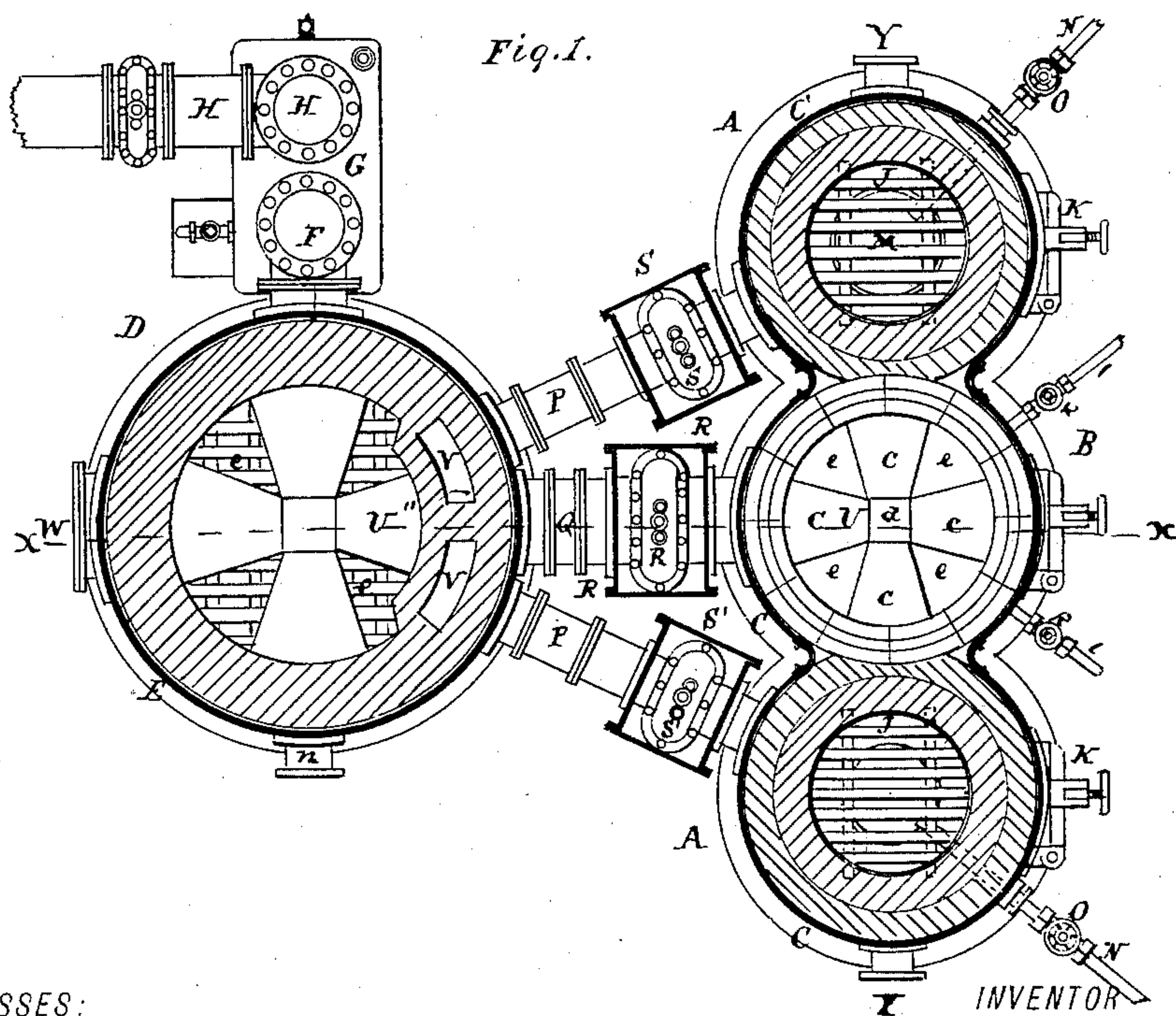
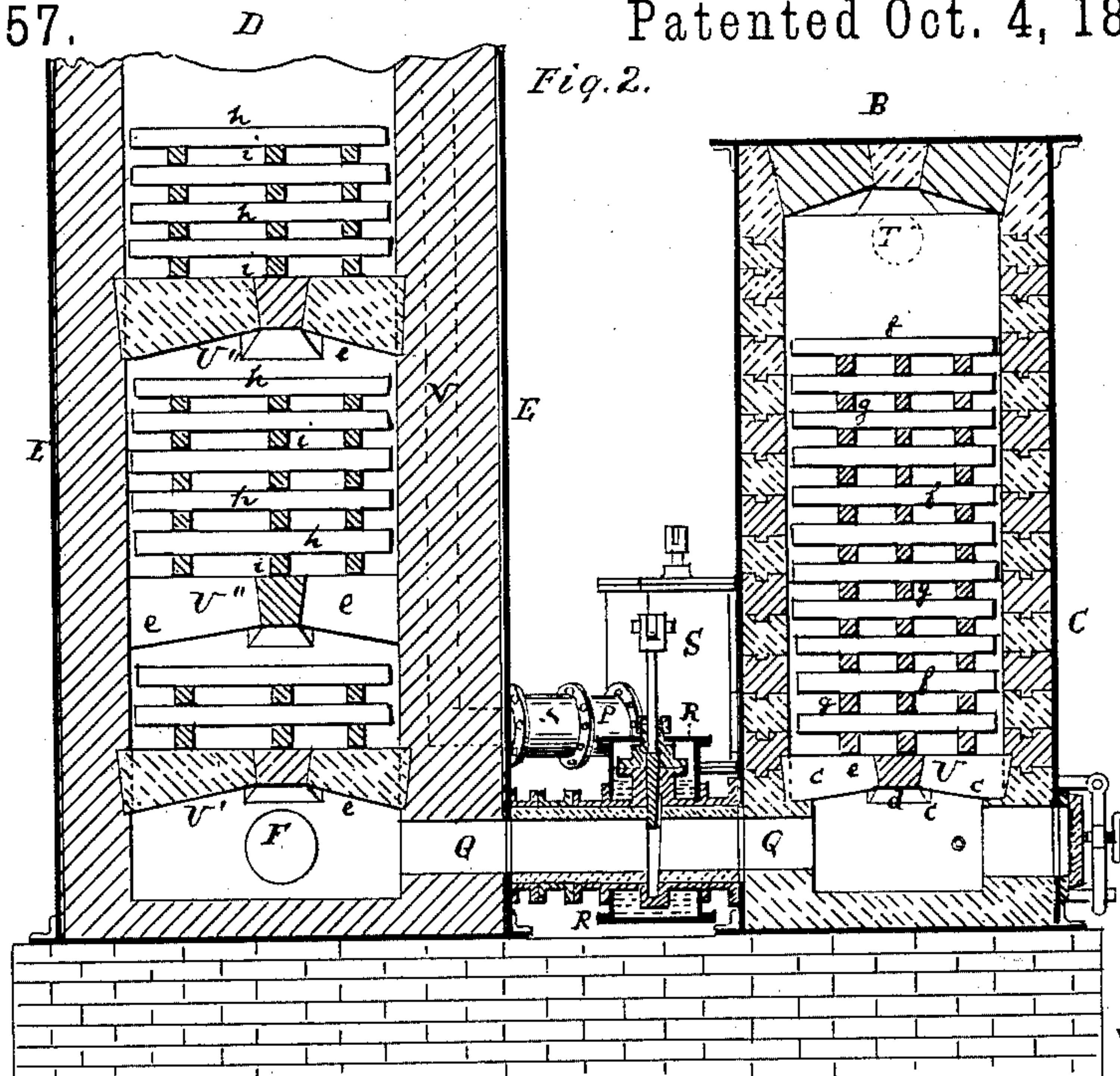


A. B. LIPSEY.

APPARATUS FOR MANUFACTURING GAS.

No. 370,957.

Patented Oct. 4, 1887.



WITNESSES:

Daniel T. Gray.
Reinhold Boeklin

INVENTOR
Andrew B. Lipsey

(No Model.)

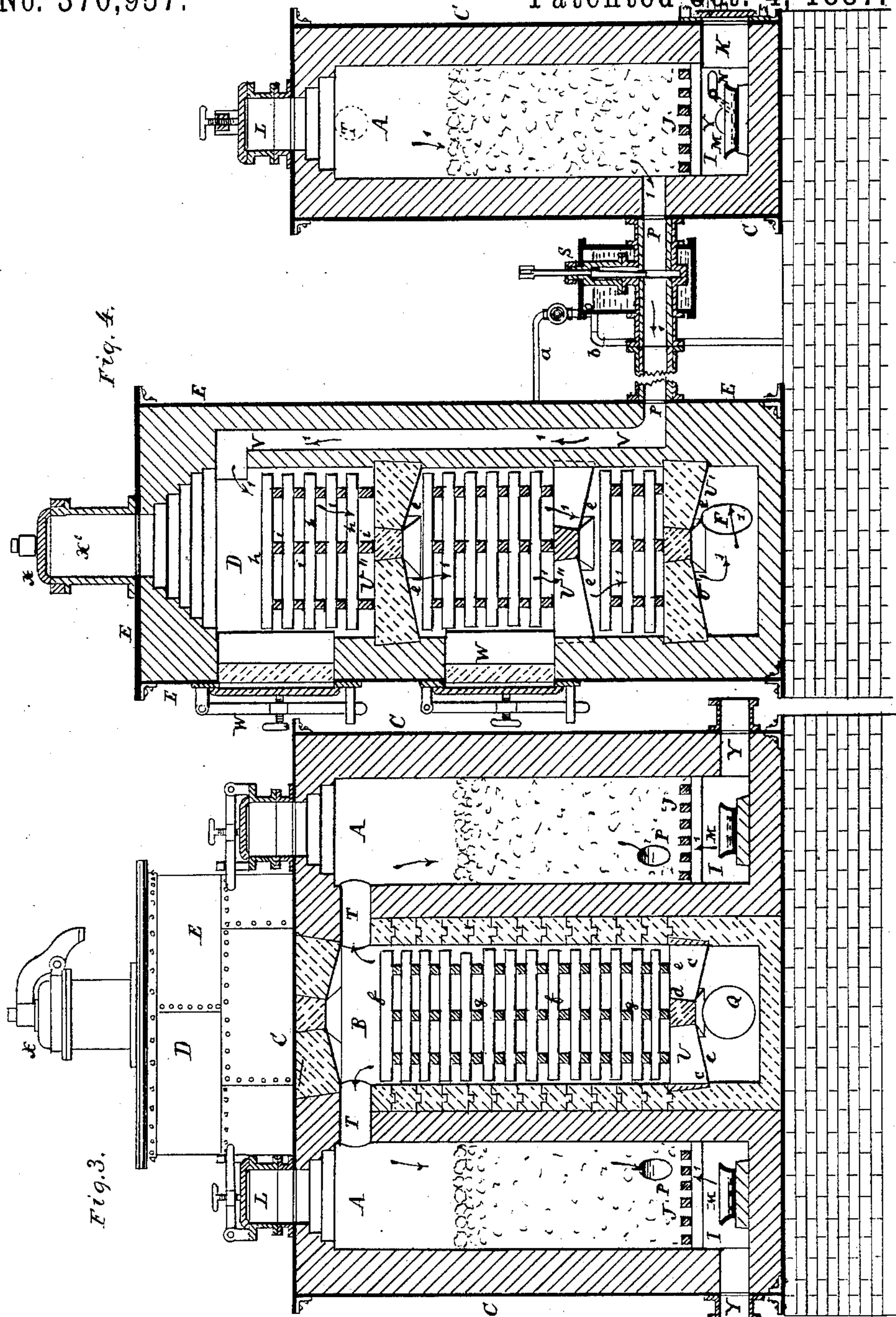
2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

ANDREW B. LIPSEY, OF WEST HOBOKEN, NEW JERSEY.

APPARATUS FOR MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 370,957, dated October 4, 1887.

Application filed February 24, 1887. Serial No. 228,758. (No model.)

To all whom it may concern:

Be it known that I, ANDREW B. LIPSEY, a citizen of the United States of America, and a resident of West Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Generating Water-Gas, of which the following is a specification.

This invention relates to improvements in apparatus for manufacturing gas; and it consists in the novel construction and arrangement of an apparatus which may be operated successfully and with the same proportionate economy to produce various quantities of gas without waste.

The invention further consists in certain novel details of construction of parts of the apparatus, all of which will be fully understood from the following description, when taken in connection with the accompanying drawings, in which—

Figure 1 represents a horizontal section of my improved water-gas-generating apparatus. Fig. 2 represents a central vertical section of the same on line *x x*, Fig. 1. Fig. 3 is a vertical section in direction centrally through both cupolas and interposed steam-superheating chamber. Fig. 4 is also a vertical section through the fixing-chamber and one of the cupolas.

Referring to the drawings by letters, A designates the cupolas, having interposed between them the superheating-chamber B, hereinafter referred to. Each of the cupolas A is properly lined with fire-brick, and is provided with an ash-pit, I, and a grate, J, over said ash-pit, upon which the coal is supported. The doors K of the ash-pit are constructed to be gas-tight, as shown.

L designates a gas-tight jointed door, one in the top of each cupola, and through which coal is supplied to the same.

In the ash-pits of the cupolas are placed a proper holder or pan, M, into which crude oil is delivered by a pipe, N, controlled by a valve or cock, O. The superheating-chamber B is lined with fire-brick, as shown, and its walls adjoin and form part of the walls of the cupolas, and this chamber connects with each cupola by means of a flue, T, at the top thereof, as shown. The fire-brick lining of chamber B should be sufficiently steam and air tight to

prevent escape of gases, and is preferably made of a series of sectional fire-brick, the top of each section having a tongue engaging in a corresponding groove in the section upon which it rests, as shown in Fig. 3, so that when properly laid the sections form a solid lining for the chamber.

The cupolas A A and chamber B stand in line, as shown, and are properly inclosed by an air-tight sheet-metal casing or shell, C.

Centrally between cupolas A A, in rear of chamber B, is situated the vertical cupola or casing which forms the fixing-chamber D for the gases, and which is inclosed by a gas-tight metal shell, E. The chamber D is connected with the cupolas by means of pipes P P, which enter the cupolas above the grates thereof, and with the superheating-chamber B by means of a pipe, Q, which enters the latter at its base, as shown. Each pipe P P and Q is provided with a suitable gate-valve, S, S', and R, respectively. Each of these pipes is suitably lined with fire-brick or other suitable refractory material, and each gate-valve is protected by a water-jacket, as shown, provided with a supply-pipe, *a*, and overflow *b*, so that a stream of cool water can be passed around said gates when the apparatus is in operation, and prevents injury to the gates by undue heating. The gate-casing is made of thick metal, while the gate itself is of thin metal, so that the heat will be more readily conducted therefrom.

The fixing-chamber D has in its bottom compartment a gas-delivery pipe, F, which is connected with the wash-box or hydraulic main G, arranged near said chamber D, and into which the gas is delivered by the usual drip-pipe, and from said box the gas is conducted off to the usual delivery main, H, and to the ordinary scrubbers and purifying apparatus, after which the gas escapes to any ordinary gas-holder for delivery to the consumers.

Above the mouth of pipe Q, where it opens into chamber B, is arranged in said chamber a lateral arch or grate, U, consisting of four similar radial tiles, *c*, and a central keystone tile, *d*. The outer ends of tiles *c* engage in the lining of said chamber, and their inner ends engage the keystone *d*, as shown. The spaces between the adjoining tiles form passages *e e*, as shown. Upon the arch U in chamber B, and occupying nearly the entire interior thereof,

are arranged the series of lateral cross-laid rows of tiles *f g*, as shown in Figs. 2 and 3.

The fixing-chamber D is provided with an arch, *U'*, similar to arch *U* in chamber B, and arranged therein above the openings of the pipe Q and gas-pipe F; and above this arch *U'* in chamber D are arranged a series of two or more similar arches, *U'' U''*. The openings *e* in the several arches *U' U'' U''* are so arranged that the gas will be caused to pass through them in a zigzag or torsional course. Above each of the arches *U' U''* are arranged a suitable series of cross-laid tiles, *h* and *i*, as shown.

The wall of chamber D nearest the cupolas A A and chamber B is made of greater width than its other parts, and in this portion are formed the parallel vertical flues V V, which connect at bottom, respectively, with pipes P P from cupolas A A, and open at top into chamber D above its highest arch *U''* and the tiles thereon, as shown in Figs. 1 and 4. Chamber D is provided with suitable gas-tight doors, W, for access to its interior for rebuilding and repairing cross-tiles *h* and *i*, and with the gas-tight-joined cap X, which is open during the firing up or blast period of the apparatus to allow the products of combustion to escape.

To operate the apparatus the cupolas A A are charged with coal, the latter properly ignited, the air-blast being supplied through pipes Y Y into the ash-pit of the cupolas. The valves S S' are closed and the valve R and seal-cap X opened. When thus arranged, the heated products of combustion are forced from both cupolas through flues T T into chamber B, down through the rows of tiles in this chamber, to and through pipe Q into the lower part of chamber D, and up through openings *e* into bridges *U' U''* therein, and through the rows of tiles *h* and *i* out through the opening X'. A small supply of air is admitted into chamber D to ignite the gases therein through any suitable opening or pipe during the blast period. By this passage of the heated products the chambers B and D and their contained tiles and bridges become intensely heated. The apparatus is then ready for generating gas. To effect this, valve R, cap X, and the air-supply are cut off and the valves S S' opened. Steam is then admitted through pipes *l* into the lower part of chamber B, which passes up through the tiles *f g*, becomes highly superheated and partly decomposed, and, passing from chamber B through passage T into cupolas A A, is forced downward through the incandescent fuel therein. The steam is then entirely decomposed and free hydrogen evolved, which commingles with and is partially enriched by the carbonaceous gases arising from the fuel.

Simultaneously with the admittance of steam into the chamber B the crude-oil-supply valves O O are opened, permitting oil to flow into the pans M M in the ash-pits of the cupolas, where, by reason of the intense heat in the cupolas, the oil is vaporized, forming an

oil-gas which rises up to the pipes P, where it meets with the resolved gases formed by the decomposed steam and mixing with these gases passes through pipe P, up through flues V, into chamber D, and then down through the heated tiles *h* and *i* and bridges *U' U''*, whereby said gases become fixed, and finally pass through the outlet F from chamber D into the hydraulic main or wash-box G.

When the heat of the plant becomes too low, the oil and steam supplies are cut off, the valves S S' closed, and the valve R, cap X, and air-supplies opened, and the operation of firing or "blowing" up the plant is repeated.

If it is desired to produce only one-half the amount of gas, one cupola A may be used alone, the other cupola being disconnected; or, if desired, the cupolas may be used alternately by properly adjusting the valves of the several pipes and regulating the admission of air, steam, and oil, as is evident. When so used, only about one-half the gross amount of gas that can be produced by the entire apparatus is generated. When still less quantities of gas are required, only one cupola is employed, and only about half the amount of fuel and oil and steam admitted into the apparatus, so by properly regulating the amounts of these elements supplied to the apparatus the amount of gas developed can be regulated.

It will be seen that the oil-gas is generated in the same cupola and by the heat of the same fuel which decomposes the superheated steam, and that these gases are first united in a single passage from the cupola to the fixing-chamber. Further, that the fixing-chamber for the gases is so arranged that the current of gases is given a torsional or spiral direction by the arrangement of the openings *e* in bridges *U' U''*, in addition to the zigzag and tortuous direction caused by the tiles *h* and *i*, so that when they finally escape from said chamber they are absolutely and thoroughly commingled.

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

1. In a gas-generating apparatus, the combination, with a steam-superheating chamber and two connected gas-generating cupolas, each having an oil-receiver in its ash-pit, of a fixing-chamber and its connections with the superheating-chamber and cupolas, each of said connections being provided with a suitable cut-off valve, all substantially as described.

2. In a gas apparatus, the combination, with the cupola, its oil-inlet, grate, and ash-pit, of an oil-receiver placed in said ash-pit, and a gas-delivery pipe from said cupola above and in close proximity to its grate, and suitable steam and oil supply pipes, constructed and arranged substantially in the manner and for the purpose set forth.

3. In a gas apparatus, the combination, with two cupolas, A A, and the oil-vaporizing pans in their ash-pits, of a steam-superheating chamber, B, connected with said cupolas, and a fix-

ing-chamber, D, its flues and valves, pipes P, for connecting it with the cupolas, and the valved pipe Q, for connecting with the chamber B, all substantially as and for the purpose set forth.

4. In a gas apparatus, the combination, with the cupolas A A, the oil-vaporizing pans in their ash-pits, the oil-delivery valved pipes N, of the central steam superheating chamber, B, its flues T, steam-supply valved pipes l, and the fixing-chamber D, its seal-cap X, delivery-pipe F, and vertical flues V V, the valved pipes P P, connecting flues V V with cupolas A A, and the valved pipe Q, connecting the fixing-chamber and chamber B, substantially as specified.

5. The combination of the cupolas A A, intermediate steam-superheating chamber, B, provided with arch U and tiles *f g*, and flues T T, connecting said chamber and cupolas, the oil-pans M below the grates of the cupolas, the oil-delivery pipes N therefor, and steam-

pipes l, delivering into the superheating-chamber, with the fixing-chamber D, having the bridges U' U'' and tiles *h i* thereon, the gas-exit pipe F and the flues V V, and the pipes P P, provided with valves S S', connecting with flues V V and the fuel-chambers of cupolas A A, and the pipe Q, provided with valve R, connecting the lower portions of the chambers B and D, and suitably-closed inlet and exit openings in the cupolas and chamber D, all constructed and arranged to operate substantially in the manner and for the purpose described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 18th day of February, 1887.

ANDREW B. LIPSEY.

Witnesses:

DANIEL T. GRAY,
REINHOLD BOEKLEN.