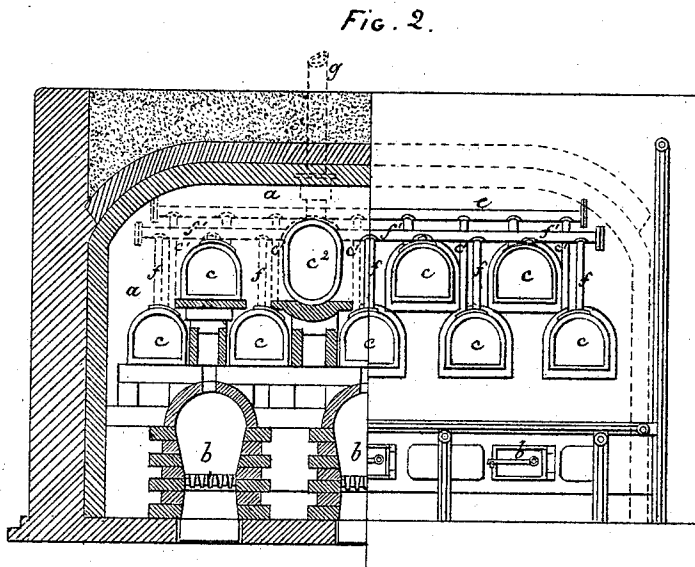
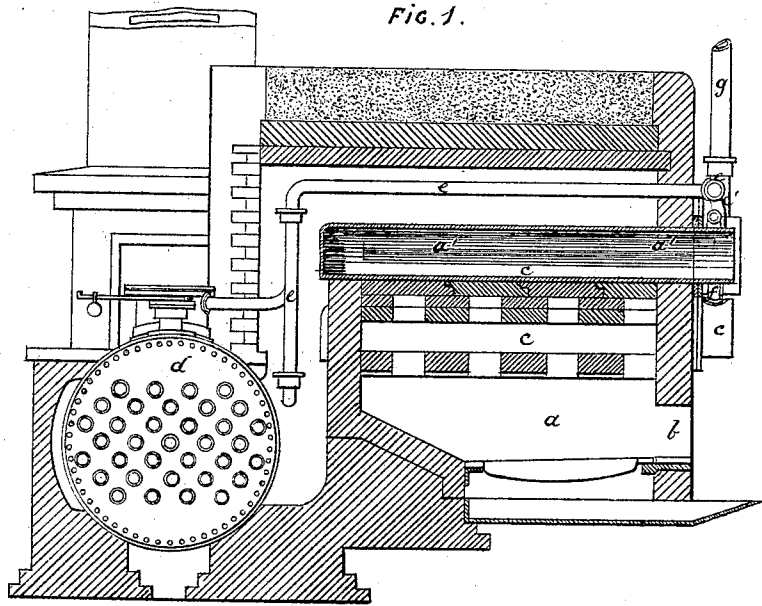


W. D. RUCK.
Manufacture of Gas.

No. 150,618.

Patented May 5, 1874.



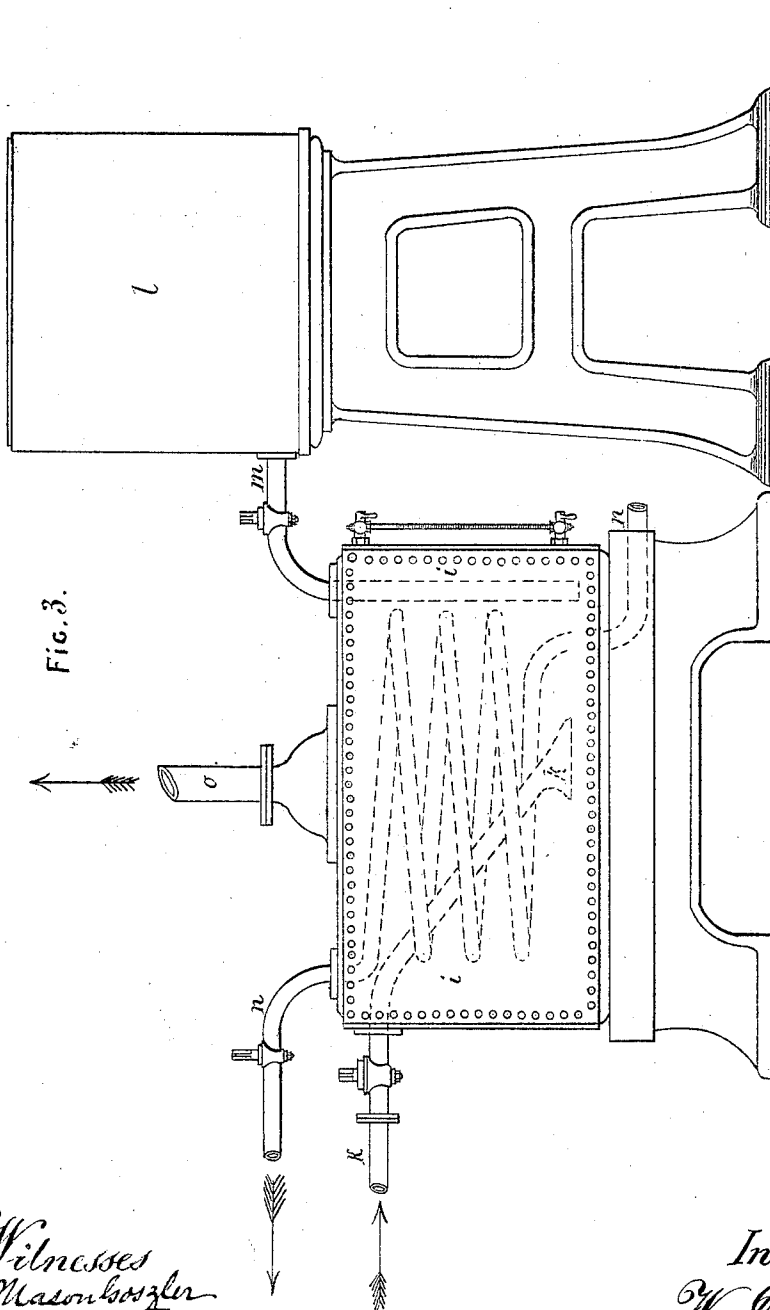
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UNITED STATES PATENT OFFICE

WILLIAM D. RUCK, OF LONDON, ENGLAND.

IMPROVEMENT IN THE MANUFACTURE OF GAS.

Specification forming part of Letters Patent No. **150,618**, dated May 5, 1874; application filed March 1, 1873.

To all whom it may concern:

Be it known that I, WILLIAM DENNY RUCK, of London, in the Kingdom of Great Britain, have invented certain Improvements in the Manufacture of Gas, of which the following is a specification:

The following description, taken in connection with the accompanying plate of drawings hereinafter referred to, forms a full and exact specification, wherein are set forth the nature and principles of the invention, by which the same may be distinguished from others of a similar class, together with such parts thereof as are claimed as new, and are desired to be secured by Letters Patent of the United States.

This invention relates to certain improvements in the manufacture of gas for heating or lighting purposes.

It is well known that, by passing currents of air through ordinary liquid hydrocarbon, a gas that is used for lighting, and sometimes for heating, purposes is produced.

The invention is designed, first, for the purpose of manufacturing or producing gas for heating purposes from the products of coal or other carbonaceous matter heated with iron, steel, or other metals, by the means and in the manner following: I propose to employ coal and its products, or any carbonaceous matter, in conjunction with iron, steel, and other metals, in scrap or otherwise. I place them, when so mixed, in retorts, ovens, or other receptacles, to be brought to a high temperature through the agency of external heat in the presence internally of superheated steam, by which means hydrogen, and oxide of carbon acid, and sulphureted hydrogen are produced.

In order to produce a large quantity of gas, I construct and employ a large furnace supplied with one or more sets of grates or fires, in which I arrange and support, in a pyramidal or other suitable form, (say, for example,) a stack or bench of nine retorts or chambers set in a position best adapted to receive the greatest amount of heat from the fuel of the furnace. Eight of these retorts I construct of one given size, which I fill with

the carbonaceous matters and metal or metals before mentioned, after which they are hermetically closed by their lids or covers, each retort being provided with a mouth-piece projecting from the front of the retort, and forming, when closed, a portion of the same. The ninth retort or chamber I make larger than the others, but connected with them, as described hereinafter. This retort is also filled with carbonaceous matters, or is so constructed that it can present a great amount of internal heating-surface—for instance, it may be constructed so as to have a number of tubes running through it similar to the tubes of a locomotive or multitubular boiler or other equivalent heating-surface—against or through which the heat of the furnace will impinge or pass in its course to the flue. Above these retorts, or on one side thereof, or in any other convenient position, in connection with the before-mentioned furnace, (or, if desired, in a separate furnace,) I place a boiler or boilers, in which steam is generated. A pipe from this boiler is connected with a superheating apparatus also set in the same furnace, the steam from which is conveyed by pipes into each of the eight retorts, which, when filled with the carbonaceous matter, scrap-iron, or other metals, are separately connected by a main or pipe, which conveys the products into the ninth or larger retort. The superheated steam (when the process of manufacturing gas is proceeding) enters the heated retorts containing the carbonaceous matters and metal through the medium of a pipe supported internally within each retort upon ledges, channels, or grooves that terminate within a few inches of the rear end of each retort, the superheated steam being caused to pass through and over the carbonaceous matters, and heated metal, and carbonic oxide, and hydrogen gases are generated. From each one of these retorts the gases so generated are conveyed, through the medium of connecting-pipes, to the main before mentioned, and thence into the ninth or larger retort, where any steam then remaining unconverted becomes thoroughly decomposed, and where, if

there be any carbonic acid or bisulphide of carbon present, they may be destroyed. The gas from this retort may be withdrawn by means of an exhauster, or other equivalent, and passed through a condenser of the ordinary or other convenient form into the receiver or gas-holder, where it is stored in the condition of a permanent gas, which may be employed for heating purposes.

This invention is also designed for the purpose of manufacturing illuminating-gas.

The hydrogen gas, prepared and heated as above described, is made into an illuminating-gas by the following process: A gas-holder, or receptacle containing hydrogen gas, prepared as above described, is connected by means of a pipe (having governing or regulating cocks or taps) with an ordinary gas-purifier and a closed chamber or receptacle. The closed chamber is supplied with hydrocarbon spirit, which should be a spirit which distils at from 50° to 70° of centigrade from a cistern containing the same through the medium of a pipe, and is regulated in its flow thereto by governing-taps. The receiving closed chamber is also supplied with indicators for regulating the height or quantity of spirit admitted, and a thermometer for indicating its temperature is attached thereto. The pipe forming the communication between the closed chamber or receptacle and the purifier and gas-holder terminates at a point in such chamber that will admit of its being constantly immersed in the spirit contained therein. This closed chamber is also provided with an internal coil, or other form of pipe, through which steam or hot air is caused to pass, to maintain the spirit contained in the chamber at one uniform temperature of about from 60° to 70°, or if desired other heating mediums may be employed for the same purpose.

Thus the gases, after having been prepared as before mentioned, will, when admitted into this chamber from the gas-holder, become impregnated with the spirit while passing through the same.

Care should be taken to prevent too low a temperature from being produced, as it will be found to prevent the absorption of the spirit; hence the necessity of the heating-medium, which must be governed so as to maintain the spirit or contents of the closed chamber at about the temperature above mentioned.

The hydrogen and other gases thus impregnated with the hydrocarbon spirit may be passed through a condenser filled with water, or other ordinary form of condenser, and thence into and through the service-pipes. These gases, previous to their passing through hydrocarbon spirit, may have great heating properties, and they only require a small amount of the said spirit to render illuminating. On this account the manufacture of my improved gas, being a permanent gas, is more

efficient and economical, having regard to the results produced, than the manufacture of what is ordinarily termed air-gas by the ordinary method.

Sheet 1 represents the improved arrangement of apparatus employed for producing heating-gas, in which Figure 1 represents a longitudinal section of the furnace containing the retorts, together with the boiler and superheater; and Fig. 2 represents a front elevation of the same, one-half of which is shown in section, Sheet 2. Fig. 3 represents in elevation the arrangement of apparatus employed for making the heating into an illuminating gas. *a* is the furnace supplied with fuel at the openings *b b b b*. Within this furnace the retorts *c, c, c, c, c, c, c, c, c, c* are supported in a position that will allow the heat to act well upon them. *d* is a boiler or steam generator, also placed in the same furnace and heated by it. *e* is a superheater—conveying steam from the boiler *d* to the retorts *c c c c c c c c c c*, through the medium of the pipes *c' c' c' c' c' c' c' c'*—which enters at the front and projects internally, as seen in Fig. 1, supported by the channels, ledges, or grooves *a' a'* to a point within a few inches of the back or rear of such retorts.

These retorts are all previously charged, before being hermetically closed, with carbonaceous matter and metal scraps, so that when heated by the furnace *b* and the superheated steam admitted, as before mentioned, hydrogen and oxide of carbon are formed. From these retorts gases so formed are conveyed by the pipes *f f f f f f f f f f* to the main or pipe *f'*, communicating with the larger retort *c'*, where any steam then remaining unconverted then becomes thoroughly decomposed. The gases from this retort pass through the pipe *g* to the hydraulic main, and thence through the condenser into the gas-holder, where they are stored as gases to be employed for heating purposes.

In Fig. 3, Sheet 2, is shown the special apparatus referred to for making heating into an illuminating gas. The gas is passed from the gas-holder through the purifier, if desired, into the closed chamber or receptacle *i* by means of the pipe *k*, the said chamber being supplied with hydrocarbon spirit from the cistern *l* through the pipe *m*. The spirit, by preference, should be of a specific gravity that distils at from 50° to 70° centigrade, and may be mixed with caustic soda, which neutralizes carbonic acid. The pipe *k* terminates in the vessel *i* at a point below the level of the spirit, an uniformity of temperature to the spirit being maintained through the medium of the heating-pipe *n*, through which steam or hot air is caused to pass, or the temperature of the spirit may be maintained by other equivalent or suitable means. The gases passing through the chamber *i* become impregnated

with spirit, and are thereby converted into an illuminating-gas and pass off through the pipe *o*.

Having now described the nature of the said invention, and in what manner the same is to be performed, I wish it to be distinctly understood, in conclusion, that what I claim as my invention is—

In combination with the boiler *d*, super-heater *e*, and retorts *c c*, &c., the large retort *c'*, in which any undecomposed steam or car-

bonic acid are converted into inflammable gases, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 13th day of February, 1873.

W. D. RUCK. [L. S.]

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