserted in a proper slot in the division-plate a^{16}, when desired, for the purpose of closing the openings in the rear wall a^{10} of the fire-pot, as shown.

a^{18} represents a grate, of any proper construction, which is adapted to rest upon the base-plate, and adapt the lower chamber for use as a furnace for heating the retort. If desired, this grate may be constructed of a series of independent removable bars.

B, Figs. 5, 6, and 14, represents a remova-

ble oven, having doors *b b*, Figs. 1 and 2, which is securely held in any proper manner between the upper portions of the side plates, as shown. b^1 represents a removable bottom plate, having a proper opening, b^2, Figs. 4 and 6, as shown, by means of which a flue is formed, adapted to receive the products of combustion from the upper and lower fire-pots, as shown. b^3 b^3, Figs. 6 and 14 represent a flue, formed in the intermediate space between the oven-wall and the side plates of this stove, which communicates above with the revertible flues b^4 between the top plate of the oven and the top plate of the stove. b^5, Fig. 14, represents the top plate, provided with the smoke-pipe opening b^6, and also with the openings b^7 b^7, from which rise the closed tubes b^8 b^8, having the dampers b^9, as shown. b^{10} b^{10} represent water-reservoirs, surrounding the tubes b^8, as shown, which are closed above, and provided with a proper system of steam-pipes, to convey steam or hot water away to any desired point. b^{11} represents a pipe, having a stop-cock, b^{12}, Fig. 15, connected with the water-main, by means of which water is introduced into the reservoirs. b^{13} represents a branch pipe, attached to pipe b^{11} below the stop-cock b^{12}, which is provided with the independent stop-cock b^{14}, and is adapted to draw off hot water from the reservoirs. b^{15}, Fig. 14, represents a pipe connecting the two reservoirs, which is provided at one end with a proper gage for indicating the height of the water within. b^{16}, Figs. 2 and 4, represents a discharge pipe, by means of which steam is conveyed away to any desired point; and b^{17}, a branch, having a safety-valve, b^{18}, as shown.

C, Figs. 4 and 9, represents the retort, constructed generally of any proper form, but essentially provided upon opposite sides with similar discharge-openings *c c*, by means of which it is adapted to be reversed after continued use in its first position. This is supported within the lower chamber in any proper manner, the bridge-bars shown, however, being preferred. Its outer end projects through the upper opening in the rear plate of the stove, so that access is readily had to its interior.

c^1 c^1, Figs. 9 and 10, represent socket-lugs, located near the end of the retort, on opposite sides, which are provided with converging sides, having overhanging edges, as shown.

c^2 c^2 represent independent ears, having a shank with converging and inclined sides, adapted to be removably held by the socket-lugs, as shown. These lugs, it will be observed, rest in corresponding recesses in the stove-plate, and securely hold the retort from turning. c^3 represents a cross-bar hinged at one end to one of the ears c^2, and provided at the other with an open slot, c^4, as shown. c^5 represents a safety-bar, consisting of a shaft of proper length, held in any proper bearings upon the side of the ear, and adapted to have a partial revolution, which is provided at one end with a right-angled termination, and at the other with a transverse head, c^6, as shown. c^7 represents the retort-door, consisting of a circular plate of proper size, provided with ears c^8, one of which rests between the fixed lug c^9 of one of the ears, and the other behind the right-angled arm of the safety-bar, as shown. c^{10} represents the screw-shaft of the cross-bar, by means of which the retort-door is fastened in the usual well-known manner.

D, Figs. 3 and 4, represents the discharge-pipe, by means of which the gas from the retort is conveyed away to the purifying-chambers. This rises from the retort in a vertical plane, and opens above into the chamber formed by the cap *d*, as shown. d^1 represents a water-vessel secured to the pipe, by means of which the lower edges of the cap are sealed, and the gas prevented from escaping. By means of this construction the pipe D is provided with an auxiliary portion extending above the opening d^2, which is adapted to give relief when the main passage is clogged. d^2 represents a transverse connecting-pipe, which opens into the pipe D some distance below its upper end, and connects the same to the similar pipe d^3, having a water-chamber and cap identical in construction with that already described. d^4 d^4 represent caps of any suitable construction, which cover suitable cleaning-openings in the ends of the connecting-pipe, as shown. The pipe d^3 opens above beneath the cap d^5, as before described, and below into the first division of the purifying-chamber, as shown. d^6 d^6 represent division-plates having openings for the passage of the gas, alternately at their upper and lower edges, as shown. None of these plates, however, with the exception of the first, extends entirely down to the bottom plate, so that the liquid contents accumulating in any division are permitted to flow without obstruction to the single drip-opening d^7. d^8 represents a drip-opening adapted to draw off the tar accumulating in the first purifying-chamber. The bottom plate of the purifying-box is made removable, so that its interior may be reached when desired.

d^9 represents the discharge-pipe, which extends to the purifying-chamber d^{10}. d^{11} represents a branch pipe, controlled by a suitable cock, by means of which, when desired, the contents of the tank d^{12} may be delivered to the purifying-box. d^{13} represents a removable cap having perforations in its annular side, which covers the discharge end of pipe d^9, and divides the gas received therefrom, so that it is brought more intimately into contact with the contents of the purifying-chamber above. This cap also serves to arrest the tar and discharge it through the vertical drip-pipe d^{14}, as shown. d^{15} represents a removable cover, and d^{16} an annular water-seal cup, adapted by its contents to seal its lower edges and prevent the escape of gas. d^{17} represents the discharge-pipe, communicating with a gasometer of any suitable construction. d^{18}, Figs. 1 and 8, represents a cap, covering the end of pipe d^{17}, and d^{19} a vessel inclosing the lower

edges of the cap, which is provided with a discharge-opening in its bottom for sediment or other accumulation.

The operation of my improved apparatus is as follows: The retort may be heated by a fire in the lower or upper chamber, or both, according to the circumstances of the case. If but little gas is required, the upper chamber, which furnishes heat for cooking purposes, may be sufficient. By means of the perforated or slotted back plate of the upper fire-box its heat may be communicated directly to the retort. When it is desired, however, to use the stove for cooking purposes only, the removable guard-plate is inserted in place to protect the retort and direct the heat into the main flue. If desired, the contents of the upper fire-chamber may be dumped into the lower chamber by sliding the grate in a longitudinal direction, so that the rectangular portion of its bearings is disengaged from the rectangular socket, when the grate, being unsupported and overbalanced upon one side, will necessarily tilt and discharge its load. Access is readily had to the lower fire-chamber for the purpose of arranging the fuel below the retort, or cleaning out the same by means of the door at each end.

The retort is supported by means of the bridge-bar, as described, and is held from turning by means of its side lugs, which rest in corresponding recesses in the back plate. It is provided with two discharge-openings, in order that its position may be reversed when one side has been used for a proper period, so that it will last twice as long as it otherwise would. The ears supporting the fastening mechanism are removable, so that their position can be changed whenever the retort is reversed, and so, also, that they can be applied to a new retort when the old one is worn out. The fastening devices when in place are all attached to the retort, so that the danger of accidental displacement or loss is avoided. The safety-bar permits the retort-door to open slightly, when the shaft is loosened and still holds it, so that accident from the pressure within the retort is impossible. The bar also operates as a double lock, the door and cross-bar being either held or released by a single movement of the bar.

The gas passing from the retort enters directly into the first vertical pipe, and, ascending to the top, is acted on by the cooling-chamber there located, by means of which condensation is effected, and the greater portion of the tar thrown down to be again acted on in the retort. The cap of the cooling-chamber being free to rise in a vertical direction, it serves as a relief-valve in case of excessive pressure by rising and permitting the escape of gas. This gas may, of course, be caught in any suitable manner, and be conveyed either to the fire-chamber or the gasometer. Any suitable means may be employed, if desired, to guide the cap in its vertical movement. The gas in its continued movement passes through the transverse connecting-pipe to the second vertical pipe, where it is subjected to the same action in a greater or less degree, as in the first pipe, the tar being thrown down into the first division of the purifying-box below. The vertical pipes and the connecting-pipe are made with openings at each end, so that ready access may be had for cleaning purposes. The greater portion of the tar is caught by means of the condensation effected by the cooling-chambers before the gas leaves the first division of the purifying-chamber, a part of which falls directly into the retort from the first vertical pipe, a part of the remainder being carried back from the tar-chamber by the suction resulting from the vacuum formed in the retort when the pressure is reduced. The tar thus carried back is again acted upon in the retort and new gas evolved therefrom, so that the final residuum is believed to be wholly destitute of gas-making properties. The gas, being now nearly free from tar, passes first through the divisions of the purifying-box, then through the second purifying-chamber to the gasometer. All sediment collecting in the box beyond the first chamber is free to flow beneath the partitions and discharge through the single drip-opening, this construction being advantageous because the fewer the openings the less are the opportunities of leakage and escape of gas. The bottom of the box is made removable, in order that its interior may be reached when desired. The gas having been already freed from its principal portion of tar, but little water is required in the box to further condense and purify it. Such water as is needed may be permitted to run from the tank through the purifying-box and out of the drip, the amount of course being controlled by a cock in the pipe. The second purifying-chamber serves the double purposes of bringing the gas intimately into contact with the lime or other solid purifying material contained therein, and also of arresting the tar, if any remains in the gas, and discharging it by means of the vertical drip-pipe. In using wood, where a larger quantity of tar is made, this construction is especially important. It will be understood, of course, that any tar accumulating in the chamber must necessarily sink to the bottom, and pass out through the drip-pipe. By means of the removable cover the contents of the chamber may be changed when desired. The gas being discharged into the gasometer below the water-line is finally washed, and any impurities thrown down into the inclosing-vessel surrounding the cap. The water in this vessel being constantly agitated by the incoming gas, all sediment, &c., is conveyed away through the bottom opening, and therefore all danger of clogging the pipe is avoided. By means of this construction also all back-flow is positively prevented. The oven of the stove is provided with a removable bottom plate, which may be replaced by a new one when the same is burned out. The

reservoirs may be heated either, as described, by closed tubes, or by a system of pipes adapted to permit the circulation of the products of combustion, or by a solid conducting block or bar depending into the fire, and extending up into the recesses.

By means of the pipe connected with the main and the glass gage the reservoirs may be readily filled and the condition of the water readily seen at all times.

By means of the steam-connections and suitable piping the gasometer may be protected in the coldest weather.

The construction described is exceedingly simple, and yet the apparatus is very effective in its operation, gas being easily and economically made by it. It is so constructed as to be practically automatic in its action, and it may be safely used by any person.

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

1. In combination with the retort, the two independent fire-chambers, adapted for use in connection with the retort, as described.

2. In combination with the retort, the upper fire-chamber, having its rear wall provided with slots or perforations, as described.

3. The combination of the retort, having lugs at one end only, with a range provided with corresponding recesses, the construction being such that the retort may be reversed without entire removal from the range.

4. A retort having a main opening at one end only, and provided with outlet gas-openings upon two sides, in line with each other, so that it may be reversed by a half-revolution, as described.

5. The reversible retort, having lugs at one end only, in combination with removable ears, the construction of the lugs being such that the ears are equally secured when the retort is in either position, as described.

6. The combination of the side lugs of the retort, having tapering surfaces, with the removable ears, having corresponding surfaces, as described.

7. The safety-bar c^5, adapted to revolve on its bearings, as described, for the purpose of locking or unlocking the retort, as described.

8. The combination of the turning safety-bar with the cross-bar c^3, having the slotted end, as described.

9. The combination of the removable ears c^2, cross-bar c^3, and safety-bar c^5 with the retort, as described, the parts being removable, as and for the purpose set forth.

10. In combination with an independent cross-bar and screw-shaft for holding the retort-lid closed, an independent safety-bar, adapted to catch the lid when the holding-shaft is loosened, as described.

11. The pipe D, having an auxiliary portion extending above the opening, communicating with pipe d^2, for the purpose of cooling the gas, as described.

12. In combination with the pipe D, having the intermediate opening communicating with pipe d^2, the cap d, adapted to relieve the pipe when clogged, substantially as described.

13. In combination with the retort, the main pipe D, having the auxiliary extended portion, water-chamber d^1, and the relief-cap d, the pipe being held in a vertical plane for the purpose of returning tar into the retort.

14. The combination of the first and second vertical pipes with the horizontal connecting-pipe, the vertical pipes being open at each end, and the horizontal pipe having cleaning-openings d^4, as described.

15. A gas apparatus having a system of open-ended vertical pipes, provided above with relief-caps, as described.

16. The combination of the two main vertical pipes and the chamber d^1 d^5 with the retort and tar-box, the pipes being adapted, by means of the chambers, to throw down the tar into the retort and box, as described.

17. The purifying-box described, having each alternate partition provided with an opening above and below, as described.

18. The purifying-chamber d^{10}, having the perforated cap d^{13}, inclined bottom, and vertical drip-pipe d^{14}, adapted to collect the drippings, as described.

This specification signed and witnessed this 10th day of April, 1876.

ADONIS GLACHET.

Witnesses:
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