

(No Model.)

4 Sheets—Sheet 1.

G. SCHARFE.

APPARATUS FOR THE MANUFACTURE OF GAS.

No. 473,350.

Patented Apr. 19, 1892.

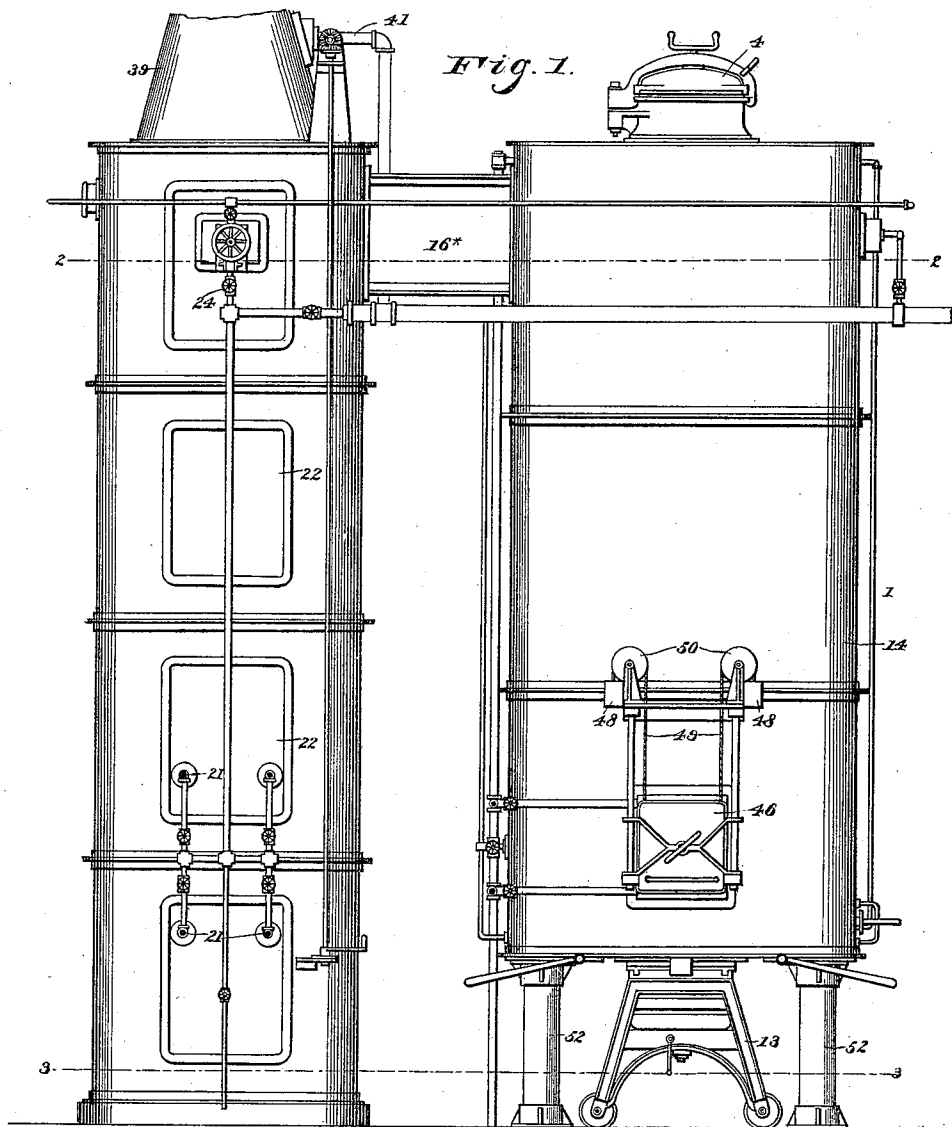


Fig. 9.

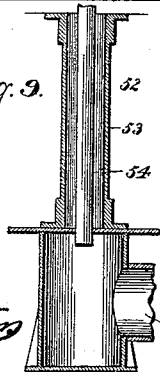
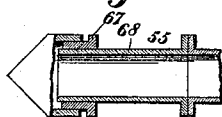


Fig. 10.



Witnesses;

J. M. Withrow,
H. D. Holthaupt,

By *his* Attorneys,

Inventor
Gottlieb Scharfe,

C. A. Snow & Co.

(No Model.)

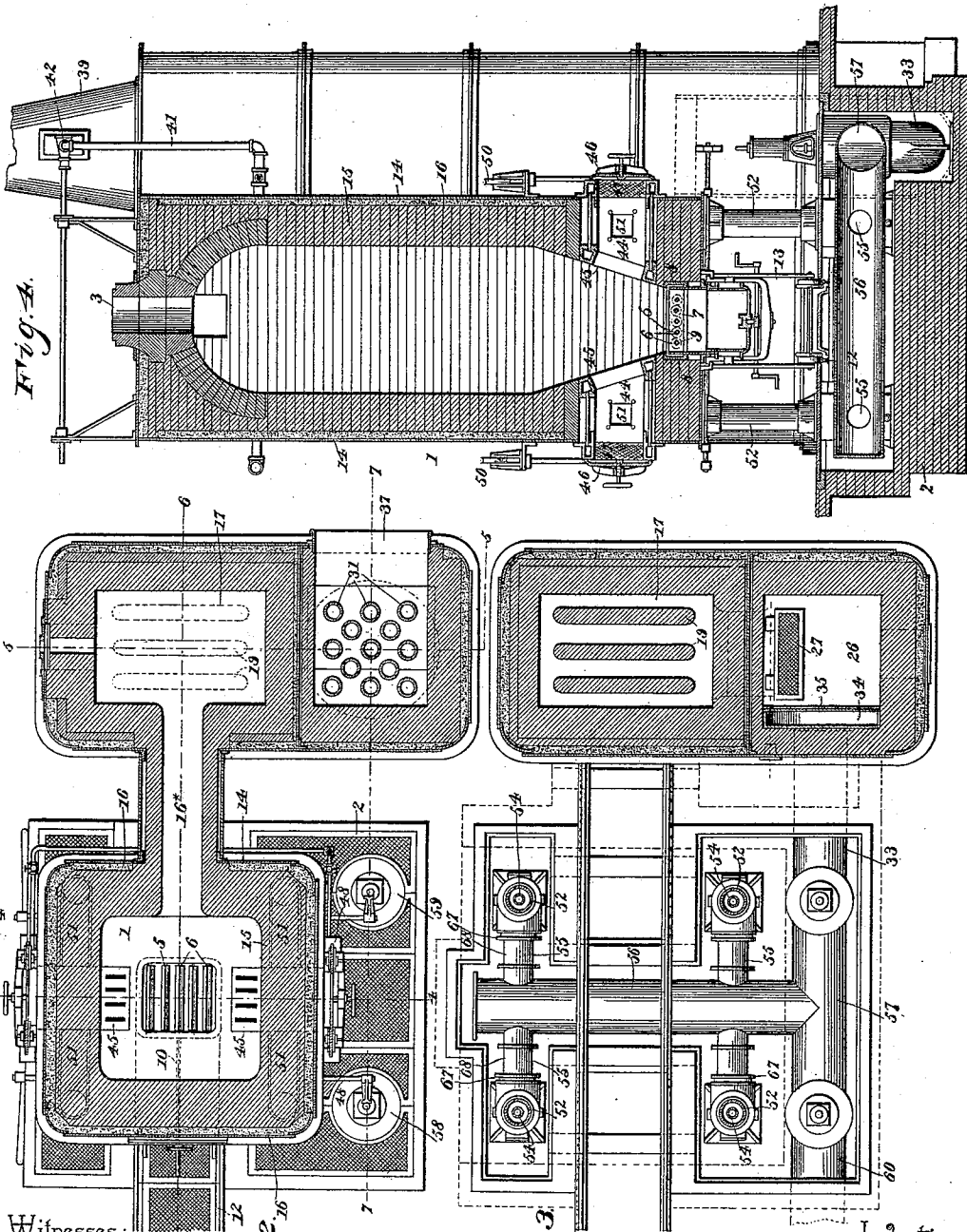
4 Sheets—Sheet 2.

G. SCHARFE.

APPARATUS FOR THE MANUFACTURE OF GAS.

No. 473,350.

Patented Apr. 19, 1892.



Witnesses:

J. M. Withrow
L. P. Holthaupt

Fig. 2

By *his* Attorneys,

Fig. 3

Inventor
Gottlieb Scharfe,

C. A. Snow & Co.

(No Model.)

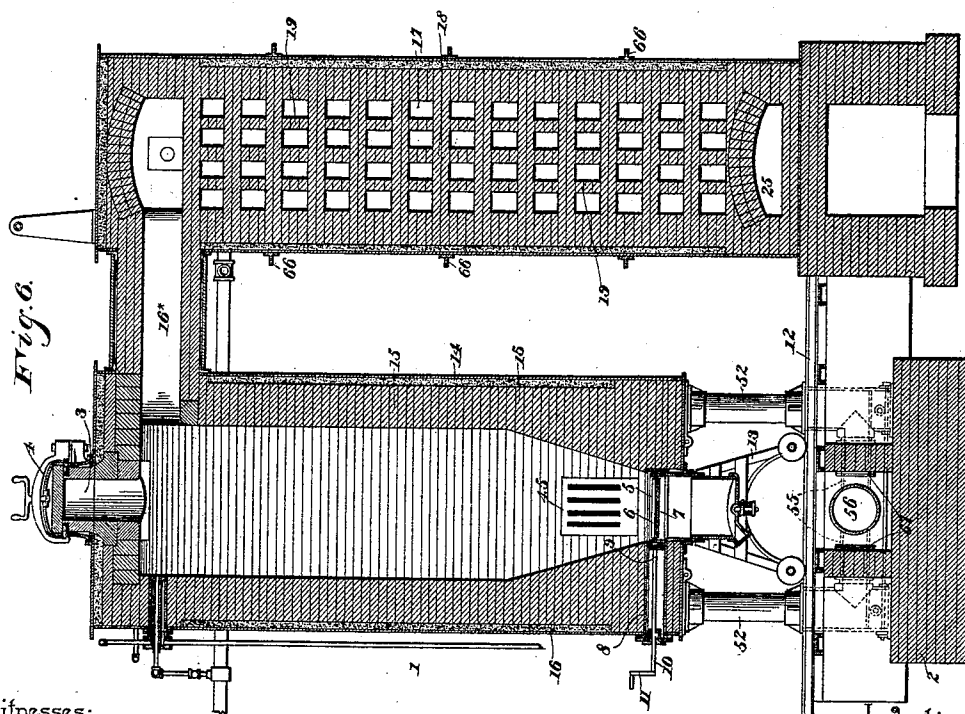
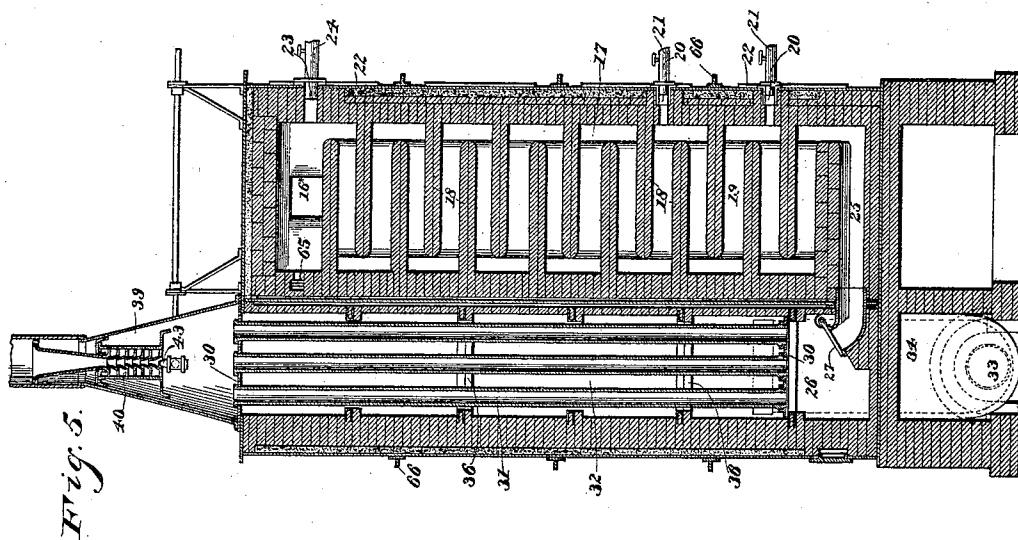
4 Sheets—Sheet 3.

G. SCHARFE.

APPARATUS FOR THE MANUFACTURE OF GAS.

No. 473,350.

Patented Apr. 19, 1892.



Witnesses;

J. M. Thurn
L. P. Hothaupt

By His Attorneys,

C. A. Snow & Co.

Inventor,
Gottlieb Scharfe,

(No Model.)

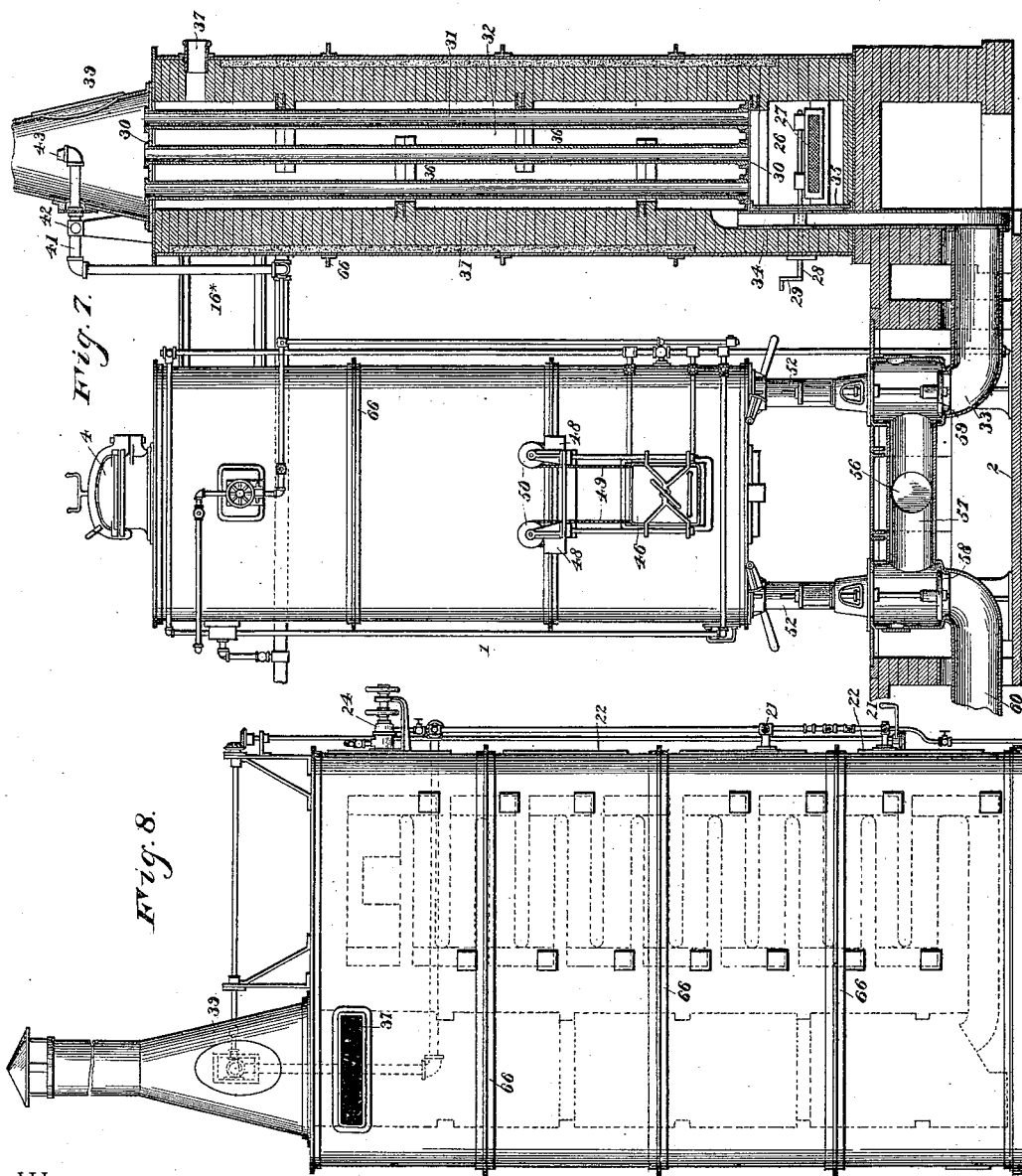
4 Sheets—Sheet 4.

G. SCHARFE.

APPARATUS FOR THE MANUFACTURE OF GAS.

No. 473,350.

Patented Apr. 19, 1892.



Witnesses;

J. M. W. K. H. M.

L. P. M. H. A. P. H.

By his Attorneys,

C. A. Snow & Co.

Inventor
Gottlieb Scharfe,

UNITED STATES PATENT OFFICE.

GOTTLIEB SCHARFE, OF ANNAPOLIS, MARYLAND.

APPARATUS FOR THE MANUFACTURE OF GAS.

SPECIFICATION forming part of Letters Patent No. 473,350, dated April 19, 1892.

Application filed June 9, 1891. Serial No. 395,693. (No model.)

To all whom it may concern:

Be it known that I, GOTTLIEB SCHARFE, a subject of the King of Sweden and Norway, residing at Annapolis, in the county of Anne Arundel and State of Maryland, have invented a new and useful Apparatus for the Manufacture of Hydrocarbon Gas, of which the following is a specification.

This invention relates to apparatus for the manufacture of hydrocarbon gas; and it has for its object to provide an apparatus of this class which shall be simple in construction and efficient in operation and by means of which gas may be manufactured, which shall be more or less rich in hydrocarbon, so as to render it useful for illuminating or heating purposes, as may be desired.

The invention consists in the improved construction of the apparatus, which will be hereinafter more fully described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a front elevation of an apparatus constructed in accordance with my invention. Fig. 2 is a horizontal sectional view taken on the line 2 2 in Fig. 1. Fig. 3 is a horizontal sectional view taken on the line 3 3 in Fig. 1. Fig. 4 is a vertical sectional view taken through the retort on the line 4 4 in Fig. 2. Fig. 5 is a vertical sectional view taken on the line 5 5 in Fig. 2. Fig. 6 is a vertical sectional view taken on the line 6 6 in Fig. 2. Fig. 7 is a vertical sectional view taken on the line 7 7 in Fig. 2. Fig. 8 is a side elevation of the superheaters. Fig. 9 is a detail view of one of the supporting-columns of the retort. Fig. 10 is a detail sectional view of the packing-boxes and sliding sections.

Like numerals of reference indicate like parts in all the figures.

1 designates a generator or producer, which is supported upon a suitable base 2 and which is provided at its upper end with an opening 3, having a closely-fitting cover 4, through which it may be charged. The bottom of the retort is provided with a grate 5, which is composed of a series of grate-bars 6, which are square in cross-section and the ends of which are journaled in a rectangular frame 7. The grate-frame is mounted slidingly in a cast-iron sleeve or muff 8, which is arranged in

one of the side walls of the generator or producer near the lower end of the latter, the said sleeve being provided with side flanges at its inner end to support the said grate-frame. The latter may thus be conveniently withdrawn, when desired, for the purpose of permitting the contents of the retort to escape. The several grate-bars are provided at their front ends with spur wheels or pinions 9, meshing with each other, and one of the grate-bars, preferably the central one, has an outwardly-extending handle 10, provided with a crank 11, by means of which it may be rotated for the purpose of causing the ashes accumulating at the bottom of the retort to escape downwardly between the grate-bars. A railway 12, arranged transversely below the generator, is adapted to support trucks, as 13, adapted to receive the discharge from the retort and to convey the same to some suitable place of deposit.

The generator as well as the superheaters, hereinafter described, which constitute my improved gas apparatus, are to be constructed, preferably, of sheet-metal casings, as 14, provided with thick linings 15, of fire-brick or other suitable refractory material, packings 16 of non-conducting material being preferably interposed between the shells or casings and the refractory linings for the purpose of preventing to the greatest possible extent the loss of heat by radiation, and also for the purpose of protecting the casings from injury by heat.

The upper end of the generator is connected by a lateral passage 16^x with the upper end of a chamber 17. The latter is provided with interiorly-arranged horizontal partitions 18, extending alternately from opposite sides of said chamber and supported by intermediate columns 19, which latter are rendered necessary from the fact that the said partitions are to be constructed, by preference, of fire-brick. The supports 19, which are likewise constructed of brick-work, perform the additional function of absorbing heat during the preliminary process of gas-manufacture, as will be hereinafter more fully described. The casing or chamber 17 is provided near its lower end with several steam-inlets 20, which are connected with a suitable source of supply by means of

valved pipes 21. The casing of the chamber 17 is also provided with doors, as 22, and the upper end of said chamber has an inlet 23, through which hydrocarbon oil may be supplied through a suitable valved pipe, as 24. It will be seen that the horizontally-arranged partitions 18 in the chamber 17 form a series of baffle-plates, whereby air or gases in passing through the said chamber are forced to take a tortuous course in contact with the said partitions and their intermediate supporting-columns.

The lower end of the chamber 17 is connected by a lateral passage 25 with the lower end of an adjacent chamber 26. The end of the passage 25 which terminates in the chamber 26 is provided with a valve or damper 27, the stem or operating-rod of which 28 extends through the casing and is provided with a handle 29, by means of which the said valve may be conveniently manipulated. The chamber 26 is provided at its upper and near its lower end with horizontal partitions or diaphragms 30, connected by vertical pipes or flues 31. The space 32 between the partitions 30 is connected with a pipe 33 by means of a vertical passage 34, which is separate from and independent of the lower end of the chamber 26, from which it is separated by a partition 35. The space 32 of the chamber 26, which is confined between the horizontal plates or diaphragms 30, is provided with a series of baffle-plates 36, and it has at its upper end an air-inlet 37. It is obvious that air entering through the said inlet will be forced by the said baffle-plates to take a circuitous course in its downward passage through the casing, thus bringing it thoroughly in contact with the flues or heating-pipes 31.

The upper end of the casing 38 of the chambers 26 and 32 is provided with an inverted-funnel-shaped stack 39, in which is arranged an injector 40, which is connected by a pipe 41, having a valve 42, with a suitable source of steam-supply. It will be seen that by forcing steam through the nozzle 43 of the injector a vacuum will be created in the pipes 31 and chamber 26, thus creating suction through the passage 25, chamber 17, passage 16, and upwardly through the generator. The latter is provided near its lower end with lateral passages 44, the inner ends of which are provided with grates 45 and the outer ends of which are provided with vertically-sliding doors 46, having linings 47 of fire-brick or other suitable refractory material. The doors 46 are balanced by counter-weights 48, attached to chains or wire ropes 49, passing over suitable guide-pulleys 50. The openings or passages 44 are connected by suitable passages 51, extending through the lining of the retort, with the upper ends of the supporting-columns 52. The latter, as will be seen in Fig. 9 of the drawings, are composed of the outer supporting-shells 53 and the inner tubes 54, which latter form passages connecting the

passages 51 with the branch pipes 55 of a central receiving-pipe 56, which latter is in turn connected with the horizontal main conducting-pipe 57. The latter is provided at each side of the central pipe 56 with valves, designated, respectively, by 58 and 59, the former of which connects with the gas holder or receiver through the pipe 60 and the latter of which is connected with the pipe 33, as will be clearly seen in Fig. 7 of the drawings.

In operation the generator 1 is charged with coal, which is ignited at the bottom, and steam is then admitted through the valved pipe 41 to the injector 40 in the stack 39, thus forming in the said stack a vacuum which results in creating a strong draft of suction in an upward direction through the generator, thence through the passage 16, downwardly through the chamber 17, through the valved passage 25, and upwardly through the flues 31 and stack 39, through which the products of combustion eventually escape. The heat is absorbed by the diaphragms 18 and supporting-columns 19, as well as by the walls of the chamber 17, and in a less degree by the flues 31. This part of the operation is continued until the contents of the generator is in a state of incandescence and the chamber 17 in a very highly-heated condition. It is also obvious that during this part of the operation the valve 58, leading to the gas-holder, is closed, while the valve 27 in the passage 25 is necessarily open, as well as the valve 59, through which atmospheric air passes to the furnace through the pipes 57, 56, and 55, columns 52, and passages 51 and 44, said atmospheric air being drawn through the inlet 37 near the upper end of the space or compartment 32 of the chamber 26. Said atmospheric air is thus heated to some extent before passing through the channel 34 and pipe 33 to the valved pipe 57, through which it is conducted to the furnace. The preliminary heating to which the atmospheric air is thus subjected enables it to assimilate more freely with the carbon, as will be readily understood. Oxygen for the more thorough combustion of the smoke may be supplied in regulated quantities through a valved opening 63 near the upper end of the chamber 17. When the retort, as well as the rest of the apparatus, has been sufficiently heated, the valves 27 and 59 are closed, and the valve 58, leading to the gas-holder, may now be opened. Steam is now admitted through the opening 20, and on coming in contact with the highly-heated brick-work of the chamber 17 is superheated. The superheated steam now passes through the channel or passage 16 downwardly through the generator, where it is decomposed and converted into the gases—hydrogen, carbonic oxide, and carbonic acid—which pass through the passages 44 and 51, columns 52, and pipes 55 and 56 to the conducting-pipe, through which the gas is conveyed to the receiver. The gas thus produced is suitable for heat-

ing purposes. If it is desired for illuminating purposes, its candle-power may be increased by admitting hydrocarbon oil in suitable quantities through the opening 23 near the upper end of the superheating-chamber 17. The oil is instantly vaporized on coming in contact with the highly-heated brick-work of the chamber 17, the oil products passing, with the superheated steam, through the passage 16 and through the retort.

The advantages of my improved gas-manufacturing apparatus will be readily understood from the foregoing description, taken in connection with the drawings hereto annexed. Owing to the herein-described construction of the retort and the means provided for disposing of ashes and the like, it is possible to "draw" the retort without waiting for it to cool, thus effecting a considerable saving in time and an equally important saving in the consumption of coal. The quality of the gas may be very easily regulated by supplying steam and oil in regulated quantities through the several openings or inlets provided for this purpose in the chamber 17. The interior structure of the said chamber is of such a nature as to fit it for the most thorough absorption of heat, and it is likewise specially constructed with a view to enable it to resist the strain to which it is subjected, the walls being subjected to a heavy strain in an inward direction during the first part of the process when the vacuum is formed within the chamber, while during the subsequent part of the process the strain upon the walls is in an outward direction, owing to the pressure of the gases formed by the decomposing steam. To aid in resisting these pressures, I also provide the several casings of my apparatus with hoops or bands, as shown at 66. Various mechanical details of construction—such as operating-levers for the valves 58 and 59, valved supply-pipes for steam, air, and oil, a specially-constructed truck for conveying ashes and the like, and other details—have been illustrated in the drawings, but do not require further description, inasmuch as their uses are obvious. The supporting-columns 52 of the retort may be removed when desired for the purpose of enabling their inner linings 54 to be removed when burned out. The branches 55 of the pipe 56 are to be provided with packing-boxes 67 and sliding sections 68 to avoid injury or rupture to the operators by the contraction and expansion to which it is necessarily subjected during operation.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In an apparatus for manufacturing gas, the combination of the generator or producer provided near its lower end with side gas-escape openings having doors at their outer ends and grates at their inner ends, opposite horizontal passages extending laterally from op-

posite sides of said side openings and directly through the lining of the generator, the main gas-conducting pipe, and vertical tubular passages extending up through the bottom of the lining of the generator and connecting said horizontal passages with said main conducting-pipe, substantially as set forth.

2. In an apparatus for the manufacture of gas, the combination of the hollow supporting-columns, the generator or producer located over said columns and provided near its lower end with side openings having doors at their outer ends and provided with lateral passages extending through the lining of the generator and communicating with the side openings, the main gas-conducting pipe, and tubular passages extending through the supporting-columns of the generator and connecting said main outlet-pipe and said lateral passages, substantially as set forth.

3. In an apparatus of the class described, the combination of the generator or producer provided near its lower end with side openings, lateral passages in the lining of the generator communicating with the side openings, the valved conducting-pipe, the central receiving-pipe connected at one end with said conducting-pipe and having laterally-extending branches provided with packing-boxes and sliding sections to admit of contraction and expansion, and the supporting-columns having tubular passages connecting said branch pipes with said lateral channels or passages in the lining of the generator and connected with the latter near its lower end, substantially as and for the purpose set forth.

4. In an apparatus of the class described, the combination, with the generator, of the superheating-chamber provided with a lining, a series of interiorly-arranged horizontal partitions or baffle-plates extending alternately from opposite sides of said chamber, intermediate supporting walls or columns between said baffle-plates and extending only from end to end of the opposite tiers of partitions to leave passages around both ends of the walls or columns, valved steam-inlets near the lower end of the superheating-chamber, and valved inlets for air and for hydrocarbon oil near the upper end thereof, substantially as set forth.

5. In an apparatus of the class described, the combination of the generator or producer, the superheating-chamber having the baffle-plates of refractory material, the passage connecting the upper ends of the generator and the superheating-chamber, the flue-chamber arranged adjacent to the superheating-chamber and connected with the lower end of the latter by a valved passage, parallel diaphragms near the upper and lower ends of said flue-chamber, vertical flues connecting said diaphragms, an air-inlet near the upper end of the space inclosed between said diaphragms, the valved conducting-pipe, a passage connecting said space with the valved

conducting-pipe, valved steam-inlets near the
lower end of the superheating-chamber,
valved inlets for air and for hydrocarbon oil
near the upper end of said superheating-
5 chamber, and means for creating suction in
an upward direction through the flues in the
flue-chamber, substantially as and for the
purpose set forth.

In testimony that I claim the foregoing as
my own I have hereto affixed my signature in the
presence of two witnesses.

GOTTLIEB SCHARFE.

Witnesses:

JOHN H. SIGGERS,
ROY WM. DAYTON.