(No Model.)

E. W. HAMLIN.

GAS ENRICHER.

No. 411,809. Patented Oct. 1, 1889.

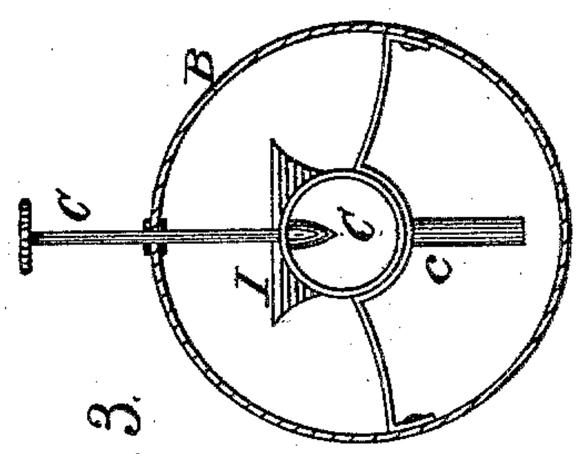

Fig. 3.

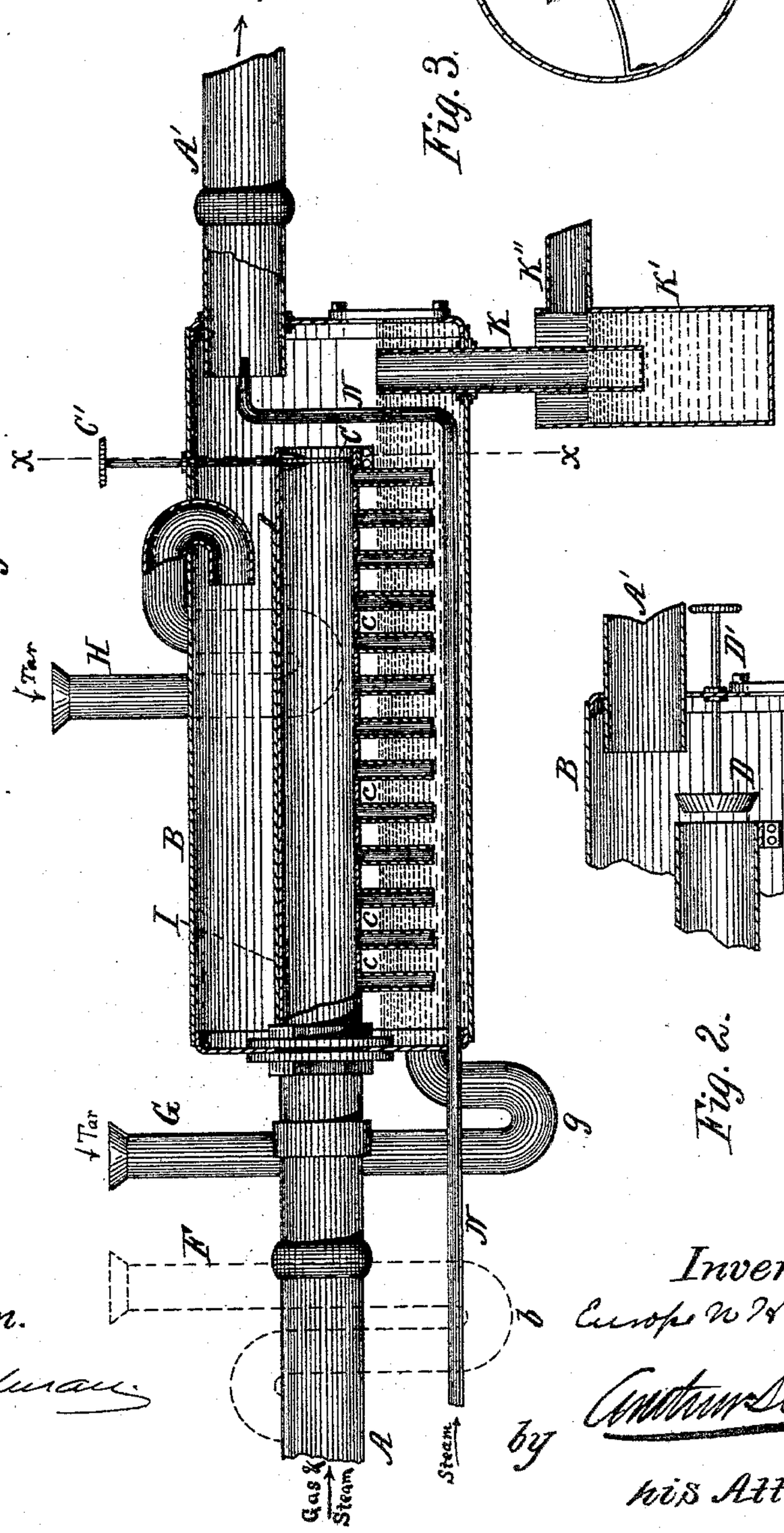

Fig. 1.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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GAS-ENRICHER.

SPECIFICATION forming part of Letters Patent No. 411,809, dated October 1, 1889.

Application filed October 8, 1888. Serial No. 287,540. (No model.)

To all whom it may concern:

Be it known that I, EUROPE W. HAMLIN, a citizen of the United States, residing at Wilmington, county of Clinton, and State of Ohio, have invented a certain new and useful Improvement in Gas-Enrichers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an improvement in apparatus for manufacturing gas for the purpose of liberating from the tar produced in the manufacture of gas the more volatile hydrocarbons contained in it and mingling them with the gas, thereby enriching it and increasing its candle-power as well as quantity, and also of dissolving and utilizing the surplus naphthaline produced with the gas.

The novel features of my invention will be more fully hereinafter set forth.

It is well known that the tar produced in the manufacture of gas contains hydrocarbons in greater or less quantities; but no means has yet been discovered for effectually liberating them, for the reason that the heat required to cause the requisite disintegration of the tar causes the tar to pitch or become hard and solid, after which it is no longer capable of the necessary manipulation.

I have discovered that when the hot liquid tar coming from the gas-works is heated to a still greater degree by live steam being passed through it from the bottom or near the bottom in such a way as to keep the tar in motion or a boiling condition, caused by the ebullition of the steam passing up through it, I can prevent the tar from pitching, while the heat causes the liberation of the hydrocarbons, which mingle with the gas and enrich it. I have arranged the device for carrying out this process, as shown in the accompanying drawings and description.

In practice the gas passes from the retorts to the hydraulic main, when the tar and ammonia-water is partly precipitated, the gas passing on to the gas main, carrying with it a small quantity of tar and ammonia-water which has not been precipitated. The gas is forced through the main by means of a current caused by a rotary or steam-jet exhaust into what is called the "scrubber" or "washer." By passing the gas as it comes from the exhaust through a vessel containing hot liquid tar and introducing with the gas live steam, so that the gas and steam enter the tar and rise through it, causing a boiling or ebullition, keeping the tar in motion, the hydrocarbons in the tar are liberated and taken up with the gas without pitching or solidifying the tar. In ordinary gas there is at times an excess of naphthaline, which is apt to crystallize and clog the pipes.

More or less hot water accumulates in the tar-chamber, which acts upon the gas, dissolving any surplus naphthaline or reducing it to more volatile form, thus preventing its crystallization and separation from the gas.

In the accompanying drawings I have illustrated the best form of device or machine for accomplishing this end.

Figure 1 is a side elevation of the machine, which I call the "enricher," partly in section. Fig. 2 is a sectional side view of one end, showing a modified form of the by-pass valve or regulator. Fig. 3 is a cross-section taken through the lines X X.

My enricher is designed to be attached to the gas-main of any gas-works between the exhaust and washer or scrubber, and can be inserted by cutting away a section of the main at that point and inserting the enricher in place of the section of pipe taken away.

Like letters of reference indicate identical parts.

A A is the main leading from the gas-works conveying the gas and steam to the washer, a section of it having been removed for the insertion of my enricher.

B is an iron vessel or boiler of any convenient shape. (Shown in the drawing as cylindrical.) The main A enters this chamber at one end and extends almost to the opposite end. The lower side of this portion of the main A is perforated, and the perforations open into small pipes *c*, extending downward into the tar. These small pipes may extend almost to the bottom of the chamber B, or may be omitted altogether if the supply of tar is kept above the openings from the main, or if the flow of the gas has sufficient force to drive it down into the tar.

The open end of the main A inside the

chamber is provided with a by-pass valve C, with a valve-rod C′ extending outside the vessel.

In Fig. 2, D is a modified form of valve, and D′ the valve-rod. When the valve C is closed, the gas, mingled with hot steam, is forced down through the tubes *c* nearly to the bottom of the chamber B. Where a rotary exhaust is used, steam must be introduced from a boiler. If a steam-jet exhauster is used, no additional steam is needed.

The chamber B is kept partly full of tar, conveyed to it from the gas-works, there being also more or less ammonia-water carried with it. This tar may be introduced in various ways, as shown in the drawings. It may be introduced directly by the pipe G, which is curved downward before it enters, as at *g*, so as to form a seal to prevent the gas from escaping; or the tar may be introduced into the main by the pipe F when it flows into the enricher along with the gas and steam; or, again, the tar may be introduced by the pipe H above the main, in which case it flows into a pan on top of the main. (Indicated at I, Figs. 1 and 3.) This is a shallow pan extending along the top of the main and partly down its sides, so as to cause the tar to hug the main and spread over it as it flows along to the inlet end of the chamber and then down over the sides of the main to the bottom of the chamber, and thereby become heated to a greater degree. The tar flows out by the overflow-pipe K, which extends down into the vessel K′, in which is kept a sufficient quantity of tar to form a seal. The pipe K is arranged with screw-threads, so that it may be raised or lowered to regulate the quantity of tar in the chamber B.

In the drawings the pipe N is such a pipe discharging into the main A′, where it serves also as an exhaust to increase the current or flow of gas through the chamber.

The following is the mode of operation: The valve C being closed, the gas flows in through the main A, mingled with steam. It is then forced down through the pipes *c* to the bottom of the chamber B, and then comes up through the hot tar and passes out through the main A′ to the washer. If preferred, the tar in the chamber B may be kept above the bottom of the main, and the pipes *c* be shortened or omitted. The gas and hot steam passing through the heated tar cause a partial decomposition or disintegration of the tar, by which the hydrocarbons contained in it are liberated. These are taken up by the gas, and serve to greatly enrich it, increasing its candle-power many per cent., beside increasing the quantity of gas produced. The tar by being kept thus agitated is prevented from pitching by reason of the heat. The hot ammonia-water, with the tar, aids in purifying the gas, and the heat and moisture prevents the precipitation or separation of any naphthaline from the gas, which would both impoverish the gas and tend to clog the pipes.

It may be desirable to heat the tar more effectually than is done in the manner above described. This may be done by carrying a steam-pipe through the tar. The gas after passing from the enricher, as described, goes to the washer through the main A′, where it is treated in the usual way.

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

1. In a gas-enricher, the combination of a receptacle adapted to contain tar in its lower portion, a gas-induction pipe having an opening into said receptacle above the normal level of said tar, a valve in said opening, branches connected to the gas-induction pipe and dipping below the normal level of said tar, a steam-heating pipe extending through the lower portion of said receptacle, a tar-feed pipe, and tar-pan on top of the induction-pipe and below the tar-pipe, and a gas-exit pipe from the upper portion of said receptacle, arranged in the manner above described.

2. In a gas-enricher, the combination of the receptacle adapted to contain tar in its lower portion, the gas-induction pipe having an opening into said receptacle above the normal level of said tar, a valve in said opening, branches connected to the gas-induction pipe and dipping below the normal level of said tar, a steam-heating pipe extending through the lower portion of said receptacle, a tar-feed pipe, and a gas-exit pipe from the upper portion of said receptacle, arranged and combined substantially as and in manner described.

3. In a gas-enricher, the combination of a receptacle adapted to contain tar in its lower portion, a gas-induction pipe having an opening into said receptacle above the normal level of said tar, a valve in said opening, branches connected to the gas-induction pipe and dipping below the normal level of said tar, a tar-feed pipe, and a gas-exit pipe from the upper portion of said receptacle, arranged and combined substantially as and in the manner described.

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Witnesses:
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