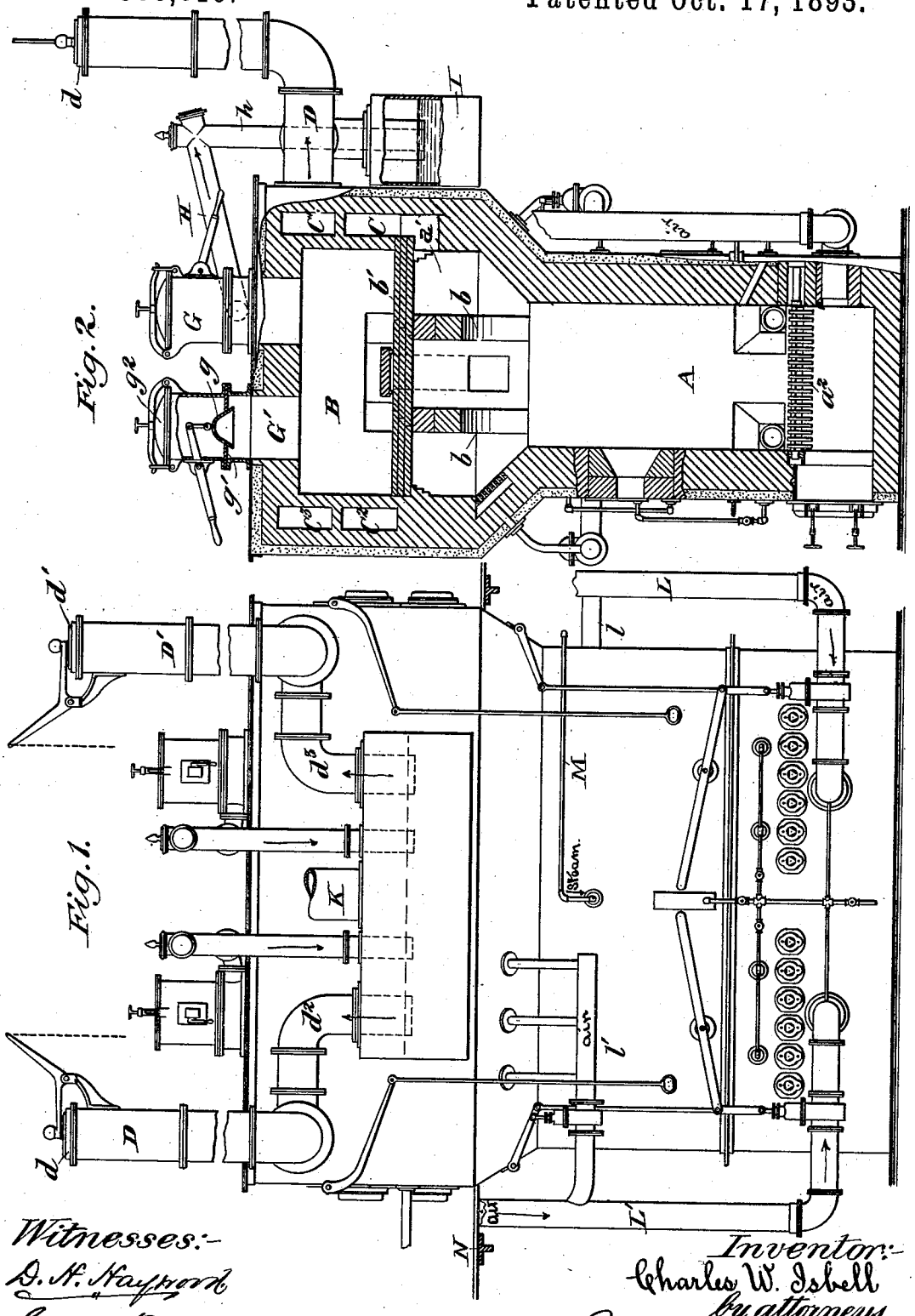
(No Model.)

3 Sheets—Sheet 1.

C. W. ISBELL.

GAS APPARATUS.

No. 506,819. Patented Oct. 17, 1893.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 8.

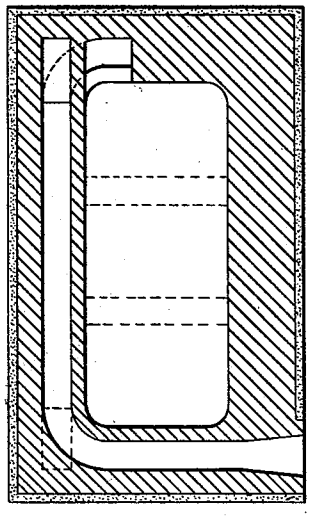


Fig. 7.

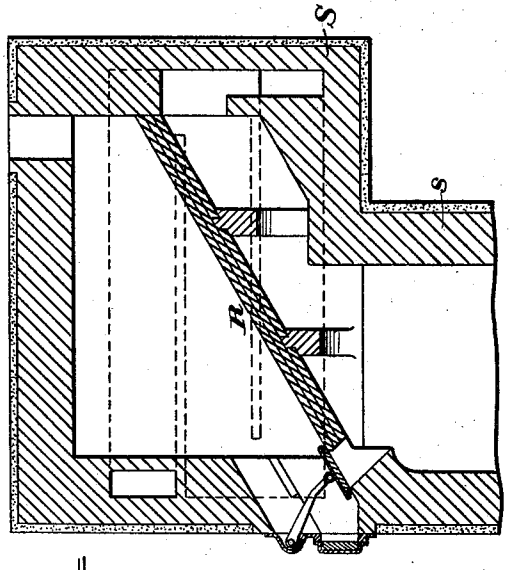
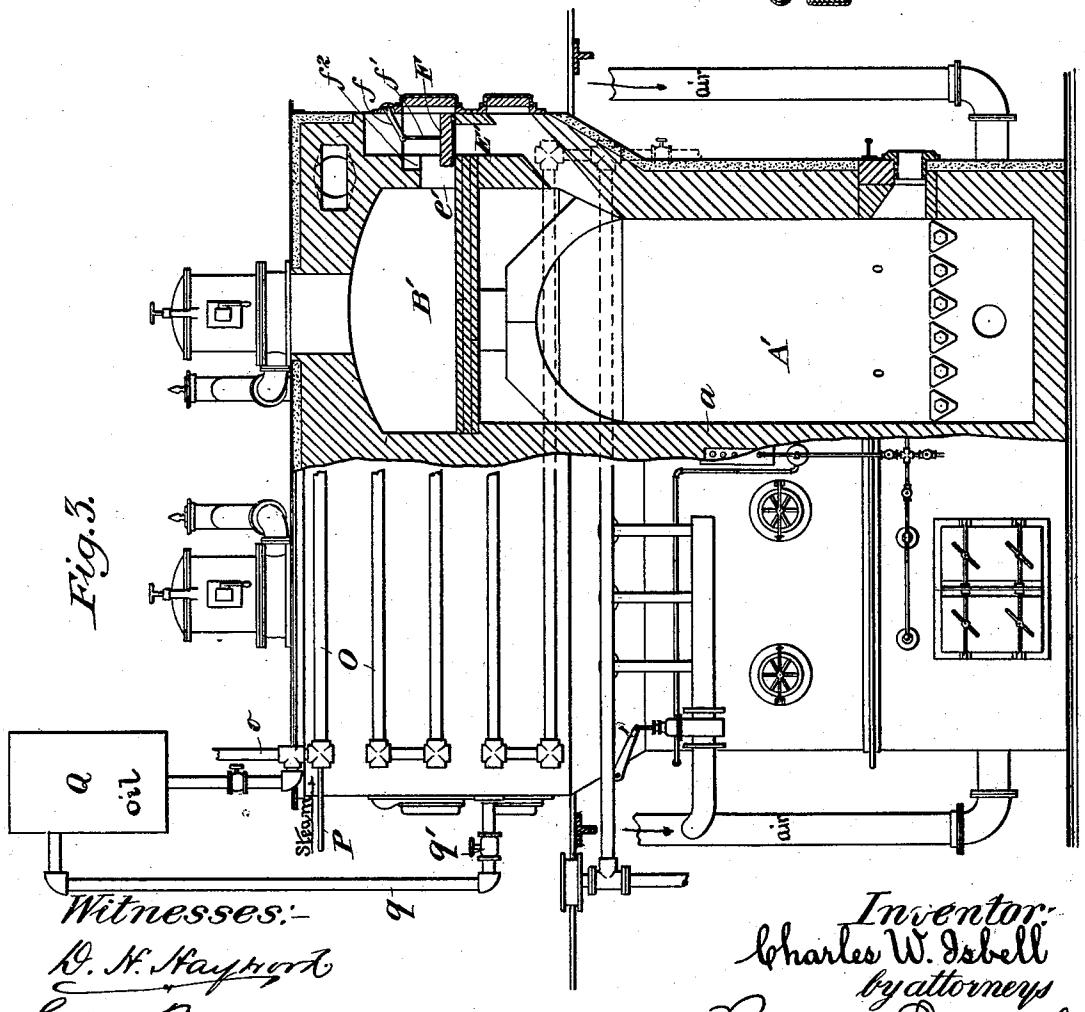


Fig. 3.



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3 Sheets—Sheet 3.

C. W. ISBELL.

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Fig. 4.

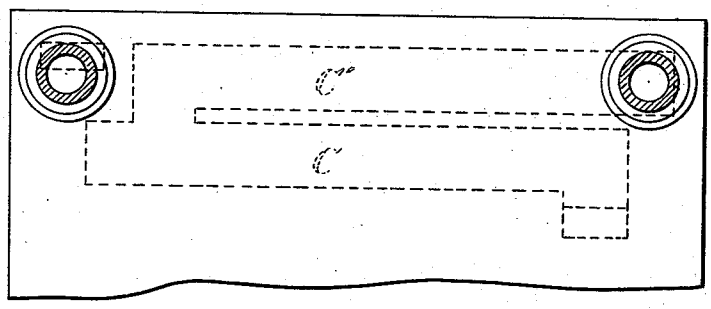


Fig. 5.

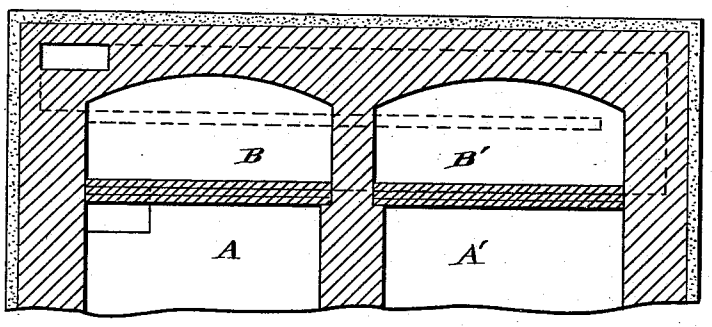
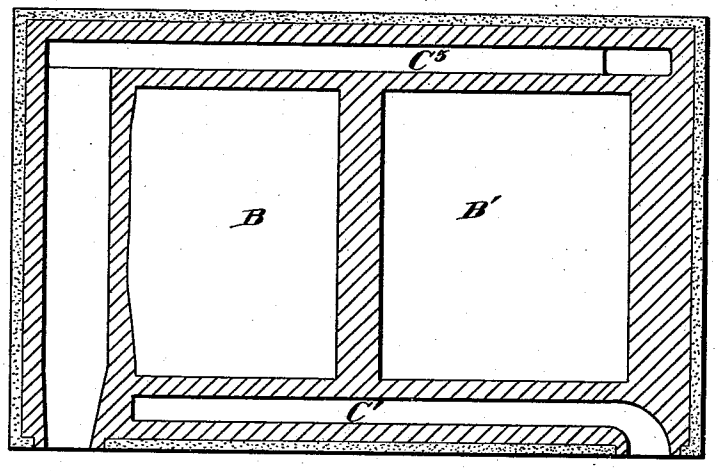


Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES W. ISBELL, OF NEW YORK, N. Y.

GAS APPARATUS.

SPECIFICATION forming part of Letters Patent No. 506,819, dated October 17, 1893.

Application filed March 30, 1893. Serial No. 468,398. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. ISBELL, of New York, in the county and State of New York, have invented a new and useful Improvement in Gas Apparatus, of which the following is a specification.

My invention relates to an improvement in gas apparatus in which provision is made for utilizing the waste gases of combustion in heating up the coking chamber and for withdrawing coke from the chamber and introducing it into the combustion chamber without any serious diminution of its heat and there utilizing it for the manufacture of water gas whereby it becomes feasible to utilize bituminous coal in the coking chamber and great economy in the manufacture of gas is secured.

A practical embodiment of my invention is represented in the accompanying drawings in which—

Figure 1 is a view of the apparatus in front elevation. Fig. 2 is a view in transverse, vertical section, partly in elevation, the section being taken near the end of the apparatus. Fig. 3 is a view in rear elevation, partly in section, showing the oil still in connection therewith. Figs. 4, 5 and 6 represent respectively views in partial side elevation, partial vertical cross section and horizontal section of the coking chambers and flues connected therewith, and Figs. 7 and 8 represent respectively a partial vertical section from end to end and a horizontal section of a modified structure in which the floor of the coking chamber is arranged on an incline and the chamber is made to extend laterally beyond the combustion chamber.

In the form which I have chosen to illustrate my invention, I couple a pair of furnaces together and provide each with its own independent coking chamber, the furnaces and the coking chambers being in communication with the hydraulic main through which the gas is passed to the holder. The arrangements of the two furnaces and their coking chambers is such that the heated products of combustion from each of the furnaces pass beneath the floor of their respective coking chambers and then along one side of the coking chambers of both furnaces, as will hereinafter more particularly appear.

The combustion chambers of the two furnaces are represented by A and A′ and in their general structure are quite similar, being separated in the present instance from one another by a partition *a*.

Upon suitable arches or supports *b* at the upper portion of the combustion chamber, rests the floor *b′* of the coking chamber B, the companion coking chamber B′ having its floor in like manner supported upon supports in the upper portion of the combustion chamber of the furnace A′. The products of combustion pass from the combustion chamber beneath the floor *b′* through an opening *a′* into a flue C, which extends horizontally along the front sides of both the coking chambers B and B′, thence up into the end of a returning horizontal flue C′, which extends parallel with the flue C, and above it, back along the sides of the two coking chambers B and B′ to the pipe D, having a purge valve *d*. In like manner, the products of combustion from the furnace A′ pass from its combustion chamber into a horizontal flue C^2 which extends along the sides of both the coking chambers B′ and B, thence up into a corresponding horizontal flue C^3, leading back again parallel with the flue C^2 along the sides of the two coking chambers B and B′ and thence across the end of the coking chamber B′ to the pipe D′ provided with the purge valve *d′*.

Each of the coking chambers is made to communicate with the combustion chamber of the furnaces through suitable passageways within the exterior furnace wall as follows. I have chosen to illustrate this clearly in connection with the furnace A′ and its coking chamber B′ in Fig. 3, it being understood that the communication between the furnace A and its coking chamber B is quite similar in construction. A flue E′ in the furnace wall at a point opposite the floor of the coking chamber B′ has a downwardly slanting opening leading to the combustion chamber of the furnace A′. An opening *e′*, above the floor of the coking chamber B′ and on a level with the floor, extends through the wall of the chamber into communication with the upper end of the flue E′. A valve F is arranged to seat over the top of the flue E′, shutting off its communication with the coking chamber B′ except when such communication is desired. When it is desired to open

communication between the coking chamber B′ and the furnace A′, the valve F—by means of a suitable lever f connected to the valve stem f'—may be lifted from its seat into a recess f^2 provided for it above the opening e' so as to leave the opening e' free for the passage of the coke from the chamber B′ into the flue E′ and thus into the combustion chamber of the furnace A′.

Each of the coking chambers is provided with a pair of coal branches G, G′ for distributing the coal over the floor of the coking chamber. The coal branches are each provided with valves g, seated in diaphragms g' in the branches and with tightly fitting covers g^2 for the purpose of charging the branches above the valve with coal, then closing the covers and finally opening the valves to permit the coal to fall onto the floor of the chamber, as is usual. One of the coal branches, G for example, has a bridge pipe H leading therefrom at a point below the diaphragm g' and communicating with a dip pipe h which extends down into the hydraulic main I, as clearly indicated in Figs. 1 and 2. The pipes H and h serve to conduct the gas from the coal within the coking chamber B into the hydraulic main at whatever moment during the charging or operation of the apparatus it may be formed irrespective of the closing of the purge valves d and d' after the "blowing-up" has taken place. The pipes D and D′ also connect with the hydraulic main I through suitable branch pipes d^2 and d^3. A general delivery pipe K leads from the hydraulic main to a suitable gas holder, not shown. Pipes L and L′ for supplying a blast of air to the furnace, communicate with the same below the grate bars a^2 and branch pipes l, l' leading from the air pipes L and L′ are provided with branches communicating with the interior of the combustion chamber of the furnace for supplying air thereto, as may be desired. A steam pipe M, from a suitable source of supply, not shown, leads to the interior of the furnace for supplying steam thereto to make water gas.

The floor on which the operator stands for transferring the coke from the coking chamber into the furnace or for otherwise manipulating the apparatus in the vicinity of the coking chamber is denoted by N.

For the purpose of enriching the gas, as may be desired, I find it convenient to locate an oil still at the rear of the apparatus and in communication therewith as follows: The oil still comprises a series of pipes O, leading back and forth along the rear of the furnace and communicating with each other, through which the hydrocarbon oil is allowed to pass by entering through an inlet pipe o. Within the pipes O, I locate steam pipes P, through which hot steam is caused to pass, tending to vaporize the oil. The oil vapors accumulate in a tank Q above the still and are held there under pressure until permitted to enter the gas conduit leading to the hydraulic main. Such connection between the compression tank Q and the gas conduit is made by a pipe q provided with a valve q'.

Such parts of the apparatus as I have not particularly described and referred to herein may be of any well known or approved form.

The apparatus is operated as follows:—One of the furnaces, A for example, having been charged with fuel and the purge valve d opened and the fuel ignited, the "blowing-up" takes place. The hot products of combustion coming in contact with the bottom of the coking chamber B and the sides of the two coking chambers will raise the floor and the wall of the chamber to a high heat which will coke the charge of coal which may have been already placed within the chamber B. When the chamber B is sufficiently heated, the purge valve d may be closed, the coke from the chamber B may be withdrawn into the combustion chamber of the furnace A, steam admitted and the making of gas will proceed; the latter passing through the branch pipe d^2 into the hydraulic main.

The furnace A′, while the furnace A is making gas, may be charged with fuel and the "blowing-up" process may take place in it in the manner hereinabove described, its heated products of combustion serving to coke the coal within the coking chamber B′ and it in turn may be set to making gas while the furnace A is itself recharged. Any gas which escapes from the coking chamber during the process of "blowing up" or while charging the chamber, will escape through the bridge pipe H and dip pipe h into the hydraulic main and will be saved from waste.

The gas made from the coal and steam within the apparatus may be enriched at pleasure with the hydrocarbon gas from the oil by opening the valve q' and permitting the oil gas from the compression chamber Q to escape into and commingle with the gas from the apparatus at any convenient point along the wall of the conduit leading from the combustion chamber.

In the form represented in Figs. 7 and 8, the floor R of the coking chamber is arranged on an incline, extending from the point beneath the coal branch downwardly to the flue through which the coke is tranferred into the combustion chamber. In this form also, the coking chamber is made longer by extending its wall S laterally beyond the wall s of the furnace.

What I claim is—

1. In gas apparatus, a combustion chamber, a coking chamber separate from and subject to the heat of the products of combustion from said combustion chamber, a valved passageway connecting the coking chamber and combustion chamber for the transmission of coke from the former to the latter, means for opening and closing said passageway at pleasure, a gas conduit leading from the combustion chamber to the hydraulic main and a gas conduit leading from

the coking chamber to the hydraulic main, the said last named conduit having communication with the combustion chamber through the coking chamber and through the said valved passageway, substantially as set forth.

2. In gas apparatus, a combustion chamber, a coking chamber separate from and subject to the heat of the products of combustion from said combustion chamber, a valved passageway at the side wall of the combustion and coking chambers connecting the said chambers, a portion of said passageway forming at the same time a charging conduit for the combustion chamber, a door opening to said valved passageway from the exterior of the apparatus, a hydraulic main, gas conduits leading from the combustion and coking chambers to the hydraulic main and a coal branch communicating with the coking chamber, substantially as set forth.

3. In gas apparatus, a plurality of combustion chambers an independent coking chamber for each combustion chamber, flues for the products of combustion leading from each combustion chamber along the walls of its own and neighboring coking chambers, means for independently charging the coking chambers and the combustion chambers, and gas conduits leading from the coking and combustion chambers to a hydraulic main, substantially as set forth.

4. In gas apparatus, a combustion chamber, a coking chamber located over the combustion chamber and having a passageway for the discharge of coke at the side thereof, a passageway leading from the combustion chamber up to a point in proximity to the said passageway at the side of the coking chamber, a valve for closing the said passageway leading from the combustion chamber, the wall of the apparatus being provided with a recess above the top of the passageway at the side of the coking chamber for the reception of said valve when the latter is open to leave a free opening for the transmission of coke from the coking chamber to the combustion chamber, a coal branch for charging the coking chamber and gas conduits leading from the coking and combustion chambers, substantially as set forth.

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