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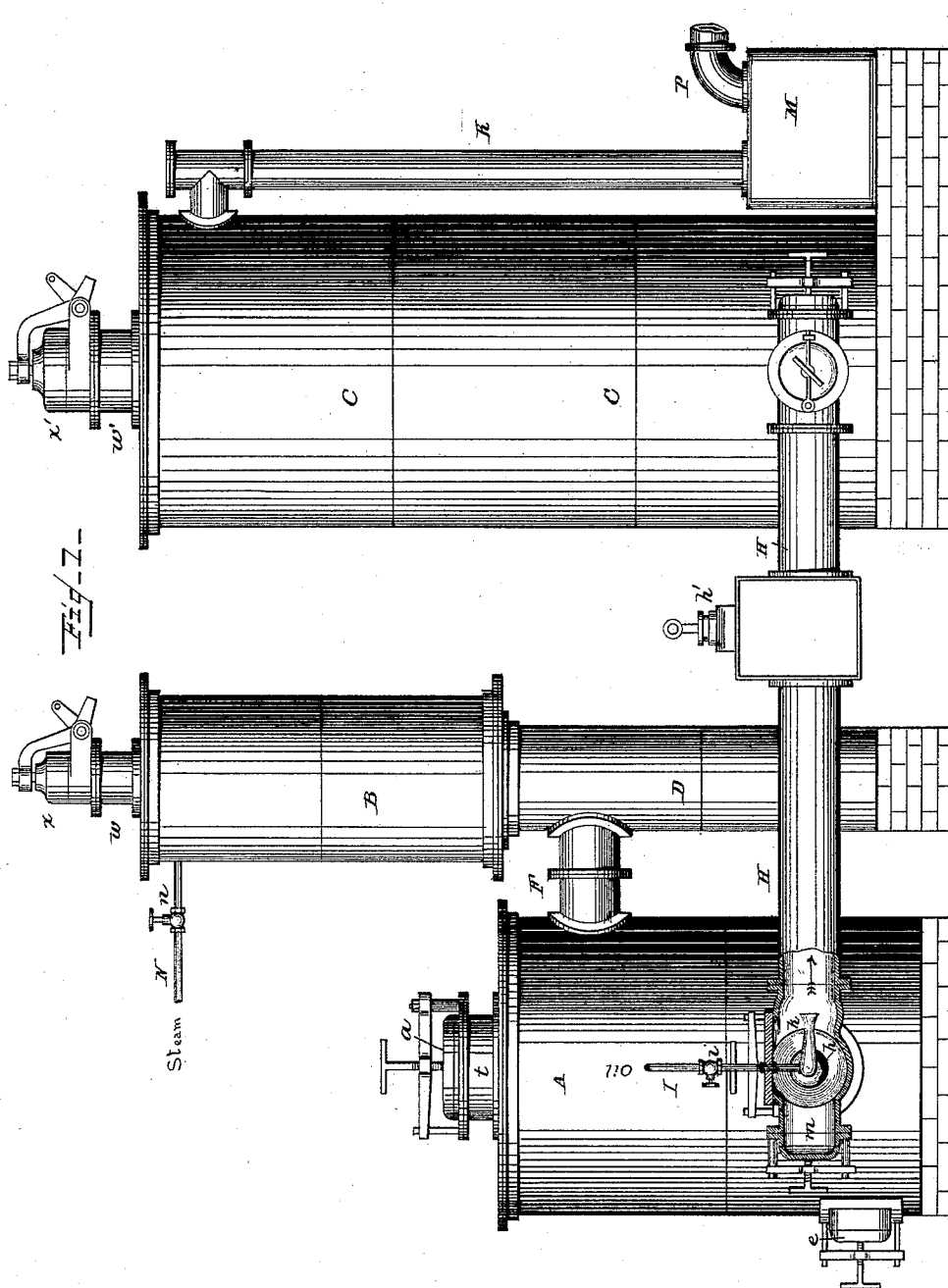
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J. HANLON.

APPARATUS FOR THE MANUFACTURE OF ILLUMINATING GAS.

No. 418,017.

Patented Dec. 24, 1889.



WITNESSES:

Edwin T. Yewell;
H. A. Roberts;

INVENTOR

John Hanlon
BY *E. B. Clark*

ATTORNEY

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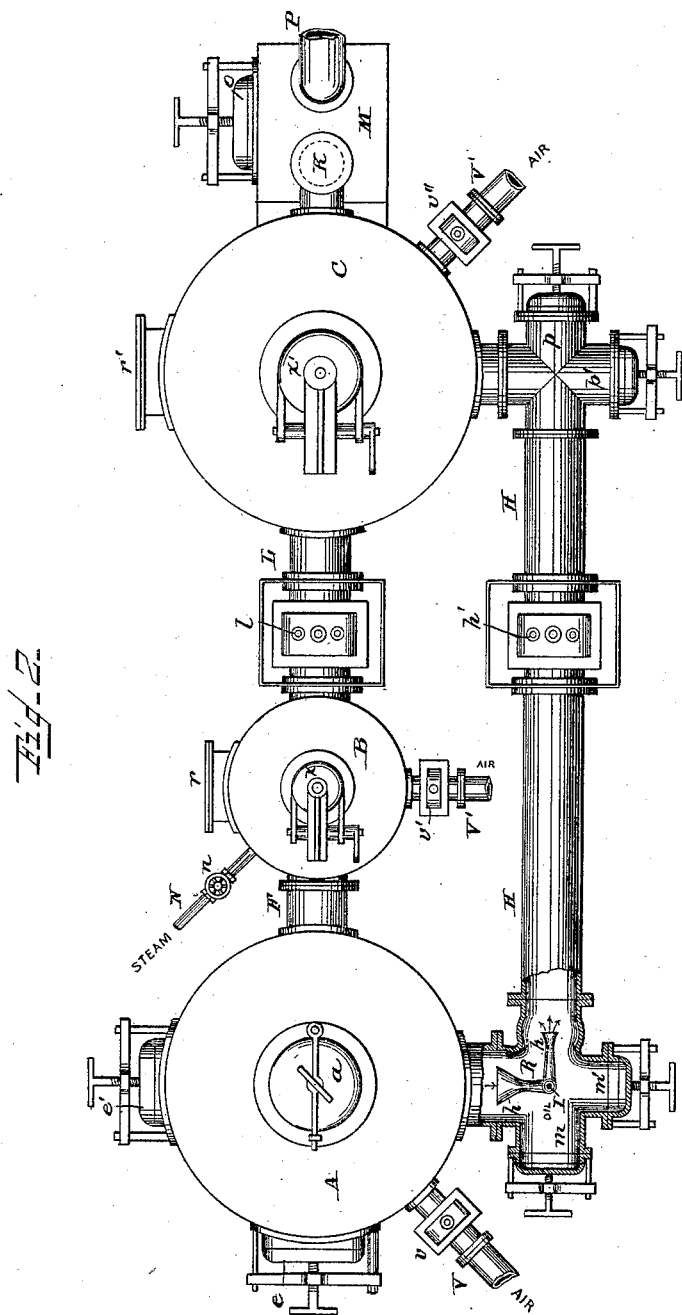
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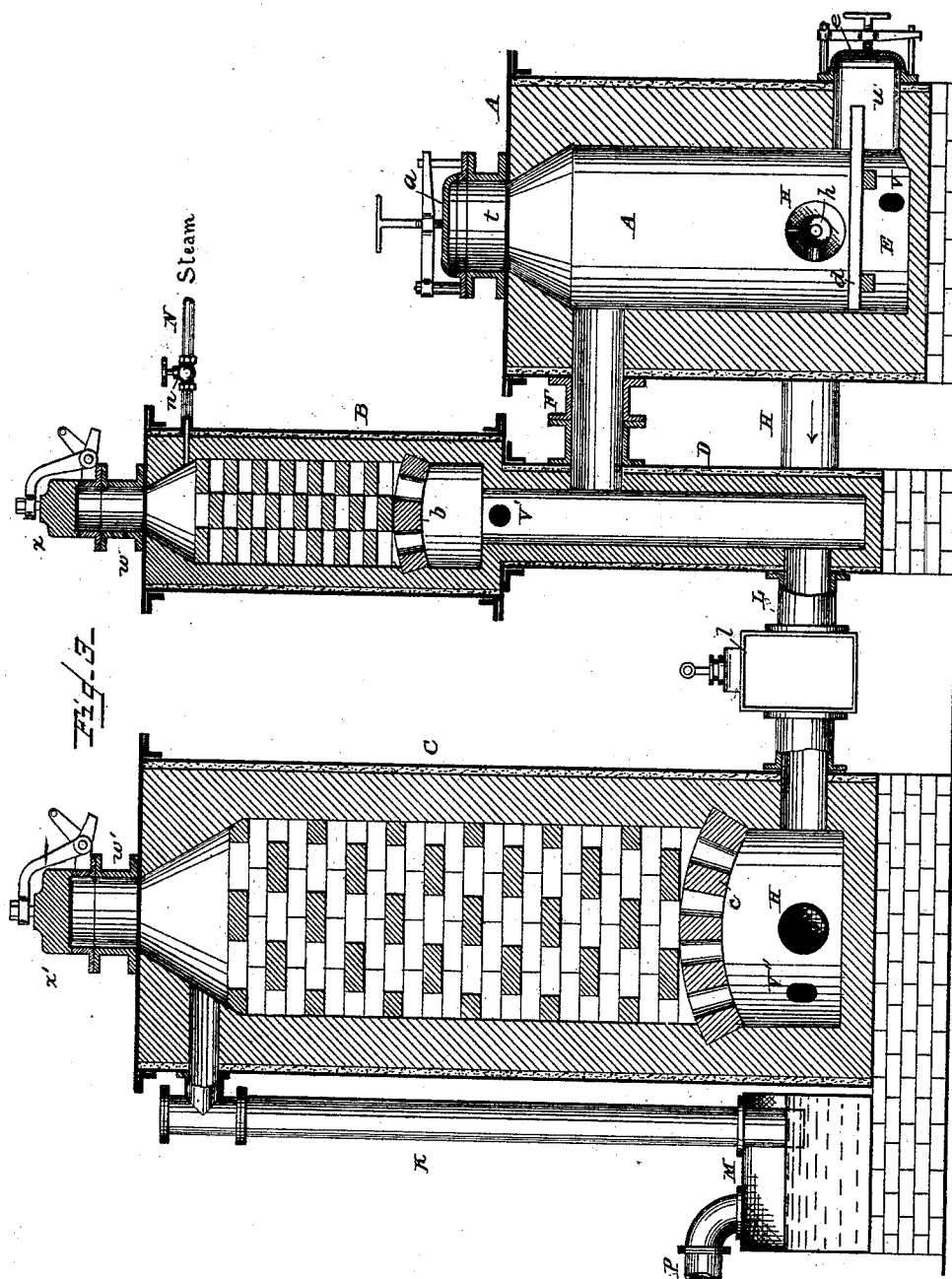
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att'y.

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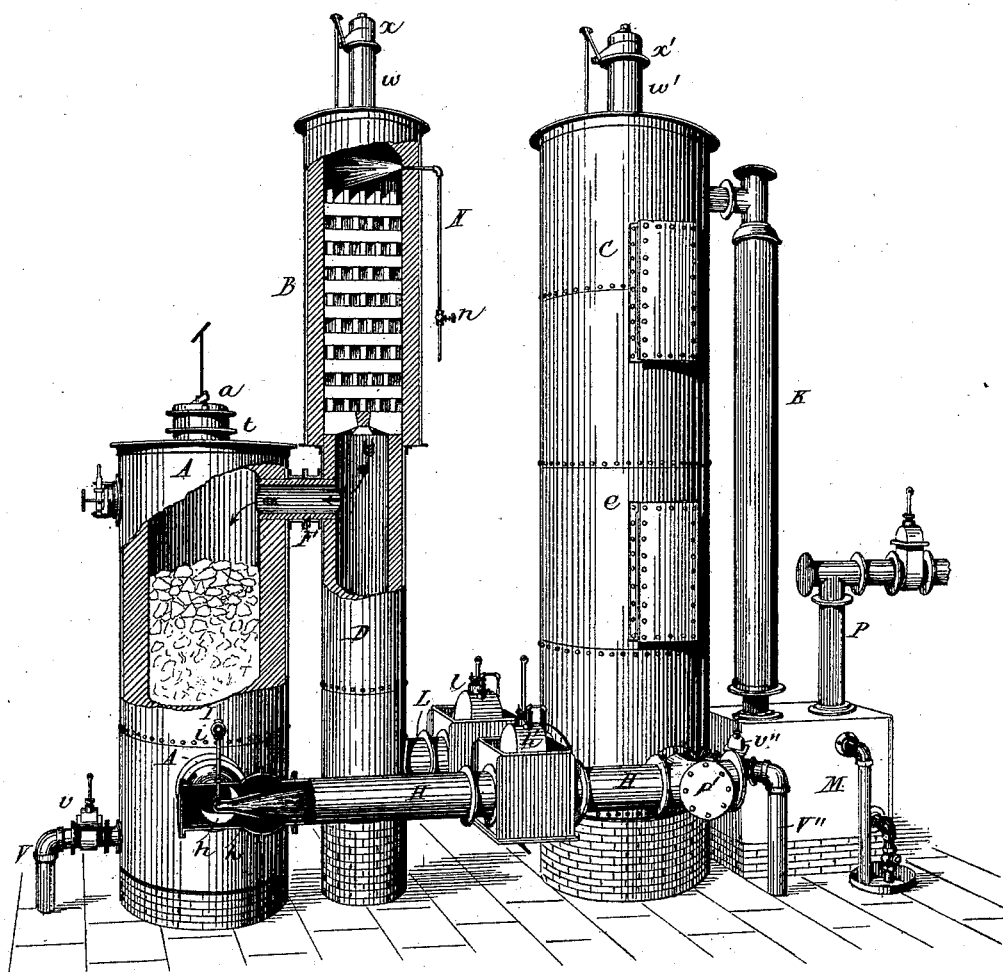
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Fig 4.



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UNITED STATES PATENT OFFICE.

JOHN HANLON, OF NEW YORK, N. Y.

APPARATUS FOR THE MANUFACTURE OF ILLUMINATING-GAS.

SPECIFICATION forming part of Letters Patent No. 418,017, dated December 24, 1889.

Application filed March 1, 1889. Serial No. 301,606. (No model.)

To all whom it may concern:

Be it known that I, JOHN HANLON, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus for Manufacturing Illuminating-Gas; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the manufacture of illuminating-gas in a furnace and fixing-chamber in connection with improved devices for enriching or carbureting the water-gas with hydrocarbon-oil vapor; and the object of the invention is to provide for more economically and uniformly mixing oil-vapor with hot water-gas without destructive decomposition and waste of oil which now commonly takes place when it is injected into the furnace above the body of fuel.

My invention embodies a peculiar construction and arrangement of a device for mixing part of the hot water-gas as generated with hydrocarbon oil and spraying it into the main body of passing water-gas in the gas-escape pipe leading from the generator; also, an improved construction and arrangement of the steam-superheater, the generator-furnace, the fixing-chamber, and the connecting-pipes, whereby a more effective and easily-managed apparatus is provided and improved results secured.

In the accompanying drawings, Figure 1 represents a side elevation of the apparatus, partly in section. Fig. 2 represents a top plan view thereof, also partly in section. Fig. 3 represents a vertical longitudinal section of the apparatus viewed from the side opposite to that shown in Fig. 1. Fig. 4 represents a sectional perspective view on reduced scale.

The generating-furnace A is constructed of fire-brick covered with a tight iron jacket, and is provided at the base with ash-pit E, grate d, ash-opening u, having a tight-fitting lid e, and air-blast pipe V, connecting with

the ash-pit. An opening is provided above the grate for removing clinker and is closed by a tight lid e'. (Seen in Fig. 2. At the top furnace A is provided with a charging-opening and iron neck t, having a tight-fitting lid a, secured by fastening devices in the usual manner. Pipe F connects generator A near its top with stand-pipe D, opening above into steam-superheater B. Superheater B is constructed of fire-brick, covered with an iron jacket, and is supported upon stand-pipe D, as shown. It is provided near its bottom with a perforated brick arch b, which supports the usual brick checker-work above, and at the top has a short iron neck w for escape of products of combustion, and is closed by cap x. A steam-supply pipe N, having valve n, connects with the top of superheater B, and an air-blast pipe V', having valve v', connects with the base thereof.

The combining and fixing chamber C is built of fire-brick upon a suitable foundation and is covered by the usual tight iron jacket. It has near its bottom a perforated brick arch c, which supports the brick checker-work above, and at the top is provided with short neck w', closed by cap x'. An air-blast pipe V'', having valve v'', Fig. 2, connects with the base of chamber C. Pipe L, having water-cooled valve l, Figs. 2 and 3, connects the lower end of stand-pipe D with the base of chamber C, so that gaseous products of combustion may be conducted directly from the top of generator A through pipes F, D, and L into the base of chamber C. A gas take-off pipe K leads from the top of chamber C to the hydraulic seal-box M, from which pipe P leads to the scrubber. (Not here shown.) Box M is provided with a side cleaning-opening closed by lid o. (Shown in Fig. 2.) Side doors r r' are also applied to superheater B and fixing-chamber C.

The outlet-pipe H for water-gas leads from the lower part of the fuel and generating chamber A, preferably just above the grate, as shown, and connects directly with the base of fixing-chamber C, and is provided with water-cooled valve h'.

The gas and oil mixing injector R is arranged in pipe H, preferably near its connection with the generator, though good results can be secured by locating it in other portions of the pipe; and I do not confine myself to locating it in any particular part of the pipe. The spraying-injector R is provided with a flaring or funnel-shaped mouth *h*, opening toward the furnace or supply end of pipe H for receiving a proportion of the passing gas, and with a discharge-nozzle *k*, directed toward the outlet end of pipe H. Oil-supply pipe I, having valve *i*, passes through a top plate on pipe H and connects with injector R at about its central portion, so that the intruding hot gas will catch the oil as it drops from the pipe and force it from the discharge-nozzle in the form of spray or vapor intimately mixed with the gas. When injector R is placed in the bend or angle of pipe H, it is made angular, as shown. The outwardly-projecting ends *m m'* of the four-way coupling-piece connecting pipe H with the furnace are provided with tight lids or caps, and the ends *p p'* of the four-way coupling-piece connecting pipe H with chamber C are also provided with tight-fitting caps, both sets of lids or caps having readily-removable fastening devices, so that access may be readily had to the oil-spraying device and to the interior of pipe H for repair and cleaning when required.

In order to manufacture gas, the fuel is ignited in generator A, valve *h'* is closed, the lids of the generator are closed at top and bottom, cap *x* of superheater B is opened, and the air-blast is admitted by pipe V into the fuel, causing its active combustion and heating it to incandescence. As combustible gaseous products are given off they pass up into the superheater B, where they are burned by a blast of air admitted through pipe V'. When chamber B is sufficiently heated, valve *l* and cap *x'* are opened and cap *x* is closed. The gaseous products now pass through pipes D and L into the base of chamber C, in which they are burned by a blast of air admitted by pipe V''. The order of heating chambers B and C may be reversed—that is, chamber C may be first heated and chamber B last heated. Chamber B is preferably heated to the higher degree, as it is to be used for superheating steam, which can receive no injury by a high heat, but on the contrary is more readily decomposed in the fuel-chamber, while chamber C is used for fixing oil-gas, which would be decomposed with the formation of lamp-black if subjected to an excessive heat. The body of fuel and the superheating and fixing chambers having been properly heated, the air-blasts are shut off, caps *x* and *x'* are closed, valve *l* is closed, and valve *h'* is opened, providing a direct communication between the generator and the combining and fixing chamber. Steam is now admitted into

the top of chamber B and is highly superheated in passing down in contact with the heated brick-work, and it then passes down into the body of incandescent fuel in generator A, where it is decomposed into hydrogen and carbonic oxide or water-gas. The hot water-gas flows partly into the wide bell-mouth *h* of the spraying-injector R and partly around the injector. As gas enters the injector, oil is admitted into it in regulated quantity by pipe I, and the gas, under considerable pressure, expels the oil from the contracted nozzle *k* of the injector in the form of spray or vapor into pipe H, where it readily mingles with the main body of gas, enriching it or carbureting it to the desired candle-power. The carbureted gas passes thence into the combining and fixing chamber C, in which it is converted into a homogeneous fixed illuminating-gas. The manufacture of gas is thus continued till the heat of the fuel and of the superheating and fixing chambers is too much reduced for effective operation, when the steam and oil are shut off and the fuel and chambers are again heated, as above described, for again making water-gas.

My method of spraying hydrocarbon oil by a portion of the hot water-gas into the main body of water-gas as it is generated has proved quite advantageous in practical operation, since the oil is much better vaporized and diffused through the whole volume of water-gas, the oil is less apt to be burned and wasted than when injected over the bed of fuel, and the detrimental effects of a jet of steam now generally used for injecting the oil is done away with. The steam used for injecting the oil in cupola gas-generators dilutes and reduces the quantity of the gas too much, since it is often only partially decomposed, resulting in the production of carbonic-acid gas, which must be removed by purification. These defects are removed by the use of my method and means for carbureting the water-gas.

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

1. The combination of the generating-furnace, the steam-superheater mounted on stand-pipe D, and fixing-chamber C, pipe F, connecting the top of the generator with stand-pipe D, pipe L, connecting the stand-pipe with the fixing-chamber, whereby products of combustion may be conducted from the generator into the superheating and fixing chambers, and gas-pipe H, leading directly from the base of the generator to the fixing-chamber, as and for the purpose described.

2. In combination with the gas-outlet pipe of the generator, the oil-spraying injector R, having a bell-mouth opening in the direction of the generator and a discharge-nozzle directed to the outlet end of the gas-pipe, and an oil-supply pipe connecting with the in-

jector, whereby the oil may be sprayed and vaporized by the passing hot water-gas.

3. In combination with the gas-outlet pipe H, leading from the generating-furnace to the oil-spraying injector, having bell-mouth *h* and discharge-nozzle *k* at right angles to the bell-mouth, and oil-supply pipe I, connecting with injector R at the angle, as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN HANLON.

Witnesses:

E. B. CLARK,
W. A. ROBERTS.