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J. U. McDONALD

PROCESS OF PRODUCING GAS

Filed Dec. 15, 1920

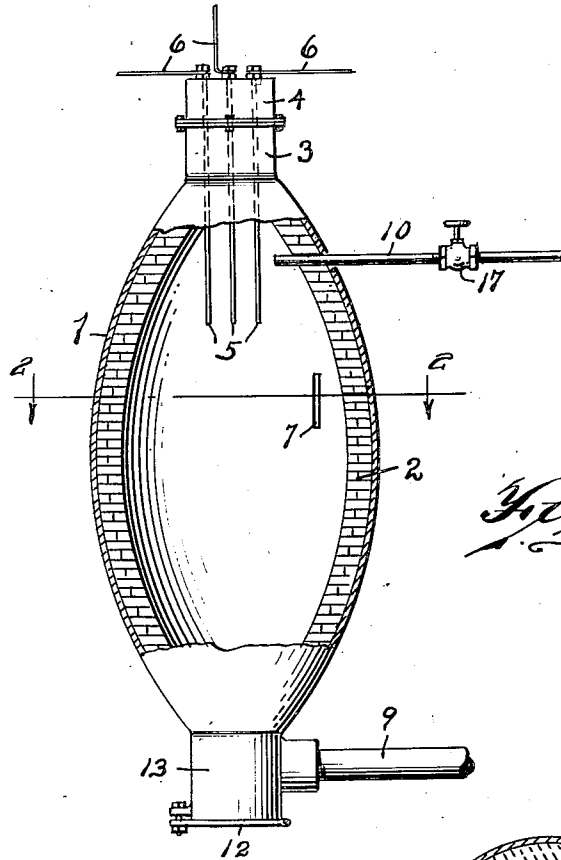


Fig. 1

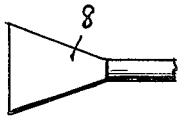


Fig. 4

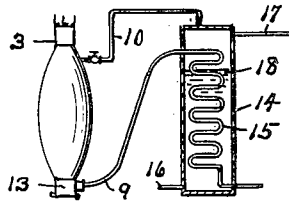


Fig. 3

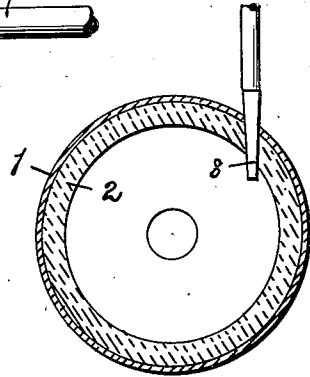


Fig. 2

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JOHN U. McDONALD, OF DECATUR, ILLINOIS.

PROCESS OF PRODUCING GAS.

Application filed December 15, 1920. Serial No. 431,002.

To all whom it may concern:

Be it known that I, JOHN U. McDONALD, a citizen of the United States, and residing at Decatur, in the county of Macon and State of Illinois, have invented a new and Improved Process of Producing Gas, of which the following is a specification.

This invention may be carried out in a normally closed chamber with electrodes extending into it so as to produce great heat therein by the electric arc between the points of the electrodes, means being provided for introducing carbonaceous material such as mineral oils or powdered coal, and means being also provided for injecting steam so that it may be disassociated by the intense heat within the chamber and the oxygen and hydrogen combine with the carbon, and thereby constituting a complete and continuous gasification of the fuel.

This invention is preferably carried out in the retort shown in the drawing, in which Fig. 1 is a central vertical section of the retort. Fig. 2 is a section on the line 2—2 of Fig. 1. Fig. 3 is a diagram showing how the waste heat of the gas may be utilized. Fig. 4 is an elevation of a spray nozzle.

Similar reference characters refer to like parts throughout the several views.

The ellipsoidal chamber shown in Fig. 1 is here called a retort for want of a better name, but it approaches an electric furnace in structure. It is formed with an outer shell 1 of sheet steel and a lining 2 of refractory material. The upper neck 3 is fitted with a cap 4 to support the electrodes 5, preferably one for each phase of current, lead wires 6 being shown at the top of the cap. If three electrodes are employed they will preferably be at the points of an equilateral triangle.

Mineral oil may be blown under pressure into the zone of intense heat just below the points of the electrodes through the opening 7, the nozzle 8 being set at such an angle that the spray and the gases formed therefrom will whirl around until they reach the bottom of the retort and pass out through the pipe 9. I prefer, however, to blow powdered coal into the retort through this opening 7, steam or gas being used as the vehicle, providing additional steam by the pipe 10 to combine, when broken up, with the fixed carbon in the bottom of the retort to produce commercial gas. The hydrogen of the

steam becomes liberated and may in part combine with part of the carbon to form light hydrocarbons while the oxygen combines with the remainder of the fixed carbon to form carbon monoxide, thus generating heat, which assists the electric arc in keeping the interior of the retort at the desired temperature and at the same time causes complete gasification of the carbon and the other combustible constituents of the fuel acted upon in a continuous manner. A door 12 at the bottom neck 13 of the retort permits removal of ashes.

The gases which escape are very hot and the heat may be recovered in any desired manner; as an example, it may be used to make steam as indicated in Fig. 3, a boiler 14 having a coil 15 of gas conductor extending down through the water 18 therein. An inlet pipe 16 provides water and the pipe 17 conducts away the steam. The steam pipe 10 may extend from this boiler to the retort and the steam may be controlled by the valve 17.

The details of construction of the retort may all be changed by those skilled in the art without departing from the spirit of my invention as set forth in the following claims.

I claim:—

1. The process of producing gas which consists in producing an electric arc at a point in the axis of an ellipsoidal retort, and forcing carbonaceous material into the retort in such a manner as to constitute a vortex whose upper center is at the electric arc, the gas generated by the heat of the arc passing out at the bottom of the retort.

2. The process of producing gas which consists in producing an electric arc at a point in the axis of an ellipsoidal retort, and forcing carbonaceous material into the retort through a nozzle set at such an angle that the spray and gases formed therefrom will whirl around the electric arc and then pass down, the fixed carbon settling to the bottom of the retort and the gases passing out through the hot fixed carbon.

3. The process of producing gas which consists in producing an electric arc at a point in the axis of an ellipsoidal retort, and forcing carbonaceous material into the retort through a nozzle set at such an angle that the spray and gases formed therefrom will whirl around the electric arc and then

- pass down, the fixed carbon settling to the bottom of the retort and the gases passing out through the hot fixed carbon and passing steam into the retort which steam becomes broken up when passing through the hot fixed carbon in the bottom of the retort, the hydrogen becoming liberated and the oxygen uniting with the fixed carbon to form carbon monoxide.
- 10 4. The process of producing gas which consists in producing an electric arc within a retort and forcing carbonaceous material into the retort in such a manner as to constitute a vortex whose axis passes through
- 15 the electric arc.
5. The process of producing gas which consists in producing an electric arc within a retort and forcing carbonaceous material into the retort through its side wall in such a manner as to constitute a vortex whose axis passes through the electric arc, the gas generated by the heat of the arc passing out at the bottom of the retort.
6. The process of producing gas which consists in producing an electric arc within a retort and forcing carbonaceous material into the retort in such a manner as to constitute a vortex whose axis passes through the electric arc, steam being supplied to the retort adjacent said arc.

JOHN U. McDONALD.