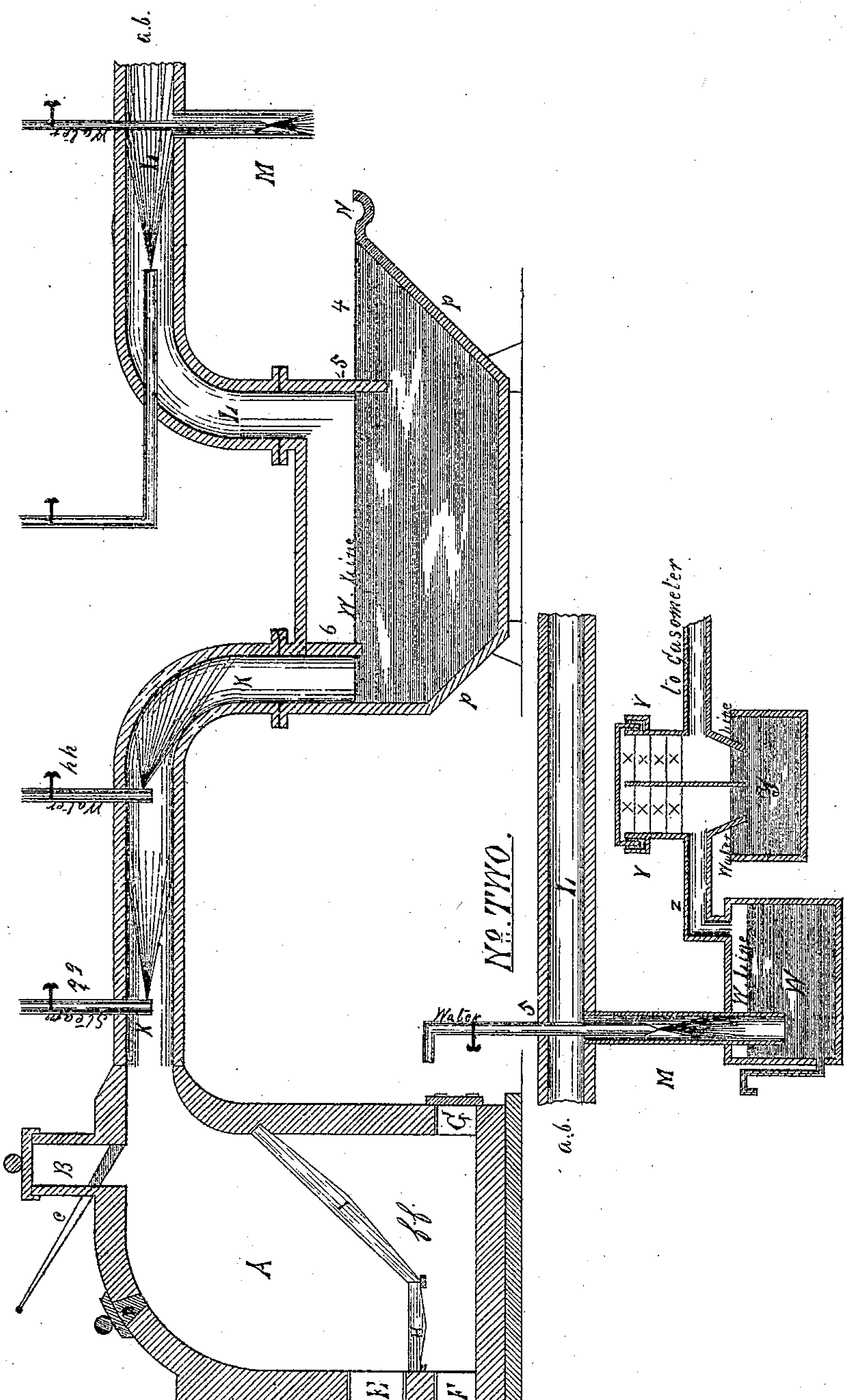
2 Sheets--Sheet 1.

J. H. CONNELLY & J. McLURE.

Improvement in Apparatus for the Manufacture of Gas for Heating and Illuminating.

No. 115,028. Patented May 23, 1871.



WITNESSES.

E. M. Howard
S. B. Bushfield Jr.

INVENTORS

Joseph H. Connelly
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per J. Boone McLure
Their Attorney.

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

2 Sheets--Sheet 2.

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FIG. I.

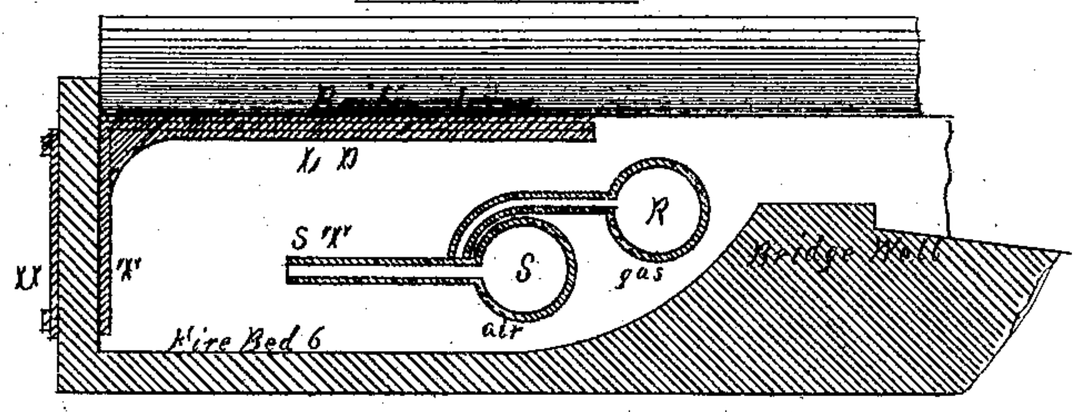


FIG. II.

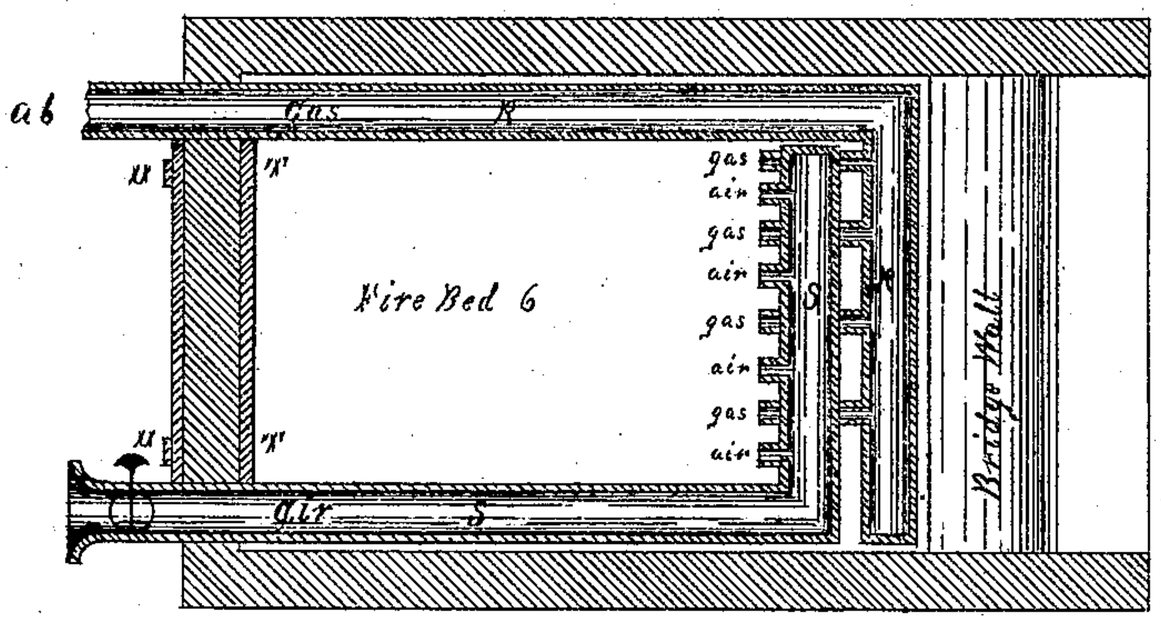
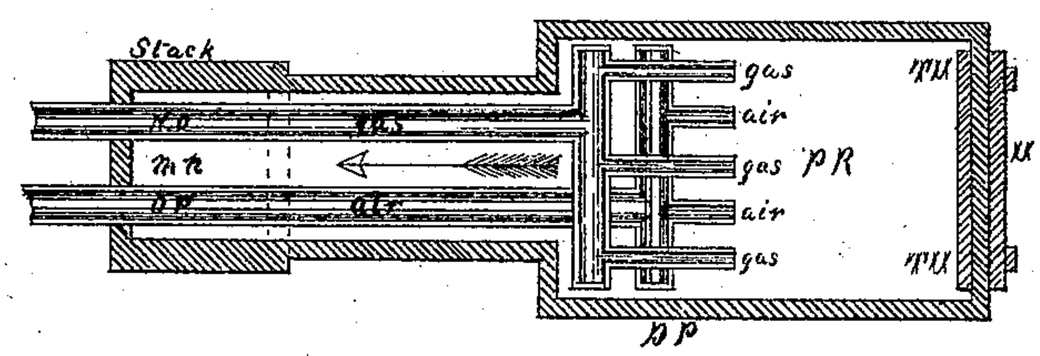


FIG. III.



WITNESSES.

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AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS)

UNITED STATES PATENT OFFICE.

JOSEPH H. CONNELLY AMD JOHN McLURE, OF WHEELING, WEST VIRGINIA.

IMPROVEMENT IN APPARATUS FOR THE MANUFACTURE OF GAS FOR HEATING AND ILLUMINATING.

Specification forming part of Letters Patent No. 115,028, dated May 23, 1871.

To all whom it may concern:

Be it known that we, JOSEPH H. CONNELLY and JOHN McLURE, of Wheeling, in the county of Ohio and State of West Virginia, have invented certain Improved Apparatus for Producing Gas from Coal, or other similar substances, Preparing the same for and Applying the same to Illuminating and Heating Purposes, of which the following is a specification, reference being had to the accompanying drawing and the letters of reference thereon.

Our invention relates, first, to the construction of the producer or retort wherein the gas is generated; second, to the construction of the condenser wherein the gas is separated from the tar, &c.; third, to the arrangement of the pipes for supplying the gas and air to the fire-chamber, to be there consumed for heat; fourth, to combining and arranging the above, by and with additional apparatus, for using the gas for illuminating or heating, or heating, or both; each and all as hereinafter described.

In the drawing, No. 1 is a vertical section through the center of our new and improved producer or retort and condenser, together with pipe connecting them with its intersecting steam and water tubes. No. 2 is a like section of an ordinary condenser and purifier, together with the pipes connecting them, and leading to and from them, and also a section of pipe leading from the condenser in No. 1. No. 3 is an interior side view of the fire-chamber or furnace, showing the arrangement of the gas and air tubes therein. No. 4 is a horizontal section of the latter, also further showing the arrangement of the gas and air tubes therein. No. 5 is a like section of a combustion-chamber for smelting metals therein, showing the arrangement of the gas and air tubes as applied thereto.

We will now describe in detail the several parts to which our invention relates, and the manner of constructing and using the same.

In No. 1, A is the chamber of our producer, wherein the gas is generated, the outside walls of which are made of fire-brick or any other suitable refractory material. B, supply-hopper, through which the coal or other material being used is let into the chamber by means of pivoted lever *c*. This hopper is placed in the top of the producer in such a position that the coal falling through it will fall pretty well up to the top of the inclined grate-bars I. D is the "stoking-hole," on the top, near the front; E, door in front for cleaning out the chamber; *f f*, air-chamber and ash-pit; F, air-damper opening into the latter; G, door to clean out ash-pit; H, horizontal grate-bars, extending full length of the producer, and about one-third of its width, and supported there by a bar or beam, extending the full length of producer; I, inclined or slanting grate-bars, extending the full length of producer, and connecting with the horizontal bars on the said beam.

When using this producer for generating gas, fill the chamber A with coal, or material being used, about two to three feet from the grate-bars, giving the said bulk of coal the shape of the grate-bars, such as shown by the dotted lines in the chamber, and admit sufficient air through the damper F to ignite and burn said coal to about three to five inches on said grate-bars. The gas thus produced is a mixed gas, and differing mainly from the gas generated in the ordinary gas-retorts by its being weaker, arising from the above admission of air into the chamber A.

P P is our improved condenser, which differs from the ordinary condenser in this, that one end of it is open and extending beyond the seal 5, and so made, by reason of the inclination of its sides, that the condenser can be cleaned out at any time, while gas is being separated in it through said opening 4; the gas, notwithstanding said opening 4, being retained in it by reason of the extension of the seal 5 further into the water than seal 6, or so far as to prevent the gas from passing around it, which will not be of such an extent as not to leave sufficient space for cleaning it out through said opening. K K is the pipe, connecting the producer with the condenser, through which the gas is conveyed from the former to the latter; *g g*, steam-jet pipe or exhaust entering the pipe K, by which the gas is drawn off from the producer and forced into and through the condenser P P into the place where it is to be used or held for use; *h h*, water-spray pipe, to admit a spray of wa-

ter into pipe K, to cool and wash the gas passing through, and also supplying the condenser with water; L L, pipe leading from condenser P P to pipe *a b*, which last is arranged in connection with the furnace, as hereinafter described.

In Nos. 3 and 4, R is a pipe, made of refractory material, passing through the interior of fire-bed or furnace, and near to the side of the wall of same, and also across the rear end of the furnace. This pipe is connected at *a b* with gas-pipe L, so that the gas from the condenser passes through them into the fire-bed, where it escapes from the pipe R into the fire-bed, through the gas tubes or apertures S, or as marked "gas" in the drawing; and while escaping is consumed, in combination with air, which enters the fire-bed in the same way, by air-pipe S and tubes or apertures marked "air." Both the gas and air so entering the fire-bed become highly heated, before being consumed, in a short time after the gas has been ignited. Both gas-pipe R and air-pipe S, and their respective tubes or openings, are so arranged not only to become highly heated, but also as to let the gas and air escape alternately therefrom; and their number can be increased to any extent necessary to produce the desired quantity of heat, or to heat any given surface of boiler, &c.

The gas, as before stated, produced in the producer A is a mixed and weak gas, being unfit for illuminating purposes. So to prepare and render it fit for such a purpose, we take a portion of it off from the pipe L leading from the condenser by the pipe M, which connects with the condenser W in No. 2, and from which it passes through the pipe Z into the purifier V, and from it, by pipes, to gas-holder or smelting-chamber P R, or to both.

The gas is taken from the pipe L and forced through the pipe M, condenser W, purifier V, and pipes to holder or smelting-chamber, by means of water flowing into the pipe M through the pipe marked "water," 5, which last pipe is enough less in diameter than the pipe M to admit of a free passage of gas between the two. Should the gas thus produced be too weak in carbon, it may be enriched by passing it through a "carbureter" after it leaves the purifier V.

In No. 5, P R is the chamber for smelting metals therein from heat produced by the combustion of gas in combination or contact with air.

The arrangement of the gas and air-pipes, and their respective escape tubes or apertures, is the same as in Nos. 3 and 4, and heretofore described.

The construction of all the parts of our combination not hereinafter claimed as new, and the relative sizes, are well known, and will readily suggest themselves to any one skilled in the art to which this appertains.

In this producer or retort coal-slack, or any inferior article of coal, can be used for the purpose of manufacturing gas, the latter being treated as heretofore described before being used for any of the purposes set forth.

The heat that can be produced by the burning of this gas, in contact with air, is sufficient for boiler or metal smelting purposes.

What we claim as new and our invention is—

1. In the producer A herein described, the air-chamber and ash-pit *f f*, and grate-bars H and I, substantially as and for the purpose set forth.

2. In the gas-condenser P P, the open end 4 and extended seal 5, substantially as and for the purpose set forth.

3. The refractory gas and air pipes R and S, in connection with the gas and air tubes or apertures marked "gas" and "air," substantially as and for the purposes set forth.

4. The producer A, gas-pipe K, steam-exhaust pipe *g g*, water-pipe *h h*, condenser P P, and the gas and air pipes R and S, substantially as and for the purposes set forth.

5. Condenser P P, gas-pipe L, water-pipe 5, condenser W, and purifier V V, substantially as and for the purpose set forth.

JOSEPH H. CONNELLY.
JNO. McLURE.

Witnesses:
J. B. McLURE,
LUKE FITZPATRICK.