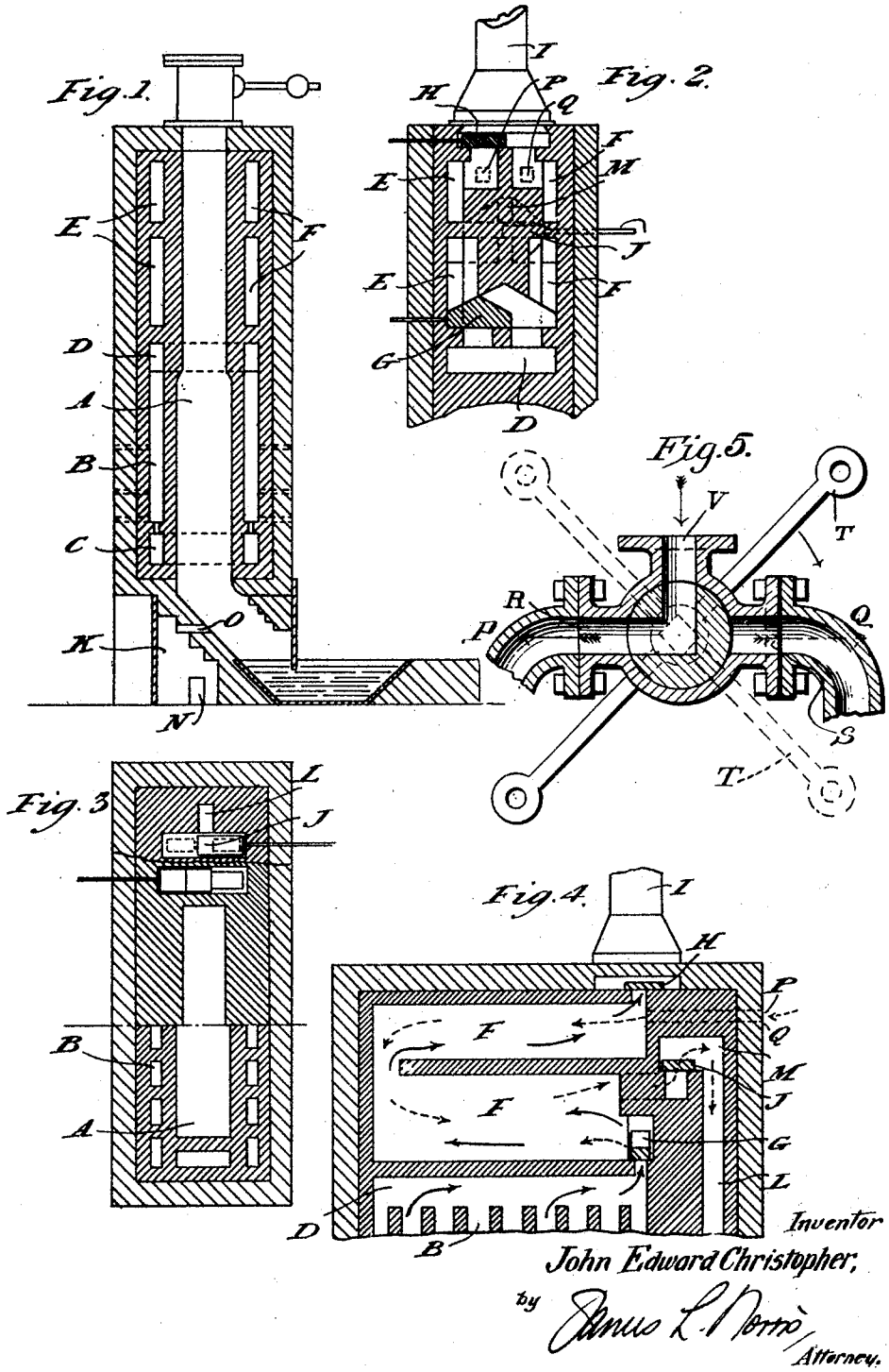
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APPARATUS FOR THE MANUFACTURE OF GAS.

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1,367,512. Patented Feb. 1, 1921.



UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE MANUFACTURE OF GAS.

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To all whom it may concern:

Be it known that I, JOHN EDWARD CHRISTOPHER, a subject of the King of Great Britain, residing in Maryport, England, have invented a certain new and useful Apparatus for the Manufacture of Gas, of which the following is a specification.

This invention relates to apparatus for the distillation, carbonization or gasification of coal, carbonaceous material, oil shales and the like and has for its object to provide an improved apparatus and method of working which is particularly economical and efficient.

According to the invention, the apparatus comprises a retort or chamber adapted to be heated by means of a suitable heating gas which is admitted together with air if necessary into a main external heating flue surrounding the retort. Two auxiliary chambers, flues or regenerative sections, or two series thereof, are arranged in connection with the main flue to receive the products of combustion from the main flue and thus further to heat the retort. Dampers or the like are so arranged that the products of combustion may be admitted to one or other of the auxiliary chambers or series thereof as desired. The heated products of combustion pass entirely through one or other of the auxiliary chambers or series thereof, giving up a portion of their heat, and pass finally into a chimney stack. During the period in which one auxiliary chamber or series thereof is being heated by the products of combustion, steam may be admitted into the upper end of the other auxiliary chamber or series thereof, and passes down into a suitable distributing chamber and thence into the retort, becoming superheated in its passage. The flow of the products of combustion and the steam is changed periodically after the known principle of the reversing type of regenerator systems by suitable dampers or the like. The introduction of superheated steam into the retort produces a highly beneficial action and greatly assists the process.

The auxiliary chambers, flues or regenerative sections may have a filling of suitably arranged heat retaining material such as bricks, for example, if desired.

To enable the invention to be fully understood, it will now be described by reference to the accompanying drawings in which:—

Figure 1 is a sectional elevation of a retort constructed according to one form of the invention;

Fig. 2 is a section through a portion thereof showing the arrangement of the dampers;

Fig. 3 is a sectional plan view;

Fig. 4 is a sectional side elevation of the top portion of the retort, showing the passage of the products of combustion and also of the steam in one of the auxiliary chambers or series thereof;

Fig. 5 is a sectional view of the valve for controlling the admission of steam to the auxiliary flues.

As shown in the drawings the lower portion of the chamber or retort A is heated by means of producer gas, coal gas or any other suitable gas which is admitted, with air if necessary, into a main external heating flue B at C. The products of combustion unite in a horizontal flue D and pass upward into one or other of the auxiliary regenerative sections, chambers or flues E or F according to the position of the dampers G and H. The heated products of combustion thus pass entirely through one or other of such auxiliary sections giving up a portion of their heat and finally emerging into a chimney stack I, after a substantial reduction in temperature. During the period in which one regenerative section is being heated by the products of combustion, steam may be admitted at the upper end of the remaining section, becomes superheated by contact with the previously heated walls and passes by reason of the position of the damper J through the port M into a vertical channel L, and issues from a port N into a distributing chamber K entering the retort itself through the passages O, and thereby acts as a means of transferring heat from the products of combustion of the gases in the flues B to the contents of the retort itself. The steam admitted to the auxiliary flues is con-

trolled by a valve of the type illustrated in Fig. 5. The steam enters at V and with the valve in the position indicated at T emerges through passage R to the port P. However, when the valve is in the position indicated by the dotted lines T' steam enters at V and leaves by the passage S which is connected to the port Q and the auxiliary flues F.

In Fig. 4 the passage of the products of combustion is indicated by full line arrows, the passage of the steam being indicated by dotted line arrows.

The flow of the waste gases and of the steam is changed periodically after the known principle of the reversing type of regenerative systems by means of the dampers G, H and J and a suitable two-way cock for the steam.

The dampers may be operated by means of rods, levers or the like so that G and H move simultaneously and in the same direction, the damper J being simultaneously moved in the opposite direction. A two-way cock is also arranged to be simultaneously operated to admit steam through the port P when the damper J is moved to the right in the position shown in the drawing, and through the port Q when the damper J is moved to the left.

Having thus described the nature of the said invention and the best means I know of carrying the same into practical effect, I claim:

1. A vertical retort, having a main external heating flue, a superposed auxiliary flue connected to said main flue on one side of the retort, a superposed auxiliary flue connected to said main flue on the other side of the retort, dampers for selectively cutting off one or the other of the auxiliary flues from the main flue, and means for admitting steam into the auxiliary flue so cut off, said retort having passage ways for conducting the steam from said auxiliary flue into the retort.

2. A retort having a main external heating flue, two auxiliary flues in connection therewith, controlling means whereby either of the auxiliary flues may be selectively cut off from the main heating flues, means for admitting steam into the auxiliary flue which is cut off from the main flue, and into direct contact with the heated walls thereof and gases therein and means for conducting said steam into the retort.

3. A retort having a main external heating flue, two series of auxiliary flues in connection therewith, controlling means whereby either series of auxiliary flues can be selectively cut off from the main heating flue and means for admitting steam in the series of auxiliary flues which is cut off from said main flue, said retort having passage ways for conducting said steam into the retort.

4. A retort having a main external heating flue, two auxiliary flues in connection therewith, controlling means whereby either of the auxiliary flues may be selectively cut off from the main heating flue, a steam cock for admitting steam into the auxiliary flue that is cut off from said main flue, and a steam distributing chamber in connection with the interior of the retort whereby heat may be conveyed by said steam from the walls of said auxiliary flues to the charge in the retort.

5. A retort having a main external heating flue, two series of auxiliary flues in connection therewith, controlling means whereby either series of auxiliary flues may be selectively cut off from the main heating flue, a steam cock for admitting steam into the series of auxiliary flues that is cut off from the main heating flue, and a steam distributing chamber in connection with the series of auxiliary flues and with the retort.

6. A vertical retort having a main external heating flue, a series of superposed auxiliary flues connected to said main flue on one side of the retort, a series of superposed auxiliary flues connected to said main flue on the other side of the retort, dampers for alternately cutting off each series of auxiliary flues from the main flue, a steam cock for admitting steam into one series of superposed auxiliary flues in direct contact with the heated walls thereof and gases therein and a steam distributing chamber in connection with the auxiliary flues and the interior of the retort.

7. A vertical retort having a main external heating flue, a series of superposed auxiliary flues connected to said main flue on one side of the retort, a series of superposed auxiliary flues connected to said main flue on the other side of the retort, dampers for selectively cutting off one series of auxiliary flues from the main flue, a steam cock for admitting steam into one series of auxiliary flues, in direct contact with the heated walls thereof and residual gases therein and a steam distributing chamber in connection with the auxiliary flues and the retort, whereby the superheated steam and residual gases are conducted to the interior of the retort.

8. An apparatus for introducing heat into the charge of a retort having a main external heating flue surrounding a portion of said retort, two auxiliary heating flues located above said main flue and on opposite sides of said retort, dampers for alternately closing the passage ways between the main flue and each of said auxiliary flues, means for passing steam into the auxiliary flue which is disconnected from the main flue, said steam being in direct contact with the heated auxiliary flue and the residual gases therein, and a distributing chamber connected with the auxiliary flues for admitting the

superheated steam and residual gases to the interior of the retort.

9. The method of introducing heat into the charge of a retort which consists in passing heated products of combustion in a confined body about the exterior of the retort, discontinuing the flow of such gases, introducing steam about the exterior of the retort and then introducing the residual gases from said confined body into the retort with the superheated steam.

In testimony whereof I have signed my name to this specification.

JOHN EDWARD CHRISTOPHER.