No. 731,434. PATENTED JUNE 23, 1903.

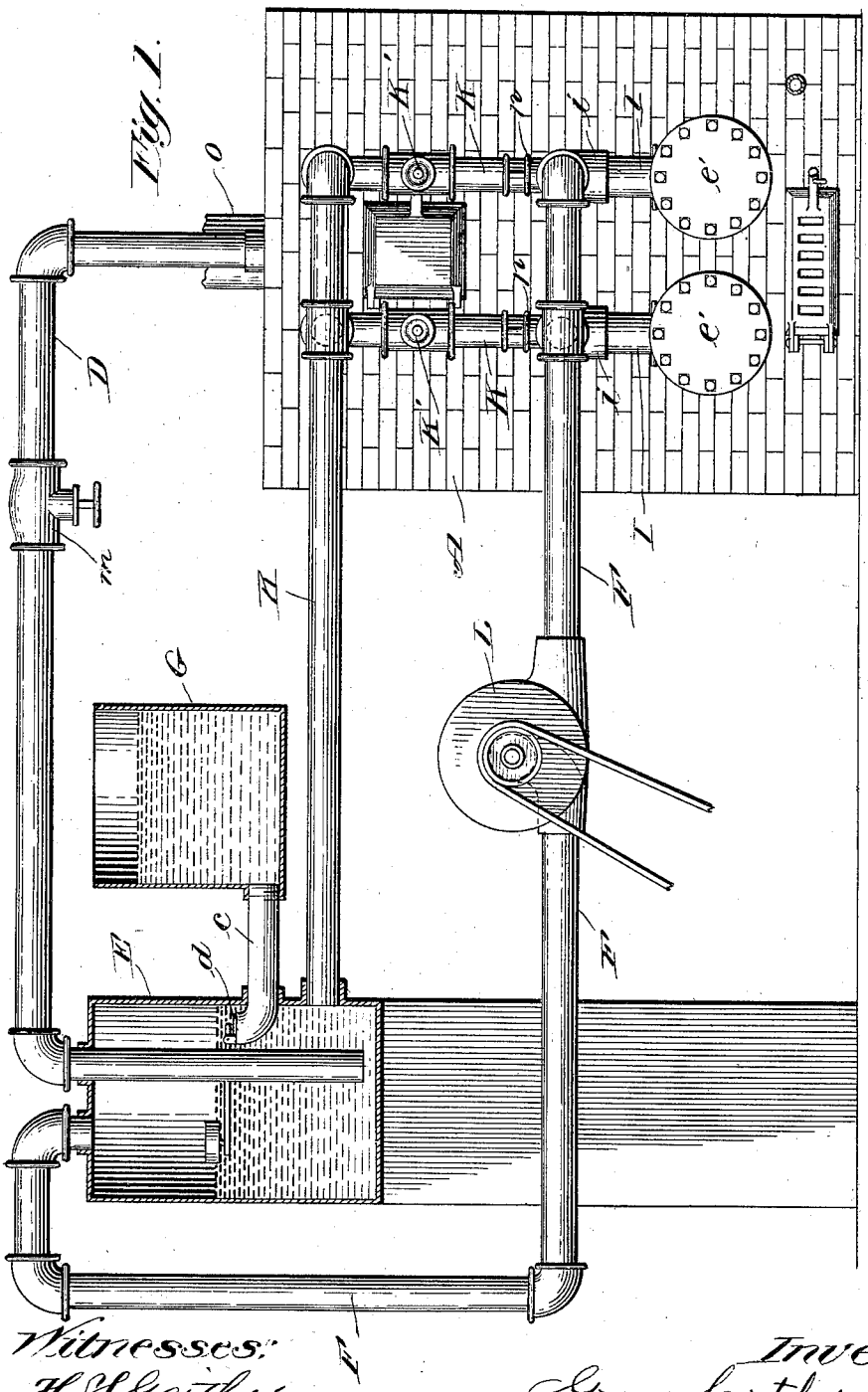
G. COTHRAN.

GAS MANUFACTURING APPARATUS.

APPLICATION FILED OCT. 10, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
H. S. Gaither
M. Friel.

Inventor:
Grove Cothran
by Frank D. Thomson
his Attorney.

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

No. 731,434. PATENTED JUNE 23, 1903.

G. COTHRAN.

GAS MANUFACTURING APPARATUS.

APPLICATION FILED OCT. 10, 1901.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

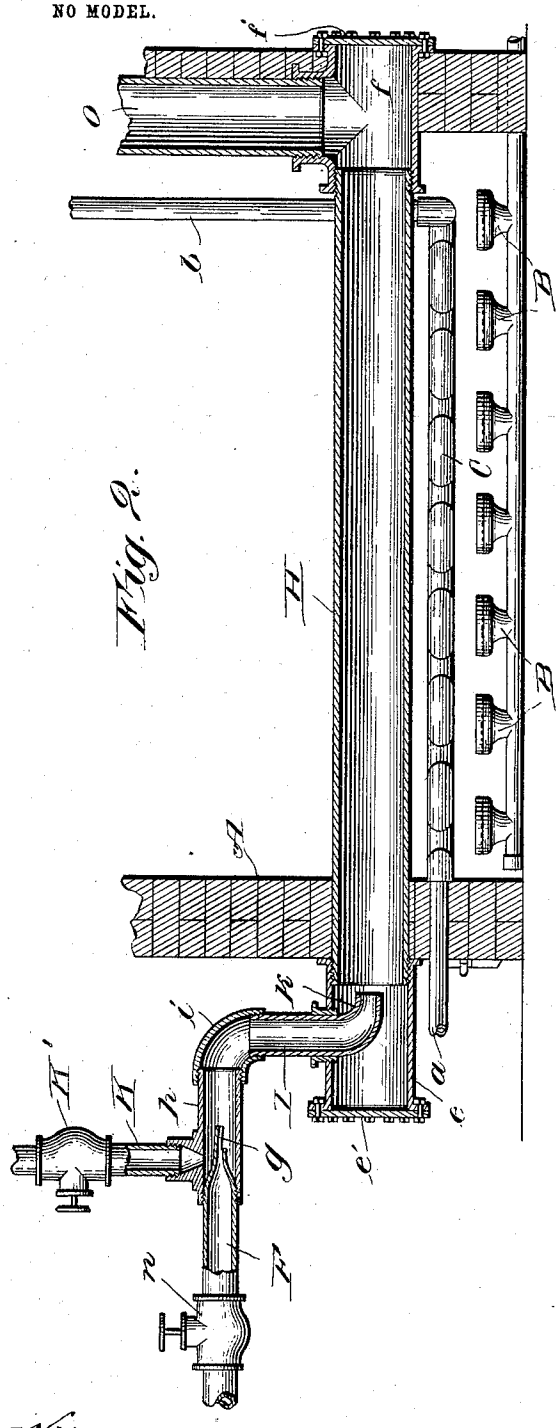
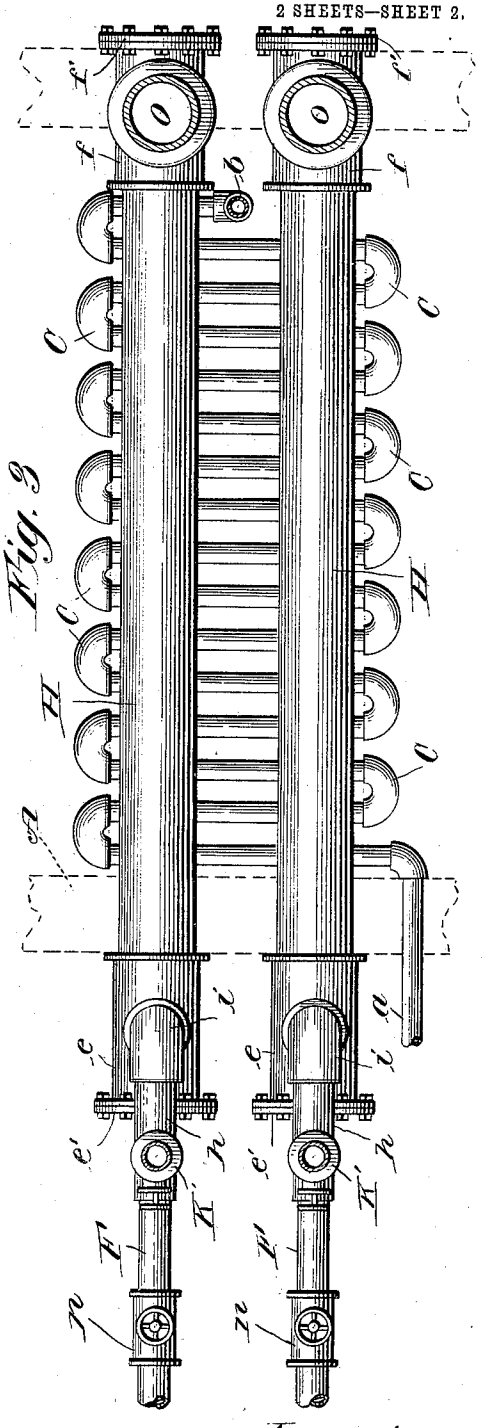


Fig. 3



Witnesses:
H. S. Gaither
M. Friel

Inventor:
Grove Cothran
by Frank D. Thomason
his Attorney

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

No. 731,434. Patented June 23, 1903.

UNITED STATES PATENT OFFICE.

GROVE COTHRAN, OF SUMMITVILLE, INDIANA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE CRUDE OIL GAS COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF SOUTH DAKOTA.

GAS-MANUFACTURING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 731,434, dated June 23, 1903.

Application filed October 10, 1901. Serial No. 78,213. (No model.)

To all whom it may concern:

Be it known that I, GROVE COTHRAN, a citizen of the United States, and a resident of Summitville, in the county of Madison and State of Indiana, have invented certain new and useful Improvements in Apparatus for Manufacturing Gas, of which the following is a full, clear, and exact description.

The object of my invention is to provide an apparatus for manufacturing a fixed gas (as distinguished from carbureted air) from oil, and particularly crude oil or petroleum, by separating the hydrocarbons from the solid or earthy matters contained in the oil, vaporizing all of said hydrocarbons, and effecting a destructive distillate of the same, so as to prevent the condensation or resolving of said hydrocarbon vapors back into a liquid again. This I accomplish by the means hereinafter fully described and as particularly pointed out in the claims.

In the drawings, Figure 1 is a plan view of said apparatus. Fig. 2 is a vertical longitudinal section of the furnace, taken on a plane striking through the retort and feed thereof. Fig. 3 is a plan view of said retorts and the superheating-coils arranged beneath the same.

Referring to the drawings, A represents a furnace which is preferably heated by gas through the medium of the series of burners B, located in the lower part thereof. A short distance above these burners I prefer to place a coil of pipe C, the intake *a* of which preferably extends through the front wall of the furnace and the outlet *b* of which preferably extends up out of the top of the furnace and discharges into a pipe D. Pipe D may, if desired, be covered with some suitable non-conducting material, and it extends to a point over a carbureting-chamber E, of suitable design and proportions, and enters and extends in said carbureting-chamber to very near the bottom thereof, so as to discharge the heated air therefrom below the surface of the body of oil contained therein. The air is forced into the coil of pipes C under pressure. The air issuing from the depending end of pipe D inside the carbureting-chamber agitates the oil as it bubbles up therethrough and resolves the lighter hydrocarbons contained in the oil into vapors that are conveyed from the said chamber E by a pipe F.

The carbureting-chamber is supplied with oil from a suitable reservoir G, and the discharge end of the pipe *c* within the carbureting-chamber is preferably kept closed by a suitable float-valve *d*, which opens and closes to maintain a given quantity of oil in said carbureting-chamber, according as the level of the surface thereof rises and falls.

Arranged, preferably, longitudinally in the furnace A, above the hot-air coils C, is one or more retorts H, comprising a tubular body of a diameter comparatively greater than that of any of the other tubular elements of the invention and of such length that its forward end can extend through the front wall of the furnace, while its rear end terminates within a short distance of the rear wall thereof. The ends of this retort have tubular heads *e* and *f* screwed onto the same in alinement therewith, the outer ends of which are closed by removable end plates *e'* *f'*, which when removed opens the retort from end to end and permits the same to be cleaned out by forcing hot air, steam, or water therethrough when the furnace is not in operation.

Pipe F extends to a point very near the front ends of the retort, where its extremity *g* is reduced in diameter in any suitable manner and is screwed into a union *h*, which latter, at a point just above said extremity *g*, is provided with an intake-stub for effecting a union with the valve-controlled oil-supply pipe K, leading from the bottom of the carbureting-chamber, in such manner as to drain the heavier hydrocarbons remaining therein after the vaporizing of the lighter hydrocarbons. The orifice through which the oil drains from pipe K into the union *h* is contracted, so as to limit the supply of oil flowing therethrough. This oil falls on the top of the extremity *g* of pipe F and is divided into minute streams by the fan-shaped corrugated trough-piece secured to the upper segment of said extremity *g*, which directs said minute

streams to a point beyond the discharge-opening of said extremity, where they will be caught as they fall from said trough by the blast of hot carbureted air issuing from the said extremity and reduced to very fine particles or spray.

The end of the union-coupling *h* alining with pipe F is connected by an elbow *i* with a nipple I. This nipple connects the said elbow and the front tubular head *e* of the retort, and its lower end extends through a suitable bushed opening in the upper side of said head *e* into the bore of the retort, where it is gradually reduced in diameter and bent toward the opposite end of the same, so as to produce practically an injector *k*, through which the carbureted air and the sprayed heavier hydrocarbons from the union *h* are discharged with considerable force into the retort.

The retorts in the furnace are attained at a temperature of from 500° to 1,200° Fahrenheit. This heat is not only capable of vaporizing all the heavier hydrocarbons and separating the same from such solid and earthy matter as may have been contained in the crude oil, but distils and destroys all the hydrocarbon vapors thereof and produces therefrom a fixed gas, which will not be affected or condensed by changes of temperature or by the compression which it is necessary to employ to force the same from the mains of an extensive gas system. The gaseous products obtained from the retort are conveyed by a suitable outlet-pipe O, connected to and projecting upward from the stub on the upper side of the rear head *e*, to a suitable gasometer.

If desired, pipe K can be provided with a valve K′ to assist in controlling the flow of oil from the carbureting-chamber into the union *h*, and, if desired, pipes D and F can also be provided with valves *m* and *n*, respectively, so as to regulate the air-pressure. If it is considered necessary to have the pressure, both atmospheric and gaseous, maintained and yet under perfect control from one end of the apparatus to the other, pipe F may be provided at a suitable point along its length with a rotary blower L. This, however, as well as the other pressure-regulating devices shown, can be changed or dispensed with, as desired.

The heavier hydrocarbon oils can, if desired, be fed to the retort under a suitable pressure without spraying them, and the spraying of the same may be accomplished either by the means hereinbefore described or by subjecting the same to a blast from pipe F without the use of the reduced extremity *g* thereof. All such changes I desire to be considered as contemplating within the scope of my invention, the most important of which is the retort.

What I claim as new is—

1. In a gas apparatus a furnace, a coil for heating air under pressure and a retort within said furnace, a carbureter in communication with said heating-coils, an outlet-pipe, and a drain leading from said carbureter to a union-coupling, means within said union-coupling for forming an admixture of the contents of said drain and outlet-pipe, and means for spraying the same into said retort.

2. In a gas apparatus a furnace, an air-heating coil and a retort contained within said furnace in close proximity to each other, a carbureter in communication with said heating-coils, an outlet-pipe, and a drain leading from said carbureter to a union-coupling, means within said union-coupling for forming an admixture of the contents of said drain and outlet-pipe, and means for spraying the same into said retort.

3. In a gas apparatus a furnace, an air-heating coil and a retort contained within said furnace, a carbureter in communication with said heating-coil, means for supplying said carbureter with oil, and means for permitting the escape and drain respectively of the gaseous lighter and liquid heavier hydrocarbon products separated within said carbureter, and a sprayer for forming an admixture of said hydrocarbon products whereby they are sprayed into said retort.

4. In a gas apparatus a furnace, an air-heating coil and a retort contained within said furnace in close proximity to each other, a carbureter in communication with said heating-coils, means for supplying said carbureter with oil, and means for permitting the escape and drain respectively of the lighter and heavier hydrocarbon products separated within said carbureter, a device for forming an admixture of said hydrocarbon products, and a sprayer whereby they are sprayed into said retort and distilled.

5. The combination with a furnace, an air-heating coil therein, a carbureter into which the hot air therefrom discharges, a retort having an inlet from said carbureter at one end and provided with a suitable outlet, both of which are adapted to be open while said retort is in operation.

6. The combination with a furnace, an air-heating coil therein, a carbureter into which the hot air therefrom is discharged under pressure, a drain-pipe for said carbureter, a pipe for conveying the carbureted air therefrom which effects a union with said drain and sprays the hydrocarbons flowing therefrom, of a retort, provided with a normally open outlet, into which said carbureted air and sprayed hydrocarbons are continuously injected while said retort is in operation.

7. The combination with a furnace, an air-heating coil therein, a carbureter into which the hot air therefrom is discharged under pressure and a normally open drain communicating with said carbureter, of a retort having a carbureted-air inlet and a normally open outlet.

8. The combination with a furnace, an air-

heating coil therein, a carbureter into which the hot air therefrom is discharged, a drain for said carbureter having a contracted discharge-orifice, a pipe for conveying the carbureted air from said carbureter the discharge end of which is tapered to a less diameter and terminates under the discharge-opening of said drain, a union with which said drain and carbureted-air pipe communicate, of a retort, provided with a normally open outlet, to which said union is suitably connected.

9. The combination with a furnace, an air-heating coil therein, a carbureter into which the hot air therefrom is discharged, a drain for said carbureter having a contracted discharge-orifice, a union with which said drain is connected, and a carbureted-air pipe leading from said carbureter having its discharged end reduced in diameter and extending longitudinally into the bore of said union, and provided with a fan-shaped corrugated trough onto which the discharge from said drain falls, of a retort having an opening communicating with said union and provided with a normally open outlet.

10. The combination with a furnace, an air-heating coil therein, a carbureter into which the hot air therefrom is discharged, a valve-controlled drain for said carbureter having a contracted discharge-orifice, a union with which said drain is connected, and a carbureted-air pipe leading from said carbureter having its discharged end reduced in diameter and extending longitudinally into the bore of said union and provided with a fan-shaped corrugated trough onto which the discharge from said drain falls, of a retort having an open communication with said union and provided with a normally open outlet.

11. The combination with a furnace, an air-heating coil therein, a carbureter into which the hot air therefrom is discharged, a drain for said carbureter having a contracted discharge-orifice, a union with which said drain is connected, and a valve-controlled carbureted-air pipe leading from said carbureter having its discharge end reduced in diameter and extending longitudinally into the bore of said union and provided with a fan-shaped corrugated trough onto which the discharge from said drain falls, of a retort having an open communication with said union and provided with a normally open outlet.

12. The combination with a furnace, an air-heating coil therein, a carbureter into which the hot air therefrom is discharged, a valve-controlled drain for said carbureter having a contracted discharge-orifice, a union with which said drain is connected, and a valve-controlled carbureted-air pipe leading from said carbureter having its discharge end reduced in diameter and extending longitudinally into the bore of said union and provided with a fan-shaped corrugated trough onto which the discharge from said drain falls, of a retort having an open communication with said union and provided with a normally open outlet.

GROVE COTHRAN.

Witnesses:
E. COTHRAN,
GEO. E. COTHRAN,
FRANK D. THOMASON.