

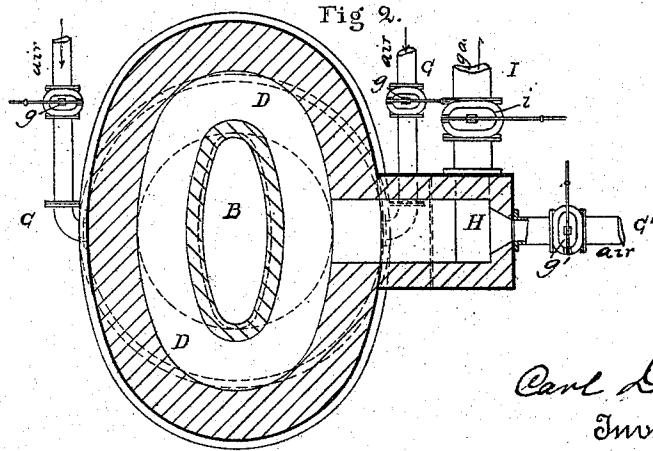
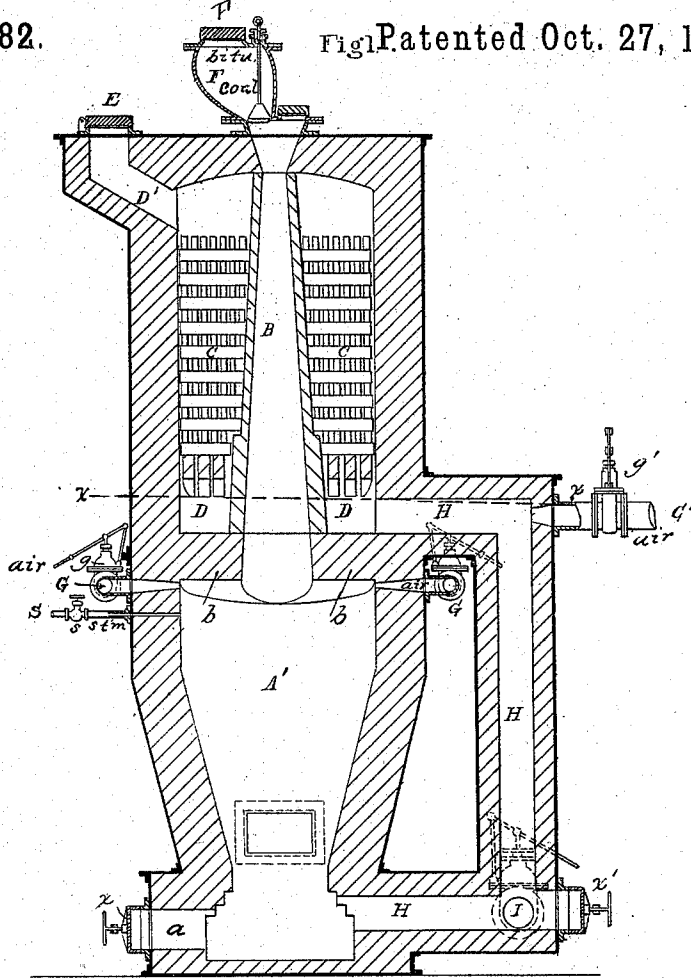
(No Model.)

C. DELLWIK.

APPARATUS FOR MANUFACTURING FUEL GAS.

No. 570,382.

Fig 1 Patented Oct. 27, 1896.



Witnesses
Albert R. Moore
John Jenkins Jr.

Carl Dellwik
Inventor

E. B. Clark
Atty.

UNITED STATES PATENT OFFICE.

CARL DELLWIK, OF ROGERS PARK, ILLINOIS.

APPARATUS FOR MANUFACTURING FUEL-GAS.

SPECIFICATION forming part of Letters Patent No. 570,382, dated October 27, 1896.

Application filed August 14, 1890. Serial No. 362,038. (No model.)

To all whom it may concern:

Be it known that I, CARL DELLWIK, a subject of the King of Sweden and Norway, residing at Rogers Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Processes of and Apparatus for the Manufacture of Fuel-Gas, of which the following is a description.

This invention relates to apparatus for manufacturing fuel-gas.

The object of my invention is to provide for the economical production of fuel water-gas from bituminous coal or from fuel containing volatile matter, such as hydrocarbons, in addition to carbon in solid form; and a more particular object is to provide for heating to incandescence a body of fuel in the decomposing-chamber of the generator by burning at the top thereof, by means of a current of air, gases resulting from the distillation of coal in a separate retort and passing the resulting flame and hot gaseous products down through said body of fuel. The hot gaseous products passing from the base of the decomposing-chamber are utilized for coking and distilling coal by passing them through a flue or chamber surrounding the distilling and coking retort. After the body of fuel in the decomposing-chamber has been properly heated, combustion of gas in contact therewith is stopped by shutting off the air and then steam and coal-gas are passed down through the body of fuel and decomposed, resulting in a mixture of hydrogen, marsh-gas, and carbonic oxid.

By my method of conducting the operation the body of solid fuel in the decomposing-chamber is consumed to a very small extent during the periods of heating it, since the gases generated by distillation of coal in the coking-retort are more readily burned and serve for effectively heating said solid fuel, whereby a largely-increased proportion thereof is utilized for decomposing steam and consequently increasing the yield of water-gas.

The matter constituting my invention will be defined in the claims.

In the accompanying drawings, Figure 1 represents a vertical section of the generating apparatus. Fig. 2 represents a horizontal section on line $\alpha\alpha$.

My generating apparatus is preferably in

the form of a cupola-furnace constructed of brick, having a lining of fire-brick and inclosed within a tight iron shell or jacket in the usual manner. It is divided by a horizontal arch or partition b into the decomposing and fuel chamber A' at the bottom and a heating-chamber C at the top, within which is arranged a distilling and coking retort B . The partition b is closed except at the opening for forming a communication with retort B and serves for supporting such retort. The retort B is preferably tapered longitudinally and may be elliptical in cross-section, as shown in Fig. 2, and is entirely surrounded by chamber C . This chamber C is preferably filled with loosely-laid fire-brick or other refractory material in the form of checkerwork supported a short distance above the partition b , so as to form an annular or elliptical flue D , which serves as a combustion-chamber.

The brickwork in chamber C entirely surrounds the retort B and serves for absorbing heat from the waste gases for the purpose of heating the coal in retort B , and thereby distilling and coking the same. An outlet-flue D' leads from the top of chamber C and is provided with a tightly-closing lid or valve E for controlling the escape of products of combustion. The retort B is provided at the top with a fuel-feeding hopper F and also with a lid F' for the insertion of a bar to regulate the fuel.

The base of the fuel and decomposing chamber A' is connected by a brick-lined flue H with the lower end of chamber C , preferably at the annular flue D , above the partition b , as shown in Fig. 1, for the passage of gaseous products, as hereinafter more fully described. The base of combustion-chamber A' is provided with an ash-opening a , having a tight-fitting lid α , and the lower horizontal portion of flue H is provided with a tightly-closing lid α' , which may be opened for cleaning the flue. Air-supply pipes G , G , having valves g , g , connect with the top of the fuel and decomposing chamber A' for supplying air to support combustion of gases generated in retort B when it is desired to heat the body of fuel in chamber A' , and an air-supply pipe G' , having valve g' , connects with the upper end of flue H for supplying air to support combustion of waste gases for

heating retort B and the surrounding brickwork in chamber C. A steam-supply pipe S, having valve *s*, connects with the top of chamber A'. A gas-take-off pipe I, having valve *i*, connects with the end of flue H, which connects with the base of the fuel and decomposing chamber A' for conducting fuel-gas to a holder or to a place of immediate use.

The operation of the apparatus is as follows: A fire is first kindled in the lower part of chamber A', and after a sufficient body of fuel has been ignited such chamber is filled with coke or hard coal. When this body is sufficiently ignited, air is admitted through pipes G G, causing active combustion of fuel and forming producer-gas, which passes out through the base of chamber A', thence through flue H into the base of chamber C. So soon as this gas is sufficiently hot to ignite, an air-blast is admitted through pipe G', causing combustion of the gas in the annular flue or chamber D, from which the hot products pass up and heat the brickwork in chamber C, also retort B, and finally escape through flue D', the valve E of which is open. When the retort has become well heated, it is filled with bituminous coal by means of hopper F. Since the coal is exposed to the high temperature of coking-retort B and the surrounding brickwork in chamber C, distillation soon commences and the resulting volatile vapors and gases pass down into the top of chamber A', where they are met by currents of air admitted through pipes G G. As the gases from retort B are already highly heated they unite with the oxygen of the air more readily than does the solid fuel, and they are therefore rapidly burned, while the fuel is now consumed to a very slight extent.

Since the partition *b* is closed, except at the communication with retort B, the flame and hot gaseous products resulting from combustion of the coal-gases are passed down through the body of fuel in chamber A' with the result of rapidly heating it to incandescence. The gaseous products continue to pass off from the base of chamber A' through flue H, and as they still contain combustible matter a supply of air is conducted through pipe G', causing complete combustion of said gases. The heat is stored in the brick checkerwork in chamber C, and is subsequently utilized for continuing the coking and distilling operation in retort B after the air-blasts have been shut off and at the time when steam is being decomposed in the body of fuel in chamber A'. The body of fuel in chamber A' having been heated to the proper temperature, the valves in air-pipes G G are closed, valve E is closed, and valve *i* in gas-take-off pipe I is opened. Steam is now admitted through pipe S, which mixes with the coal-

gas still being generated in retort B, and the mixture passes down through the body of heated fuel in chamber A', where the steam is decomposed and the coal-gas is fixed, resulting in a mixture composed principally of hydrogen, carbonic oxid, and marsh-gas, which mixture passes off through pipe I to a holder or to a furnace for immediate use.

The manufacture of fuel-gas is continued as above described until the body of fuel in chamber A' is cooled below the proper temperature for effectively decomposing steam, at which time the steam is shut off, valve *i* closed, valve E opened, and the valves of the air-supply pipes opened.

Since coal-gas is still being generated in retort B it is ignited by admission of currents of air through pipes G, and the resulting flame and hot products are again passed down through the body of fuel in chamber A' for heating it to incandescence. The heat of the waste gaseous products is again stored in the refractory brickwork around retort B and continues the heating of such retort for the distillation of coal. After the body of fuel in chamber A' and the other parts of the apparatus have been properly heated, the air-blast is shut off, the valves properly regulated, and fuel-gas again manufactured, as above described.

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

1. In an apparatus for manufacturing gas; the combination with the fuel and decomposing chamber A', of the distilling and coking retort B, chamber C, filled with brick checkerwork, surrounding said retort, a closed partition *b*, around the lower end of said retort and between chamber A' and C, the flue H, connecting the base of chamber A' with the bottom of chamber C above the partition a pipe admitting air to burn the waste gases and an air-supply pipe connecting with the top of chamber A', below said partition, substantially as and for the purpose described.

2. In an apparatus for manufacturing gas the combination with the fuel and decomposing chamber A', of the distilling and coking retort B, chamber C, filled with brick checkerwork, surrounding said retort, solid partition *b*, around said retort flue H, connecting the base of chamber A' with the bottom of chamber C, an air-supply pipe G, and steam-supply pipe S, connecting with the top of chamber A', and a gas-take-off pipe I, connecting with the base of chamber A', substantially as and for the purpose described.

CARL DELLWIK.

Witnesses:

ALFRED LOCKWOOD BROWN,
JOHN E. DREW.