United States Patent

Wenzel et al.

[15] **3,671,402**

[45] **June 20, 1972**

[54] FLUIDIZING BED COKING METHOD OF BROWN COAL

[72] Inventors: **Werner Wenzel,** Aachen; **Hans Penning,** Cologne Lindenthal, both of Germany

[73] Assignee: **Rheinische Braunkohlenwerke AG,** Koln, Germany

[22] Filed: **April 29, 1970**

[21] Appl. No.: **32,891**

[30] **Foreign Application Priority Data**

April 29, 1969 Germany .....P 19 21 710.8

[52] **U.S. Cl.**.....**201/15,** 201/27, 201/31, 201/42, 201/6

[51] **Int. Cl.** **C10b 49/10**

[58] **Field of Search**.....201/27, 13, 14, 15, 16, 31, 201/42, 32, 36, 37, 38; 110/28 J, 8; 202/121

[56] **References Cited**

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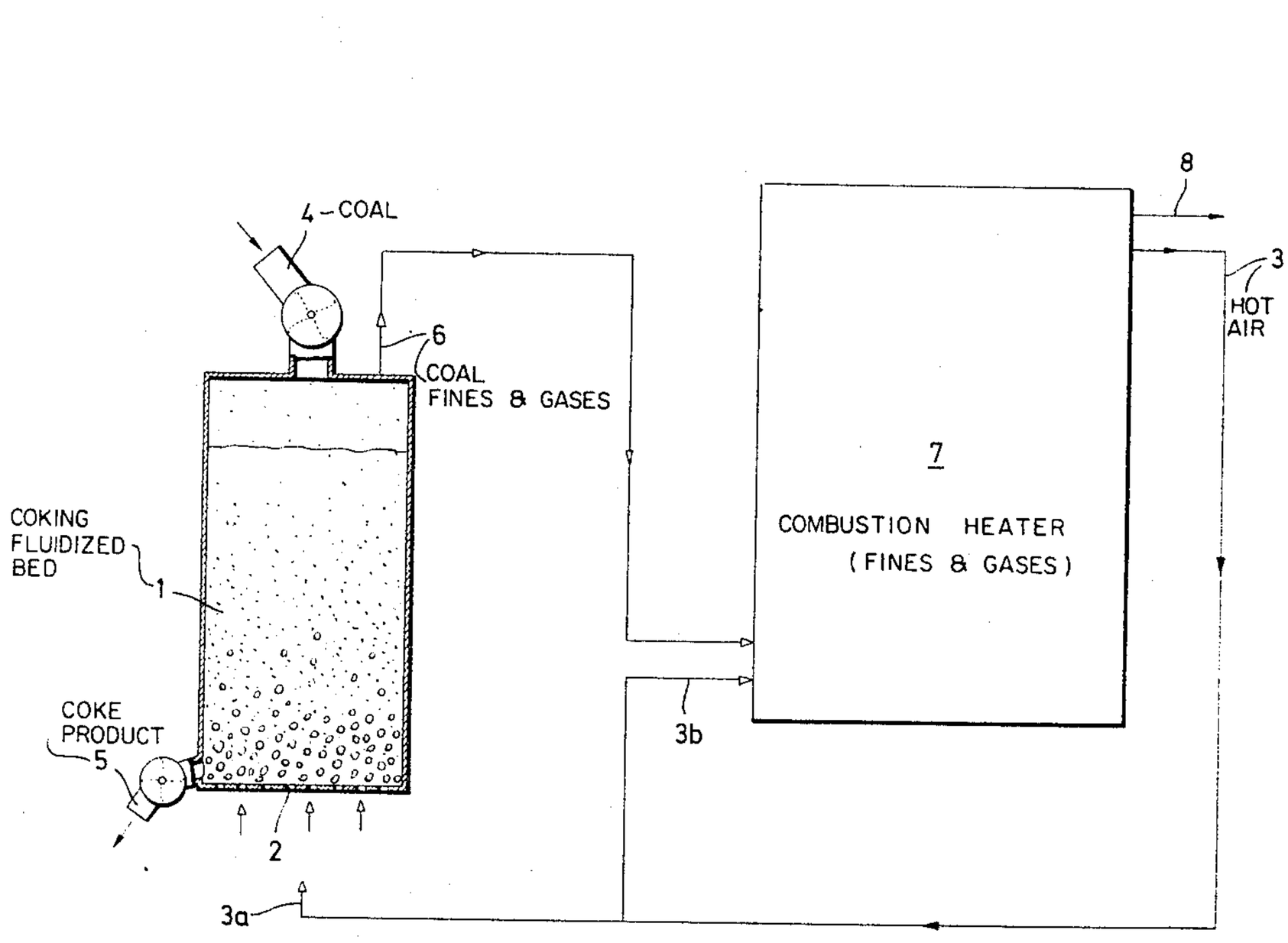
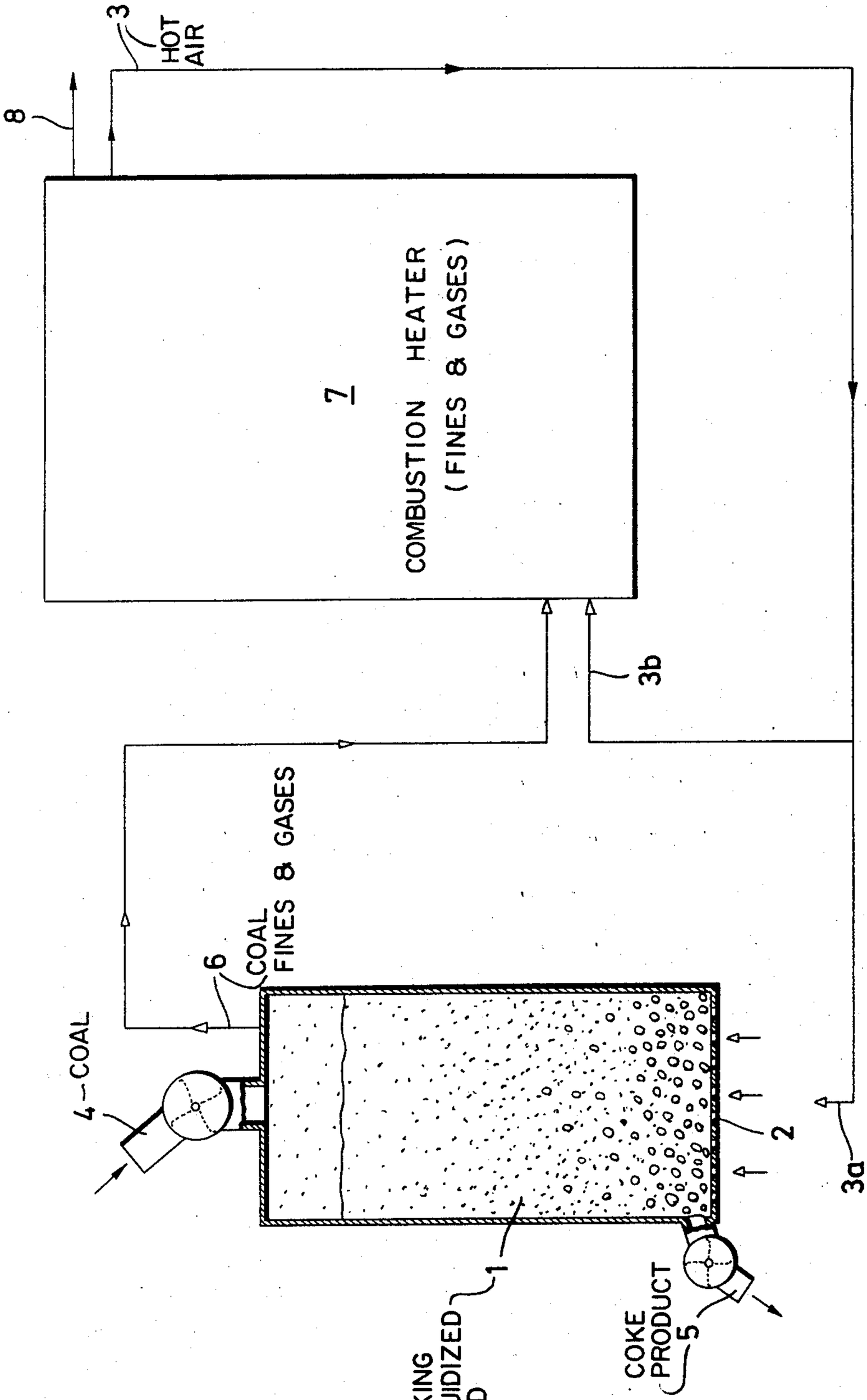
Primary Examiner—Norman Yudkoff
Assistant Examiner—David Edwards
Attorney—Edwin E. Greigg

[57] **ABSTRACT**

For the coking of brown coal, lignite or the like there is provided a coking system which includes a coking apparatus and an associated heater from which hot air is introduced into the coking apparatus. One part of the fine grained portion of the charge mixed with gases derived from the coking process is introduced from the coking apparatus into the combustion chamber of said heater to serve as fuel therefor.

6 Claims, 1 Drawing Figure




3
HOT AIR
8
7
COMBUSTION HEATER (FINES & GASES)
3b
6
COAL FINES & GASES
4 — COAL
2
3a
1
COKING FLUIDIZED BED
COKE PRODUCT
5

FLUIDIZING BED COKING METHOD OF BROWN COAL

BACKGROUND OF THE INVENTION

The economic feasibility of the manufacture of coke from fossil-type fuels is affected to a significant extent by the costs involving their preparatory treatment. Accordingly, it is a basic desideratum to submit the coal, prior to coking, to as few processes as possible to keep the entire coking operation simple and economical.

In view of the above considerations, either raw brown coal, or a coal little burdened by drying, comminuting or preforming (such as pelletizing) should be used for coking fossil-type charges. Despite advantageous prospects of coking raw coal, no coking processes of this type for mass production have been developed. The reason for this may probably be found in the difficult pyrometric conditions required for the coking of raw coal.

The invention is based on a known process of and an apparatus for coking brown coal, particularly brown coal having a relatively high water content, whereby the coking is performed while the coal is in a turbulent condition and the necessary heat is supplied by injecting hot gases, preferably derived from a partial combustion of the coal. The gases obtained during the coking process are burned in a heater.

OBJECT AND SUMMARY OF THE INVENTION

It is an object of the invention to introduce an improved method and an apparatus of the aforenoted type for providing a technically and economically advantageous coking of brown coal, particularly raw brown coal, lignite or similar fuel.

Briefly stated, according to the invention, the coking apparatus is connected with a heater from which hot air is introduced into the coking apparatus. One part of the fine grained portion of the charge is carried by the gases derived from the coking process into the heater to serve as fuel therefor.

The invention will be better understood and further objects and advantages will become more apparent from the ensuing detailed specification of a preferred, although exemplary embodiment of the invention taken in conjunction with the sole figure schematically illustrating the embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENT

0–comminuting

The coking system according to the invention includes a coking apparatus **1** having an apertured, sieve-like base **2**. The apparatus **1** is charged at the top at **4** with coking fuel such as brown coal which preferably has a grain size of 0– 30 mm. The grain size distribution is that which normally results from crushing raw brown coal in a conventional communiting device.

The coking system according to the invention further includes a heater **7** from which heated air for combustion is taken through conduit **3** and introduced into the coking apparatus **1** at *3a* through the apertured base **2**. By virtue of the upwardly directed air flow a fluidized bed is formed which is supported by the apertured base **2**.

The velocity of the gas through the fluidized bed is set to such a value that the large size coal settles on or in the vicinity of the base **2**. In this range the coal is not exposed to the turbulent air action proper; there is merely a relatively slight mixing caused by the throughgoing gases. In an extreme case, the large-grained coal supported on base **2** may form a stationary bed which, as the grain size decreases upwardly, gradually changes into the fluidized bed proper.

The velocity of the gas streaming through the coking apparatus is further so regulated that a major, fine-grained portion of the coal (approximately 75–95 percent of the charge) is carried by the combustion gases derived from the coking through conduit **6** and introduced into the heater **7**. Approximately 5–25 percent of the charge remains in the coking apparatus due to its grain size. In the heater **7** the mixture of coal and coking gases is burned with the aid of hot air taken from the heater **7** itself and introduced into its firing chamber through conduit *3b*. Exhaust gases resulting from this combustion are discharged at **8**.

The most advantageous velocities of the gas at different heights of the fluidized bed may be regulated in a known manner by accordingly varying the cross-sectional configuration of the fluidized bed. Thus, for example, the cross section of the fluidized bed may be of a smaller value at its base than at its upper surface.

The hot air furnished by the heater **7** to the coking apparatus at a temperature of approximately 250°–450° C, burns preponderantly with the fine-grained portion of the raw coal with simultaneous heat generation. The ratio of hot air admitted through base **2** to the raw brown coal charged at **4** is set to such a value that an average temperature of 600°– 900° C prevails in the coking apparatus. At such temperature, a rapid drying of the fine-grained pieces of the raw brown coal takes place, so that the latter may be carried out of the coking apparatus at **6** by the gases in a substantially dried condition.

The coal pieces of large dimension which, as noted hereinbefore, settle at the base **2** because of their weight and constitute about 5–25 percent of the charge, are dried and degassed, whereby the degree of degasification and of conversion into coke are dependent on the dwelling time of the respective coal pieces in the coking bed and on the temperature prevailing in the coking apparatus.

The finished coke, which has a grain size of about 5– 20 mm, may be taken out of the fluid bed at **5** by known removing means (e.g. an auger mechanism) directly from above the perforated base **2**.

In order to adapt the coal taken from the coking apparatus **1** to the firing conditions of the adjoining heater **7**, the coal may be comminuted, preferably to powder form, prior to the introduction thereof into the heater. For this purpose, known comminuting apparatus such as an impact mill, may be used.

Several modifications may be effected in the aforedescribed exemplary embodiment of the invention to adapt it to any particular type of coal or heater. Thus, instead of a fluidized bed-type coking apparatus a mobile grill-type coking apparatus may be used. In such an apparatus a major part of the coal is combusted on the grill for generating the heat necessary to operate the heater, while a smaller part of the charge is carried out by the grill as coke. Instead of hot air, hot gases may be blown through the coking apparatus. These hot gases may be, for example, the exhaust gases taken from the heater.

What is claimed is

1. A method of coking brown coal or the like comprising the following steps:

A. continuously charging a coking apparatus with said coal having a grain size between 0 and approximately 30 mm,

B. introducing hot gas from a heater into said coking apparatus for effecting coking therein,

C. introducing approximately 75–95 percent of the coal charge as fine-grained coal with and by means of coking gases from said coking apparatus into said heater,

D. burning the coal-gas mixture introduced in said heater to obtain said hot gas,

E. converting the approximately 5–25 percent of the charge remaining in the coking apparatus into coke having a grain size approximately 5 – 20 mm, and

F. withdrawing said coke from said coking apparatus.

2. A method as defined in claim **1**, wherein said charge is introduced into said coking apparatus downwardly at the upper portion thereof and said hot gas is introduced into said coking apparatus upwardly through a base thereof to create a fluidized bed containing said 5–25 percent of said charge and to cause said 75–95 percent of said charge to be carried into said heater.

3. A method as defined in claim **1**, wherein said hot gas has a temperature between approximately 250° C– 450° C.

4. A method as defined in claim **1**, wherein the flow rate of said charge and of said hot gas is so regulated that the tem-

perature in said coking apparatus is at a value between 600° – 900° C.

5. A method as defined in claim 1, including the step of comminuting the coal taken out with said coking gases from said coking apparatus prior to its introduction into said heater.

6. A method as defined in claim 5, wherein said comminuting step effects a reduction of the coal taken from said coking apparatus to powder size grains.

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