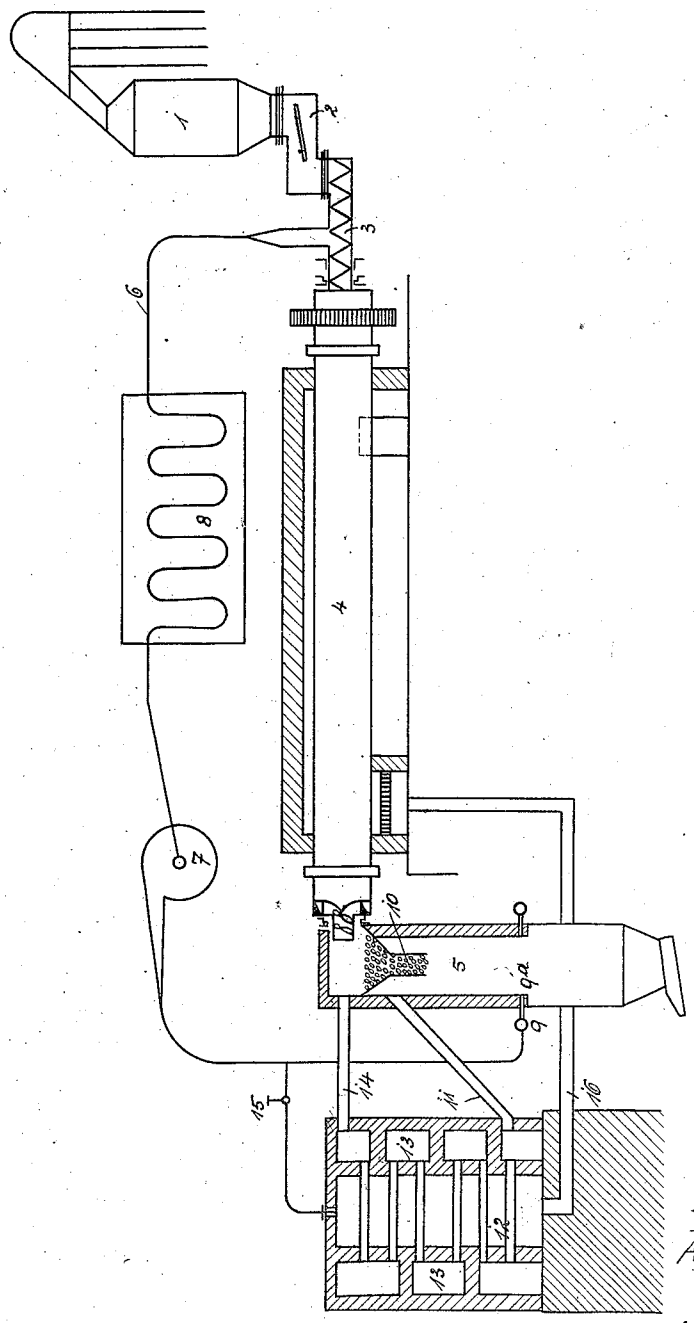
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PROCESS AND APPARATUS FOR PRODUCTION OF COKE AT A LOW TEMPERATURE

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PROCESS AND APPARATUS FOR PRODUCTION OF COKE AT A LOW TEMPERATURE.

Application filed February 16, 1921. Serial No. 445,545.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, ALBIN BERTHOLD HELBIG, citizen of the German Republic, and resident of Berlin, Germany, have invented certain new and useful Improvements in Processes and Apparatus for Production of Coke at a Low Temperature.

The invention has for its object an improvement in the distilling of coal at low temperature, by which this process can be carried out on a large scale.

One of the economic consequences of the war has been increased importance of the distilling of coal. The distilling at low temperature generates a coke with more valuable properties than the one obtained at high temperature. The coke is soft and porous and contains a part of the original volatile matter of the coal, especially hydrogen.

During the process the greatest care must be taken not to overheat the material by surpassing the temperatures allowed at the low-temperature-distillation.

Under the provision of the application the coal is treated in a retort heated outside and inside. The internal heating is effected by a current of gas, produced by the distillation of the coal. This gas moves in a closed circuit and from this the superfluous gas is taken away and used as further described.

The external heating of the rotary drum superheats and ruins in a very short time the iron shell, unless care is taken to maintain the temperature below the danger point of iron, below 500 to 550 degrees centigrade. The heat-transmission through the shell is limited and therefore also the production of coke or the output of the retort. The present invention utilizes both external and internal heating with the object of increasing the output. The internal heating must also be carefully done.

If combustion gases would be used for the internal heating, carelessness on the part of the fireman would result in overheating the drum and the destruction of the hydrocarbons or set the whole content afire. The free oxygen of the firegases would combine with the distillation gases and reduce very materially the commercial value of the byproducts. The heating value of the permanent gases of the distillation would be lost, as a mixture with the combustion gases would decreas the heating value to such an extent, that the mixture could not be used any more for combustion purposes.

All these difficulties are avoided by my process. The distillation gases leaving the rotary drum are drawn through the condenser, which condenses the byproducts, while the permanent gases partly return to the retort and partly are burned to generate the necessary heat for the process as hereinafter described.

One method of carrying out the present invention is shown in the accompanying drawing, by way of example, which is a diagrammatical view of the whole apparatus.

The raw coal is conveyed to a receiver *i* by a suitable carrier. A distributor 2 feeds the coal in quantities regulated as required into a revolving retort 4. The coal travels forward in the axis of a worm 3 which carries it along. The retort end of the worm connects with the said retort, the joint being well packed so as to make it perefectly tight. The retort revolves in its frame in the usual manner, the rotation is governed by any suitable gear. The retort may lie in a horizontal position or be inclined. Its inclination and the speed at which it revolves are regulated according to the rate of distillation and in such a way as to ensure, that the coal shall not leave the heated part of the retort before the distillation process is complete. In order that the operation may be carried out satisfactorily, care must be taken, that the retort is well plugged at both ends so that the interior is as tight as possible. With this end in view the outlet end is provided with a discharge device (shown in the drawing) which fits into the neck of the retort, the diameter of the said neck being less than the diameter of the retort itself in order to facilitate plugging. This discharge device has another advantage in that it enables the level of the coal in the retort to be varied and

thereby assists in regulating the distillation.

The external heating of the retort is effected in the usual manner by means of a furnace of the grate type walled in brickwork and by the waste gases of the gas heater.

The gases from the retort are exhausted by an exhauster 7 through the pipe 6 and pass through a condenser 8 surrounded by water or any suitable refrigerant. The mixture of noncondensable gases, containing little or no oxygen, is pressed by the exhauster through the conduit 9 and a number of nozzles 9^a into the well 5, a little above its center. The raw coal in the receiver *i* must be kept at a sufficient height to prevent any air from percolating through into the current of gas.

The coke collected at the bottom of the well keeps the installation air tight at that end. The coal gases coming from the condenser 8 are heated by the heat of the coke and the otherwise lost heat of the coke is utilized for the process.

The internal heating of the retort may be produced by a current of gas circulating in either direction. By changing the speed at which the exhauster revolves the velocity of the gas current can be modified at will. If, as a result of a lack of care, air should enter the apparatus, such air would be removed by the exhauster. Its oxygen would be burned by the hot coke in well 5.

The coke falling out of the retort 4 is caught in a hopper 10 and forms a barrier in the way of the gases to the retort. The gases passing through the coke and cooling it accumulate in the free space under the hopper 10, they are drawn by the suction of the fan through the conduit 11, the inside of the heating tubes 12 of a gas heater 13 and the tube 14 into the retort 4. The surplus gas is taken away by the bypass 15 and can be used for the generation of the necessary heat in the gas heater or for any other purpose.

The waste gases of the gas heater go through the conduit 16 in the brickwork around the rotary retort and heat the latter from the outside. If the amount available is not sufficient the necessary excess of heat for the external firing can be generated on the fire place shown on the drawing.

The advantages of the process are:

1. The increase of the output of the retort.

2. The utilization of the waste heat of the coke.

3. The absolute control of the temperature in the retort.

4. The very much longer life of the retort.

In order to overcome resistance, it may be necessary to employ a second exhauster in the circuit.

What I claim is:

1. The herein described process of coke production at low temperature in a distillation chamber consisting in heating bituminous matter in the chamber to produce low temperature permanent gases, withdrawing the permanent gases of distillation from the distillation chamber and dividing said gases into two parts, burning the first part of these gases to superheat the second part, passing the residual gases of the combustion of the first part to the chamber to heat the latter exteriorly, and the superheated gases of the second part to pass over the incandescent products passing from the chamber and conducting these gases to the inside of the chamber for heating it interiorly.

2. Apparatus for coke production at a low temperature comprising a revolving retort having a coke discharge end, means for heating the outside of the retort, means for feeding coal to the retort, a well for receiving coke from the discharge end of the retort, a pipe connected at one end to the end of the retort opposite the discharge end and connected at its opposite end to the well at a point midway the height of the latter, an exhauster connected with said pipe, a superheater including heating tubes, a branch line connecting the pipe, at a point between the exhauster and the well, with said superheater, a pipe for conveying the gases circulating on the outside of the tubes of said superheater to the retort heating means, a hopper in the upper part of the well, means connecting the well below the hopper with the tubes of the superheater, and means connecting the tubes of the superheater with the well at a point above the hopper.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

ALBIN BERTHOLD HELBIG.

Witnesses:

GEORGE MELIEG,

R. ESTÉVEZ DE PENCA.