

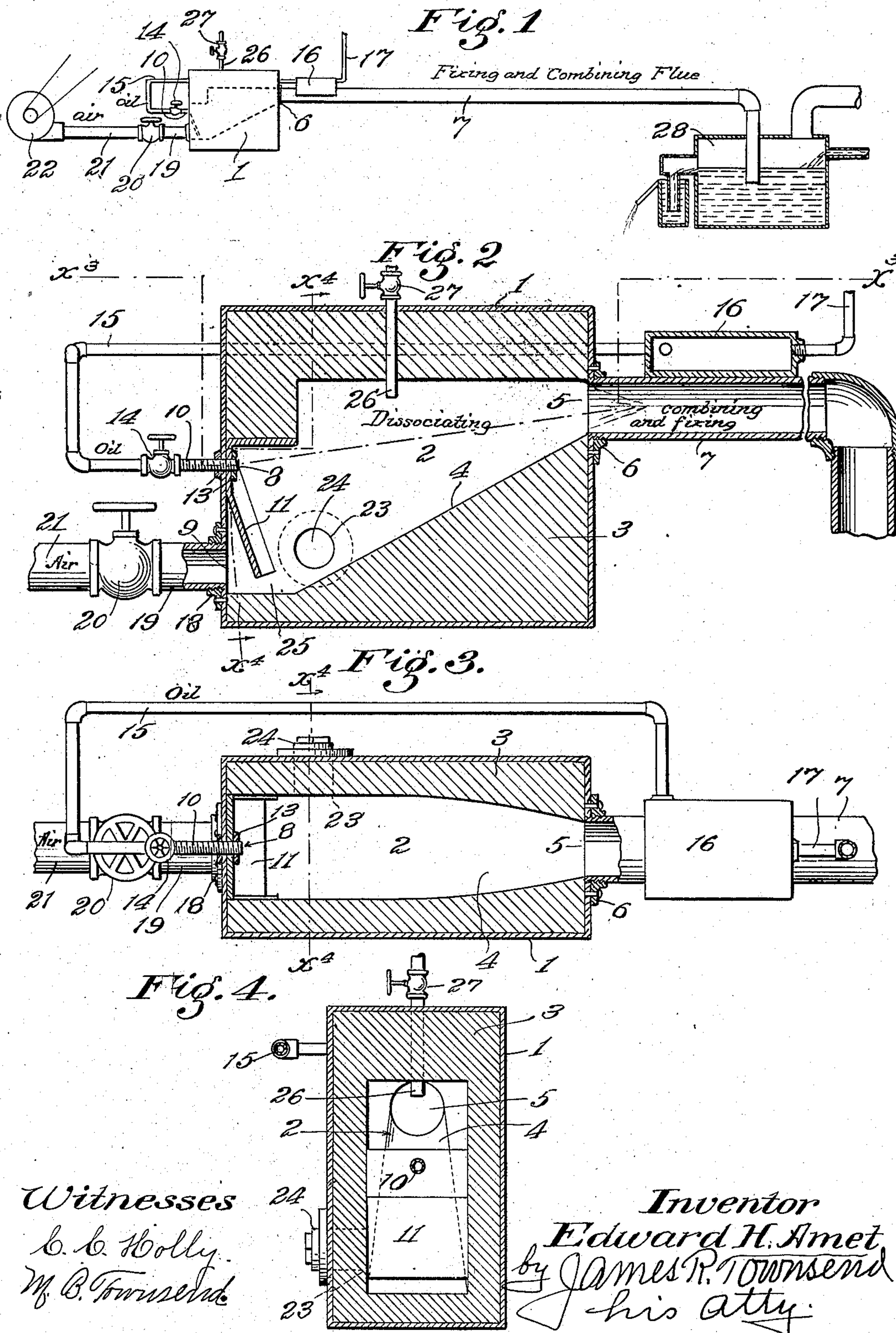
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E. H. AMET.

APPARATUS FOR PRODUCING GAS.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR PRODUCING GAS.

No. 885,904.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWARD H. AMET, a citizen of the United States, residing at Phoenix, in the county of Maricopa and Territory of Arizona, have invented and discovered a new and useful Apparatus for Producing Gas, of which the following is a specification.

This invention relates to apparatus adapted for the manufacture of gas in accordance with a process discovered and invented by me, and for which I have filed a co-pending application, Serial No. 353,385, for Letters-Patent of the United States.

It is of the objects of this invention to provide cheap, simple apparatus of minimum size for converting crude hydrocarbon oils or other gas-making materials into a fixed combustible gas; to eliminate the necessity of checker-work and baffle walls in gas-making apparatus; to effect the extinguishing or cutting off of a part or portion of a flame that would normally result from the action of heat on said material in the presence of oxygen, so that a fixed combustible gas will be obtained from what would otherwise be wholly or partially consumed; to provide apparatus whereby the heat of the elements from which the flame has been extinguished will be made operative to cause a new combination of said elements to be formed, and to cause the final production of a fixed gas which will remain fixed for an indefinite period of time; to provide for conducting said operation continuously to consume the coke and heavy hydrocarbons heretofore resulting as by-products from the oil or other gas-making material supplied; to utilize such coke and heavy hydrocarbons to partially maintain gas-producing flame; to avoid any choking or clogging of the apparatus with the residue of oil or other gas-making material; and to provide for a constant continuous flame of intense heat by which the dissociation of the elements will be continuously effected.

I have demonstrated that heavy asphaltic oils can be used in this apparatus for an indefinite time without any clogging, and that the substances ordinarily forming residue in the process of gas making, will become consumed and assist in the process.

The accompanying drawings illustrate the invention in the form I at present employ as most satisfactory.

Figure 1 is a side elevation of apparatus

embodying my invention, it being understood that the same will ordinarily be connected with the usual gas scrubbers, washers and holders. Fig. 2 is a fragmental, longitudinal mid-section of the same. Fig. 3 is a plan section on line x^3-x^3 , Fig. 2. Fig. 4 is a sectional elevation on the irregular line x^4-x^4 , Figs. 2 and 3, looking rearwardly in the direction of the arrows.

1 is a metallic case or jacket inclosing the dissociating chamber 2 which is surrounded by a refractory lining 3. The bottom of the dissociating chamber 2 has an upwardly-inclined surface 4 at the upper end of which an opening 5 through the jacket forms the outlet from the chamber and also serves as an extinguisher for the flame to be generated in said chamber. Said opening is fitted with a screw-flange 6 which receives the threaded end of the narrow combining and associating flue, tube or pipe 7. In the opposite end of the jacket 1 are two openings 8 and 9, one above the other. Through opening 8 oil-feed-pipe 10 passes through the jacket 1 and is threaded into an oil-spreader 11 which is fixed to said jacket and is in the form of a rearwardly and downwardly sloping plate or trough.

13 designates a jam nut rigidly retaining in position the oil-spreader 11 and oil-feed-pipe 10.

14 is a regulating valve in the oil-pipe.

15 is an oil-supply-pipe connecting the oil-feed-pipe 10 with an oil heater 16 which may be located on the combining, associating and fixing tube 7, so that the heat from said tube will serve to increase the fluidity of the oil. 17 is an oil-pipe to supply oil to said heater 16.

The opening 9 is fitted with a screw-flange 18 which receives air supply pipe 19 having a regulating valve 20 and an air-conducting pipe 21 which leads from a suitable supply of air, as a blower 22.

23 is a primary ignition opening having a closure as a screw-plug 24.

25 is a slot-like opening between the lower edge of the inclined spreader 11 and the floor of the dissociating chamber, the same forming an inlet into said chamber for the air underneath the spreader.

The operation is as follows:—The screw-plug 24 having been removed and oil admitted through feed-pipe 10, and air through

air-supply-pipe 19, a torch may be inserted through the opening 23, thus igniting the oil flowing over and from the spreader 11. At this period the oil and air-controlling valves will be partially closed to prevent flooding the apparatus and overbalancing the flame. When the flame has thus been initiated the torch will be withdrawn and the screw-plug replaced, whereupon the oil and air valves may be adjusted to the appropriate position to admit the requisite quantities of oil and air to accomplish the purposes in view. The pressure of the air from the air inlet causes a flame of intense heat to be produced in the chamber, and the heat of this flame acting upon the elements in the chamber, causes dissociation of the same, and said elements while in suspension and before complete combustion, will be carried to the outlet 5, which being considerably contracted with reference to the cross-sectional area of the dissociating chamber, extinguishes the flame and terminates the combustion of said elements, which thereupon proceed still in an incandescent condition into the combining or associating tube or flue 7. Said flue may lead to a water-seal 28, or may otherwise terminate to deliver the resultant products which will be found to be in the form of a fixed gas, specimens of which I have stored for months without noticeable deterioration.

I have in some instances taken the products directly from the opening 5 in the jacket from which the flue 7 had been removed, and have found such gas to be partially fixed and partially unfixed, but in a condition to support combustion if ignited outside the jacket, although when said flue has thus been removed the elements issue from the opening in an extinguished state,—that is, not in a state of ignition,—and an additional flame is required outside to initiate flame at that point.

I have determined that in order to secure the maximum efficiency in the production of fixed gas from carbonaceous materials, as crude petroleum, it is necessary that the outlet be reduced and the combining tube 7 be of considerable length.

The purpose of the flue 7 is to hold the dissociated elements after their flame has been extinguished, in intimate relation with each other until sufficient time has elapsed for them to combine with each other to form new gas. I have determined that in an apparatus in which the dissociating chamber is approximately twenty-six inches long, four and one-half inches wide, twenty-one inches deep at the intake end, and tapering to an outlet of four inches, opening into a pipe or flue having an internal diameter of approximately four inches, by making said flue approximately twelve feet long, the products from the chamber having a temperature of approximately 1800° Fahrenheit at the out-

let 5, would drop to a temperature of 400° or 500° Fahrenheit at the further end of the flue, at which temperature the resultant gas passes to the water-seal, from whence it passes to the usual washers and scrubbers not shown, where the temperature is further reduced to normal.

In experimenting with this apparatus I have made a series of small holes, (not shown), along the top of the pipe 7, thus giving access to the interior of the flue. As the operation of the apparatus proceeds, the holes will rapidly clog with solid carbon, which at the end near the dissociating chamber 1 is in the form of coke, such form changing gradually at the successive holes from the coke form to the form of soft lamp black, which will be deposited along the pipe at the outlet end thereof.

While the holes are open, jets of gas will issue therefrom and the gas of the jets nearest the dissociating chamber is in an incandescence condition and said incandescence gradually decreases as the distance from the chamber increases. Said jets may be ignited by application of flame outside the tube, but otherwise will flow off without ignition.

Gas from the jets nearest the dissociating chamber may be partially condensed and will yield a small quantity of free oil, a portion of the gas only being in a fixed condition; but as the distance from the dissociating chamber increases the amount of oil which may thus be obtained from the issuing gas becomes less and less and the proportion of fixed gas becomes greater until at the farther end of the tube a gas issues none of which can be condensed into oil. This latter gas carries a small proportion of lamp black in suspension and as the gas passes through the necessary scrubbers and washers, not shown, such lamp black is removed, in the usual way but the proportion of lamp black relative both to the amount of oil consumed and to the amount of gas produced is much less than occurs with any former apparatus with which I am acquainted, and no tar or other liquid by-products are obtained from the gas. When the holes above mentioned are left without external interference, they soon become clogged; those nearest the dissociating chamber filling up with hard coke and the hardness of the deposits diminishing as the distance from said chamber increases, and the holes farthest away from said chamber filling with lamp-black.

By reason of the inclined floor 4 any surplus oil that may find its way into the dissociating chamber will be conducted toward the air inlet where it will be subjected to the action of the flame and taken up and dissociated and carried out to form gas. The action inside said chamber is such that heavy asphalt oils when fed thereto do not leave any residuum of asphaltum or coke, except

that if the chamber be not originally provided with a rearwardly-sloping floor substantially as shown, a deposit of coke and asphaltum may form at the rear of the chamber until the form of the floor assumes a slanting character substantially corresponding to that shown in the drawings.

I find that the most satisfactory results are obtained by supplying a quantity of water to the chamber at such a point that the same will be dissociated by the heat and action of the elements in the chamber.

26 is a nozzle controlled by a valve 27 and leading from a water supply not shown, by which a fine stream of water may be constantly fed to the interior of the chamber. The nozzle or pipe 26 is preferably arranged about midway of the dissociating chamber, thus introducing the water at a point in the flame where it will add oxygen and hydrogen to the flame.

It is to be noted that by the novel construction of the combining and fixing element 7 as a narrow tube, I have made a radical departure from the known art, and have at once dispensed with all the expensive and cumbersome checker work and obstructed or tortuous passages heretofore deemed necessary to accomplish the fixing of the gas. By the construction shown, an intense heat occurs on the interior of the combining and fixing tube 7 and a fixed gas results.

What I claim is:—

1. A gas-making apparatus comprising a tapering chamber, oil and air inlets at the larger end of said chamber, the former being above the latter, an oil-spreader between said inlets, a contracted outlet at the smaller end of the chamber, and a flue to receive the products from said contracted outlet and hold the elements thereof in intimate relation for the purpose of combining the same to form fixed gas.

2. A tapering dissociating chamber, the floor of which slopes upwardly toward the smaller end, means for supplying air and hydrocarbonaceous substances at the larger end of said chamber, a contracted outlet at the smaller end of said chamber, and a narrow combining tube leading directly from said outlet.

3. A refractory chamber having a sloping floor, means for supplying heat-producing combustibles at one end of said chamber, a contracted outlet at the other end to form a flame extinguisher, and a narrow combining tube to hold the extinguished products for a period in close relation in the presence of their residual heat produced by the flame in the chamber, said tube leading directly from the outlet and being adapted to pass the resultant products onward as a fixed gas.

4. The gas apparatus set forth comprising a dissociating chamber having a contracted outlet at one end, means for supplying car-

bonaceous substances to the chamber at the other end, means for supplying a sheet of air to the chamber below the carbonaceous substance, and a combining tube or flue leading directly from the contracted outlet, said chamber being unobstructed from inlet to outlet, said outlet being of such size relative to the chamber as to extinguish the flame of the products of the chamber, and said tube or flue being of such proportions as to confine the gases under their residual heat until a fixed gas results.

5. A gas apparatus provided with a combining tube, a dissociating chamber having at one end an extinguisher formed by said combining tube at its connection with the dissociating chamber and leading directly from such end, and also having an upwardly-inclined floor leading to said extinguisher, and means for supplying combustibles to the chamber at the lower end of said floor.

6. A gas apparatus comprising a chamber having an inclined floor and an outlet, said floor sloping to said outlet, an oil spreader at the end of the chamber opposite the outlet slanting toward the lower end of the floor, an oil supply for said spreader, means for directing a supply of air under the oil supply and toward the sloping floor, and a combining tube leading from said outlet, the dimensions of said outlet being such as to extinguish the flame of the products of the chamber.

7. A gas apparatus comprising a dissociating chamber, means for extinguishing the flame therefrom, said means comprising a tube connected directly to the outlet from said chamber, said tube being also adapted to receive the products after extinguishment, means for supplying gas-producing materials to the chamber opposite the outlet, the space between such means and the outlet being unobstructed, and said tube affording an unobstructed passage of considerable length substantially as and for the purpose set forth.

8. A gas apparatus comprising a dissociating chamber, means for extinguishing the flame therefrom, said means comprising a tube connected directly to the outlet from said chamber, said tube being also adapted to receive the products after extinguishment, means for supplying gas-producing materials to the chamber opposite the outlet, the space between such means and the outlet being unobstructed, said tube affording an unobstructed passage of considerable length substantially as and for the purpose set forth, and means for supplying water to the chamber between the outlet and the fuel inlet.

9. A gas producer comprising a chamber having a slanting floor, an outlet at one end to which the floor leads, which outlet is contracted to serve as an extinguisher for the flame of the chamber, means for supplying

air at the lower end of the slanting floor, and means for supplying oil and water above the level of the air supply.

10. A gas-producer comprising a chamber
5 having a slanting floor, an outlet at one end to which the floor leads, which outlet is contracted to serve as an extinguisher for the flame of the chamber, means for supplying air at the lower end of the slanting floor,
10 means for supplying oil and water above the level of the air supply, and a combining tube

leading from the outlet for the purpose of producing a fixed gas by the action of the residual heat of the products.

In testimony whereof, I have hereunto set 15
my hand at Los Angeles California this 3rd
day of January 1907.

EDWARD H. AMET.

In presence of—

JAMES R. TOWNSEND,
JULIA TOWNSEND.