

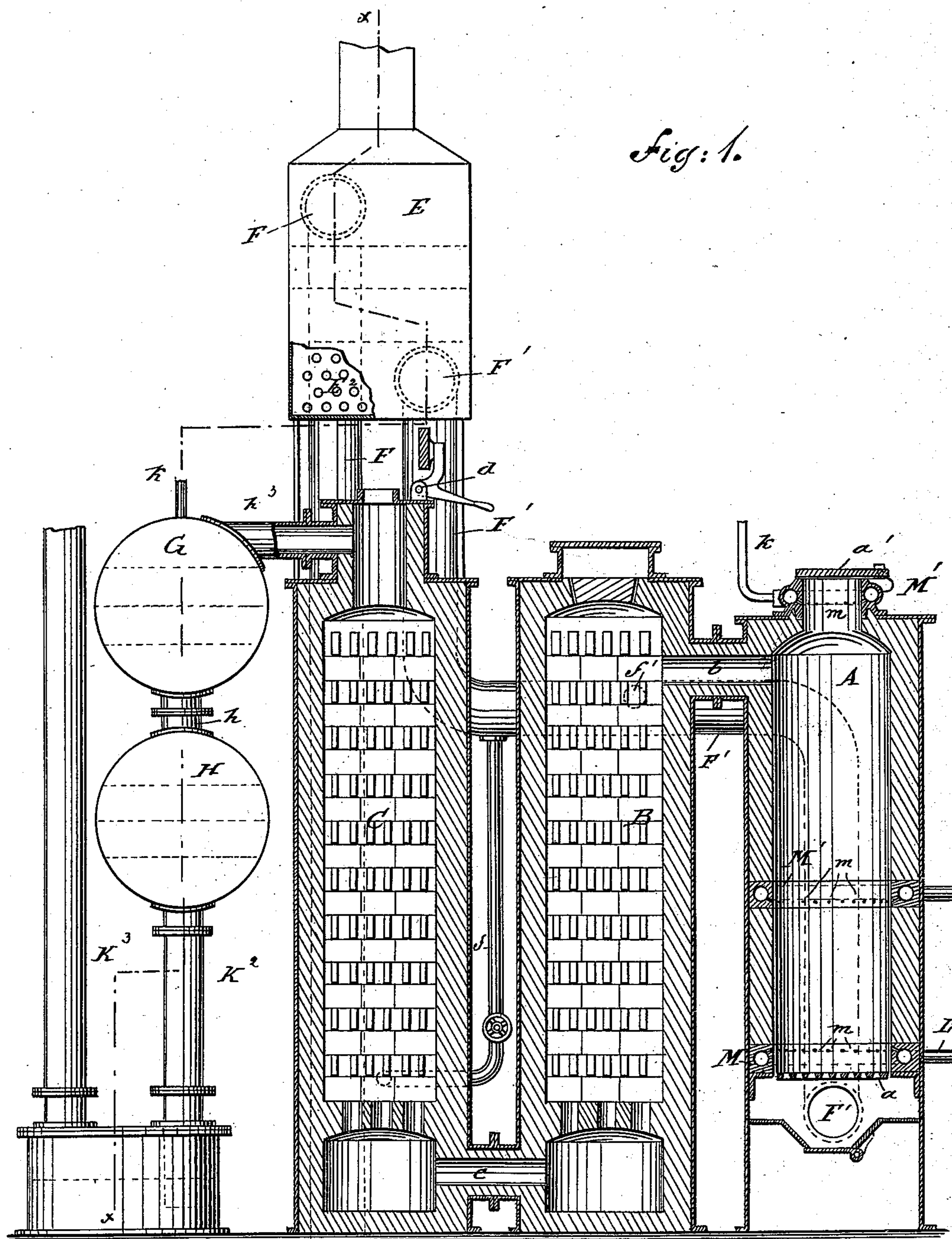
(No Model.)

2 Sheets—Sheet 1.

W. W. DASHIELL.
MANUFACTURE OF GAS.

No. 376,944.

Patented Jan. 24, 1888.



WITNESSES:

Chas. V. V. V.
C. Sedgwick

INVENTOR:

W. W. Dashiell

BY

Munn & Co.

ATTORNEYS.

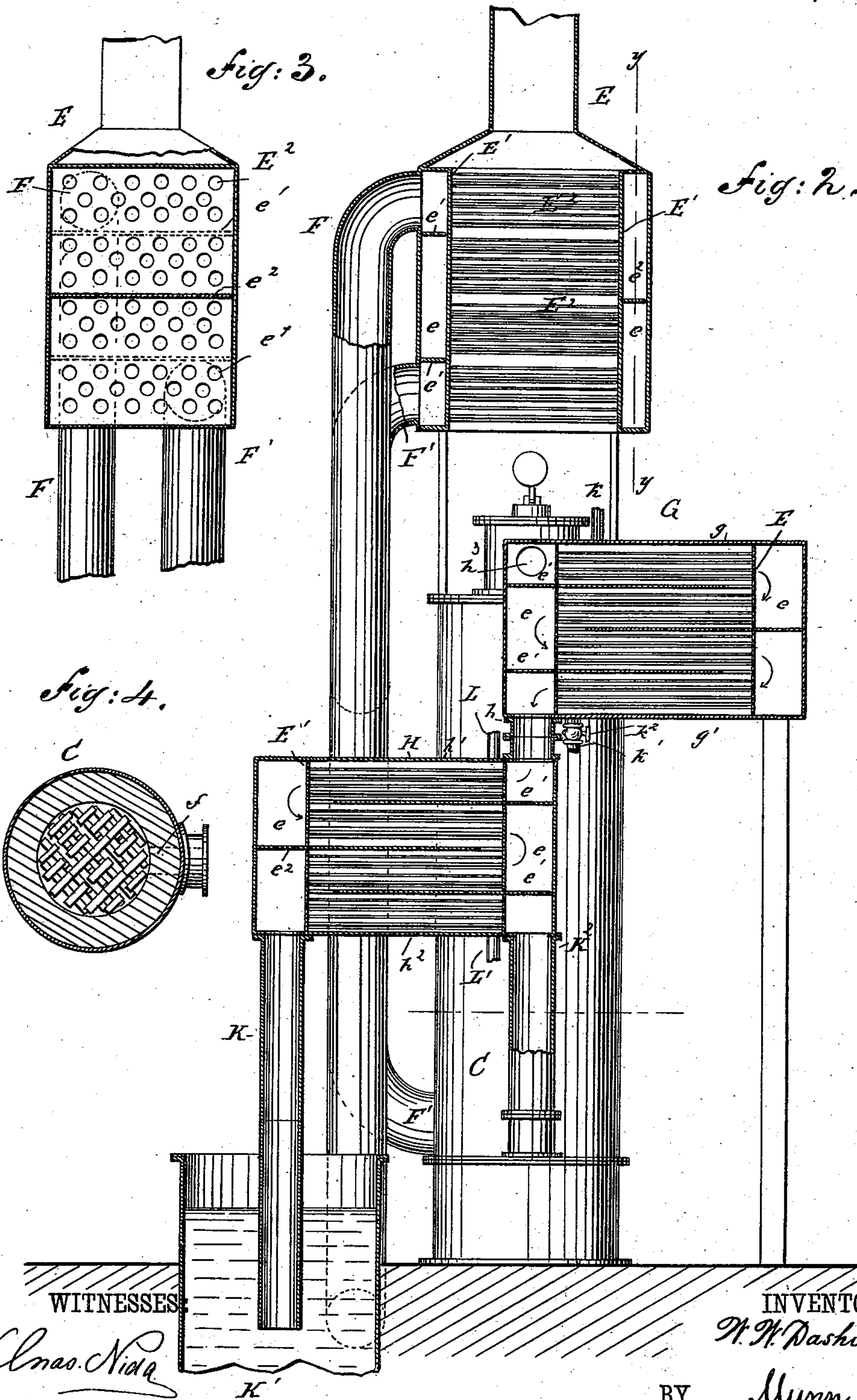
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UNITED STATES PATENT OFFICE.

WILLIAM W. DASHIELL, OF BERGEN POINT, NEW JERSEY.

MANUFACTURE OF GAS.

SPECIFICATION forming part of Letters Patent No. 376,944, dated January 24, 1888.

Application filed March 3, 1887. Serial No. 229,621. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. DASHIELL, of Bergen Point, in the county of Hudson and State of New Jersey, have invented new and useful Improvements in the Manufacture of Gas, of which the following is a full, clear, and exact description.

My invention relates to an improvement in the manufacture of gas, and has for its objects to utilize the waste products of combustion to heat air supplied beneath the fire, and also to utilize the hot gas in its passage to the holder as a means of heating oil and superheating the steam used in the manufacture of gas.

The further object of the invention is to provide an improved means of supplying oil and steam to the fire, each through a single conductor, whereby the same will be equally distributed in the generator over the fire, in contact therewith, over the grate, or beneath the grate.

The invention consists in the combination, with a gas apparatus, of heating devices for the air, steam, and oil supply of the same, and in an improved construction of the oil and steam supply devices, as will be hereinafter more specifically described, and set forth in the claims.

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

Figure 1 is a partial vertical sectional view through the apparatus, and Fig. 2 a vertical section taken on line *xx* of Fig. 1. Fig. 3 is a vertical longitudinal section through one of the heaters on line *yy* of Fig. 2, and Fig. 4 is a transverse horizontal section through one gas-superheater.

In carrying the invention into effect A, B, and C represent, respectively, the generator and superheaters, the latter containing stacked brick, as usually employed in the manufacture of gas, especially water-gas, the generator A being provided with the usual grate, *a*, hinged top *a'*, and connected with the first superheating-chamber, B, by a passage, *b*. The said superheating-chamber B is in turn united with the second superheating-chamber, C, by a passage, *c*.

The second superheating-chamber, C, is provided at top, centrally, with a valve, *d*, adapted

to be operated in any convenient manner and purposed to open and close said chamber. An air-heater, E, is held in suspension above the top of the superheating chamber C, provided with an open bottom and top and an inner spaced casing, E', (see Fig. 2,) the space *e*, intervening the inner and outer casing, being inclosed at top and bottom. Within the said space *e*, upon one side, two or more horizontal baffle-plates, *e'*, are secured, and within the opposite space one or more similar plates, *e''*.

The inner casing of the heater E is provided with a series of horizontally-arranged tubes, E², connecting the opposite spaces, *e*; and air is supplied to said tubes by a pipe, F, entering the space *e* above the upper baffle-plate, as shown in Fig. 2, air being forced into the said pipe F by means of a pump, blower, or equivalent means. An outlet-pipe, F', is also made to penetrate the heater E upon the same side with the supply-pipe F and communicate with the space *e* below the lower baffle-plate, *e'*.

The outlet-pipe F' extends from the heater E downward, having communication with the superheating-chamber C, near the bottom thereof, by a branch pipe, *f*, and communicating with the superheating-chamber B also by a second branch, *f'*, as shown in dotted lines, Fig. 1. The main pipe, however, continues downward, and is made to penetrate one side of the generator A below the grate. Thus when a fire is built in the generator the products of combustion pass into and through the superheating-chambers, heating the bricks therein, being kept at a high temperature when said bricks are hot; and from said chambers the intensely-hot waste products pass upward through the opening in the last chamber, C, the valve *d* being open. Ordinarily this heating agent has been allowed to mingle with the air and become lost. In the present apparatus, however, the products pass up through the heater E, being open at its bottom as well as at top, around the horizontal tubes E², and up out of the open top, and the air forced up through the pipe F, circulating through the said tubes E², is supplied through the pipe F' to the generator at a high temperature, thereby greatly facilitating combustion and economizing fuel.

Near the mouth of the superheating-chamber C a connection is made by a connection, *h*³,

with a heater, G, supported at right angles to said chamber, which heater is connected to a second heater, H, extending oppositely to the said heater G, direct connection *h* being had at their opposing ends. Each of the said heaters G and H is constructed substantially in similar manner to the heater E aforesaid, with the exception that the baffle-plates *e'* are made to project through the inner casing, *E'*, between the flues *E²*, nearly from side to side of said inner casing, and an inclosing top and bottom plate, *g g' h' h²*, is also provided. The pipe *h³*, connecting the chamber C and heater G, is made to enter the space *e* upon one side, and at the bottom of said heater an inlet-pipe, *k'*, is entered, leading from a boiler or exhaust-steam chamber, and which inlet-pipe is provided with a valve, *k²*, for regulating or cutting off the supply of steam, while at the top of said heater G is entered a delivery-pipe, *k*, leading to and connecting with a hollow spraying-ring, M, arranged within the generator immediately above the fire-grate *a*.

The heater H is provided at its outer and lower end with a pipe, K, leading from one space, *e*, downward in a deep well, K', whereby a water seal is made, and the said heater is provided at the opposite or inner end at the bottom with a pipe, K², leading in a shallow covered well, from which well a pipe, K³, projects, adapted to lead to the gas-holder. The heater H is provided with an inlet-pipe, L', at the bottom, adapted to admit oil, and an outlet-pipe, L, at the top, connecting with a hollow ring, M, provided with a circumferential series of apertures, *m*, which ring M is supported, as shown in Fig. 1, within the generator at the top, the apertured surface being the inner surface of the said ring. Thus as the oil is introduced to the bed of fire to generate a gas it is sprayed in among the coal, and thereby distributed equally over a large area.

An extra oil-ring, M', may, if found desirable, be placed a distance below the top of the generator, as shown in Fig. 1; or but one, either at the top or below the top, may be employed.

The operation is as follows: The waste products of combustion passing up through the superheater C enter the heater E, through which air is circulated, and the said heated air is introduced to the fuel in the generator, and also to the superheaters B and C, through the pipes *f f'*, which pipes are provided with suitable valves. The heated air in the superheaters or mixing-chambers unites with the unburned gas from the generator, which, igniting, serves to more quickly heat the chambers B and C. Should one chamber become sufficiently heated before the other, the supply of air is shut off from that chamber, and the gases are only allowed to burn in the other. When both chambers B and C have become sufficiently heated, the valve *d* is closed, and steam passing through the heater G is sprayed upon the fire through the apertured ring M. This action generates a water-gas, but poor in quality.

The gas is enriched by the admission of oil to the ring M', passing through the heater G, which oil, as heretofore stated, is thereby more advantageously applied, and in addition is supplied through a single pipe, and consequently under better control. The steam may be exhaust-steam, as it is superheated in the heater H, and if live steam it is kept in good condition by its passage through the said heater. The oil is also heated to a high temperature, and, like the steam, the result is accomplished by being held in contact with the tubes *E'* by the baffle-plates *e' e²*. The tubes of the steam and oil heaters are kept intensely hot by the passage of the heated gas from the superheating or mixing chamber C through them. The gas entering through pipe *h³* into the upper heater, G, passes through the tubes therein down into the lower heater, H, before entering the last tubes in said heater. Any tar which may have collected will pass down through the pipe K into the well K'. The weight of the tar, sinking it to the bottom, constantly keeps a water-seal upon the said tar drip-pipe K. The gas in its further progress through the last tube of the heater H passes down the pipe K² into the usual well and up through the water into the stand-pipe K³, from whence it is conveyed to any suitable storage-tank.

The upper heater may be used to superheat oil, and the under heater for steam, if found more convenient in the application of the herein-described process to an existing gas-plant.

From the foregoing the following advantages are secured: The steam heater or superheater being intermediately situated between the supply and delivery pipes and the supply of steam to the steam-heater being regulated by the valve *k²*, live steam or exhaust-steam is superheated in an expanded state, and has no further expansion to undergo after entering the generator. By this means a much drier steam is obtained, the variations in pressure of boiler supplying steam being immaterial, as by this method exhaust-steam will answer the purpose equally as well as steam at high pressure, for by my process the steam from the boiler entering the heater, which is much larger than the supply-pipe to the same and having no stoppage, expands to a very much lower pressure in the heater. This heat of expansion is put back into the steam at a lower tension, and the steam is superheated while at this low tension and passes into generator without further expansion. In this highly-superheated state heretofore either live steam from boiler, which is saturated steam, has been admitted to generator, and, being saturated, the moment it expanded into the generator deposited water and dampened the fuel, &c., or it has been superheated under high pressure and its delivery to the generator regulated at a point between the superheater and generator, and thus when admitted to generator expanded, resulting in the loss of this heat of expansion, and which be-

comes wet steam, or nearly so, deadening the coals, so that as much gas cannot be made per run or per pound of coal as when the steam is delivered to generator in an expanded super-heated state.

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

1. The combination, with the generator of a gas plant or apparatus, a heater having divided chambers connected by tubes supported over the exit-flue of said generator, an air-supply pipe leading to said heater, and an outlet-pipe connecting the heater with the generator beneath the fire, of a tubular steam-superheater connected with the gas-outlet of the generator and an oil-superheater connected with the steam-heater and with the gas-tank seal, substantially as shown and described, whereby the waste products of combustion are made to heat the air fed to the fire and the steam and oil

used in connection with the plant are heated by the gas in its passage from the generator to the tank, as set forth.

2. The combination, with the generator A of a gas plant or apparatus, provided near the top with a series of apertures, *m*, of a tubular heater, H, adapted to contain oil around the tubes connected with the gas-outlet of the generator, and with the tank-seal, a tubular ring, M', surrounding the generator, provided with a series of apertures registering with the apertures in the generator, and a pipe-connection between the heater and ring, substantially as shown and described, whereby the oil is heated by the passage of the gas through the tubes of the heater and distributed over the fuel in the generator, as set forth.

WM. W. DASHIELL.

Witnesses:

J. F. ACKER, Jr.,
E. M. CLARK.