C. W. ISBELL.

Apparatus for the Manufacture of Coal-Gas.

No. 221,565. Patented Nov. 11, 1879.

Fig 1.

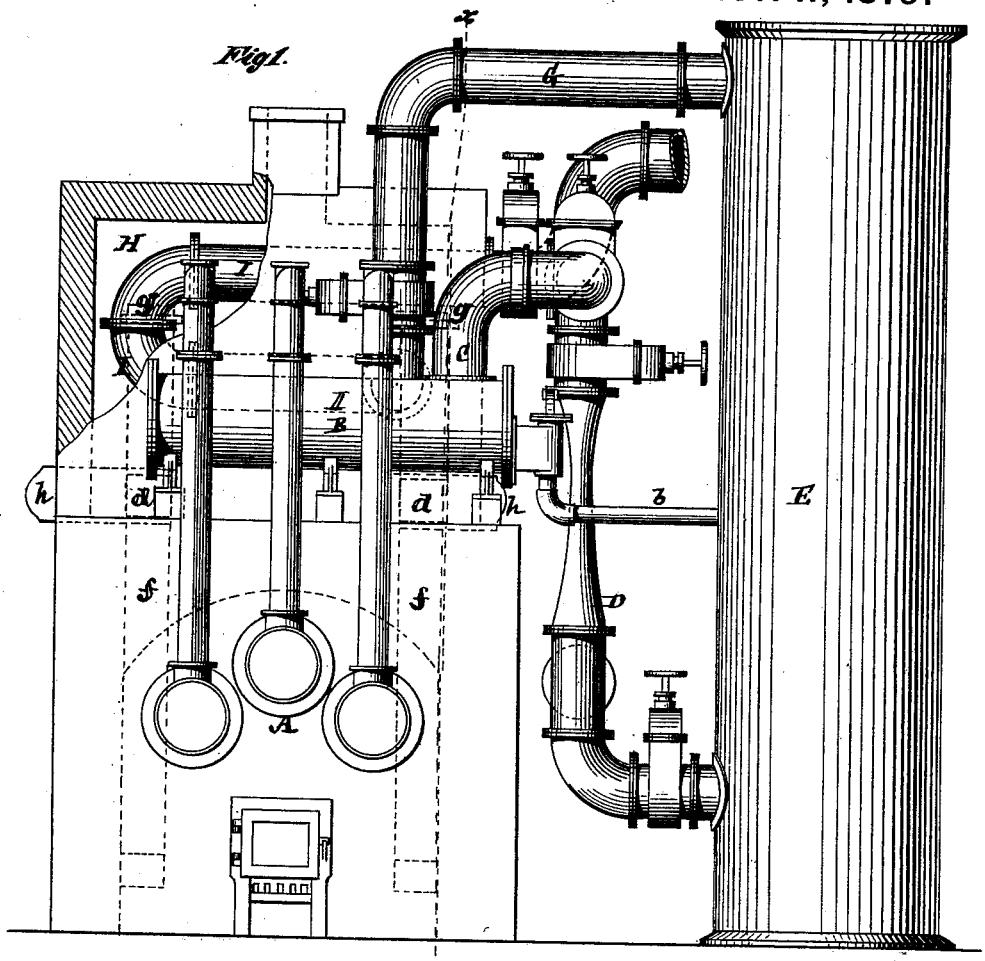
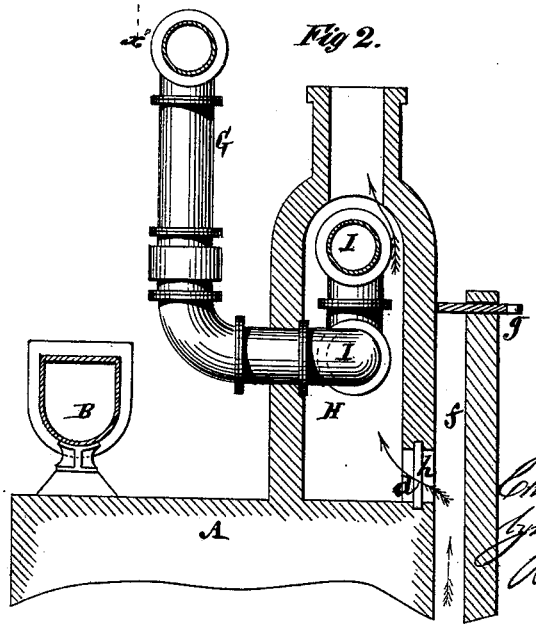


Fig 2.



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UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN APPARATUS FOR THE MANUFACTURE OF COAL-GAS.

Specification forming part of Letters Patent No. **221,565**, dated November 11, 1879; application filed April 21, 1879.

To all whom it may concern:

Be it known that I, CHARLES W. ISBELL, of the city and State of New York, have invented a new and useful Improvement in Apparatus for the Manufacture of Coal-Gas, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This invention more particularly relates to a process and apparatus for manufacturing coal-gas which constitute the subject of Letters Patent No. 214,042, granted to me April 4, 1879. That process consisted in a process of separating the naphthaline and other volatile hydrocarbons from the tar produced in the manufacture of coal-gas by the direct and combined action upon the tar of the hot coal-gas and free steam, and subsequently converting such hydrocarbons into permanent gas by the agency of heat. The means employed consisted in a combination, with the hydraulic main of one or more gas-producing retorts and one or more secondary retorts for converting the naphthaline and other hydrocarbons into permanent gas, of a steam-scrubber interposed between the said main and the secondary retorts, a pipe for conveying the tar from the said main to the said scrubber, a pipe or pipes and a steam-jet exhauster for conveying gas from the said main and steam into the said scrubber, and a pipe or pipes for conveying the separated hydrocarbons into the secondary retorts, wherein they were heated to convert them into a permanent gas, which was afterward passed into the gas-mains for general consumption.

The object of the invention in the present application is to dispense with a separate furnace used to heat the secondary retorts for converting the hydrocarbons into permanent gas, and to utilize for such purpose the waste heat or products of combustion which escape from the flues of the bench of retorts used to effect the distillation of the coal, thereby economizing fuel.

To this end the invention consists in a combination, with a bench of retorts for the distillation of illuminating-gas from coal, and a steam-scrubber, into which are separately introduced the hot gas from said retorts and a quantity of tar from the hydraulic main of said retorts, and in which are vaporized a portion of the hydrocarbons of such tar, of a converter which is arranged in or in communication with the flues of said retorts, and is heated by the waste heat thereof, and into which the steam, gas, or hydrocarbon vapors pass from said scrubber to be therein heated together for the conversion of the said vapors into permanent gas.

Valves are also provided for regulating the escape of the waste heat to and through said converter, or direct from the flue or flues of the bench of gas-producing retorts, or both, as circumstances may require.

In the accompanying drawings, Figure 1 represents a front elevation of an apparatus for the manufacture of coal-gas in accordance with the process hereinbefore referred to, and having my invention applied. Fig. 2 is a vertical section mainly on the line *x x*, in illustration of a converter for the hydrocarbons into permanent gas as applied to or connected with the escape flue or flues of a bench of gas-producing retorts in accordance with this invention.

A represents a bench of retorts in which coal may be distilled for the production of gas; B, the hydraulic main of said bench, and C a pipe for conveying the gas from said main to a steam-jet exhauster, D, by which it is passed, along with free steam, to and through a steam-scrubber, E, containing twigs or other suitable material, over which the tar, conducted by a pipe, *b*, from the hydraulic main, is caused to flow, and, by its exposure to the gas and steam rising through the scrubber, has the naphthaline and other hydrocarbons separated and vaporized from the pitchy portion of it, all as described in my patent hereinbefore referred to.

G is a pipe by which the separated and vaporized hydrocarbons are passed along with the gas produced by distillation of the coal from the steam-scrubber E to the converter, which changes said hydrocarbons into permanent illuminating-gas. This converter, which takes the place of one or more secondary retorts heated by a furnace which is separate

and distinct from that used in the bench of gas-producing retorts A, consists of a chamber or receptacle, H, of any suitable shape, in communication by apertures *d* with the flues *f* of the bench A of gas-producing retorts, and one or more close ducts or pipes, I, arranged within said chamber, and connected with the pipe G, for passing or circulating the hydrocarbons through such heating-chamber to convert them into permanent illuminating-gas.

I do not restrict the invention to any particular construction of the close ducts or pipes I, nor yet to any particular arrangement of the converter relatively to the bench A of retorts, so long as it connects with the flues of said bench for utilizing the waste heat from said bench. The flues *f* should be provided with valves *g*, and the apertures *d*, which connect said flues with the chamber H, with valves *h*, to either admit of a direct draft from said flues or to turn and regulate the passage of the escaping products of combustion through the converter, and from the latter by an outlet, *s*, as circumstances may require or the varying condition of the fire in the bench A of retorts may render necessary. The whole volume of gas, after it leaves the converter, is passed through the ordinary or any suitable purifying apparatus.

I claim—

1. The combination, with one or more retorts for the distillation of illuminating-gas from coal, and a steam-scrubber, into which are separately introduced the hot gas from said retorts and a quantity of tar from the hydraulic main of said retorts, of a converter which is arranged in or in communication with the flues of said retorts and is heated by the waste heat thereof, and into which the steam, gas, or hydrocarbon vapors pass from said scrubber, substantially as and for the purpose herein described.

2. The combination, with the converter for changing the hydrocarbon vapors obtained from tar in the distillation of coal into permanent gas, and with the flues of a bench of retorts used in distilling said coal, in communication with said converter, of valves for controlling the escape of the gaseous products of combustion from said bench through the flues or independently thereof, essentially as described.

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