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W. F. NAGEL

COAL DISTILLING APPARATUS

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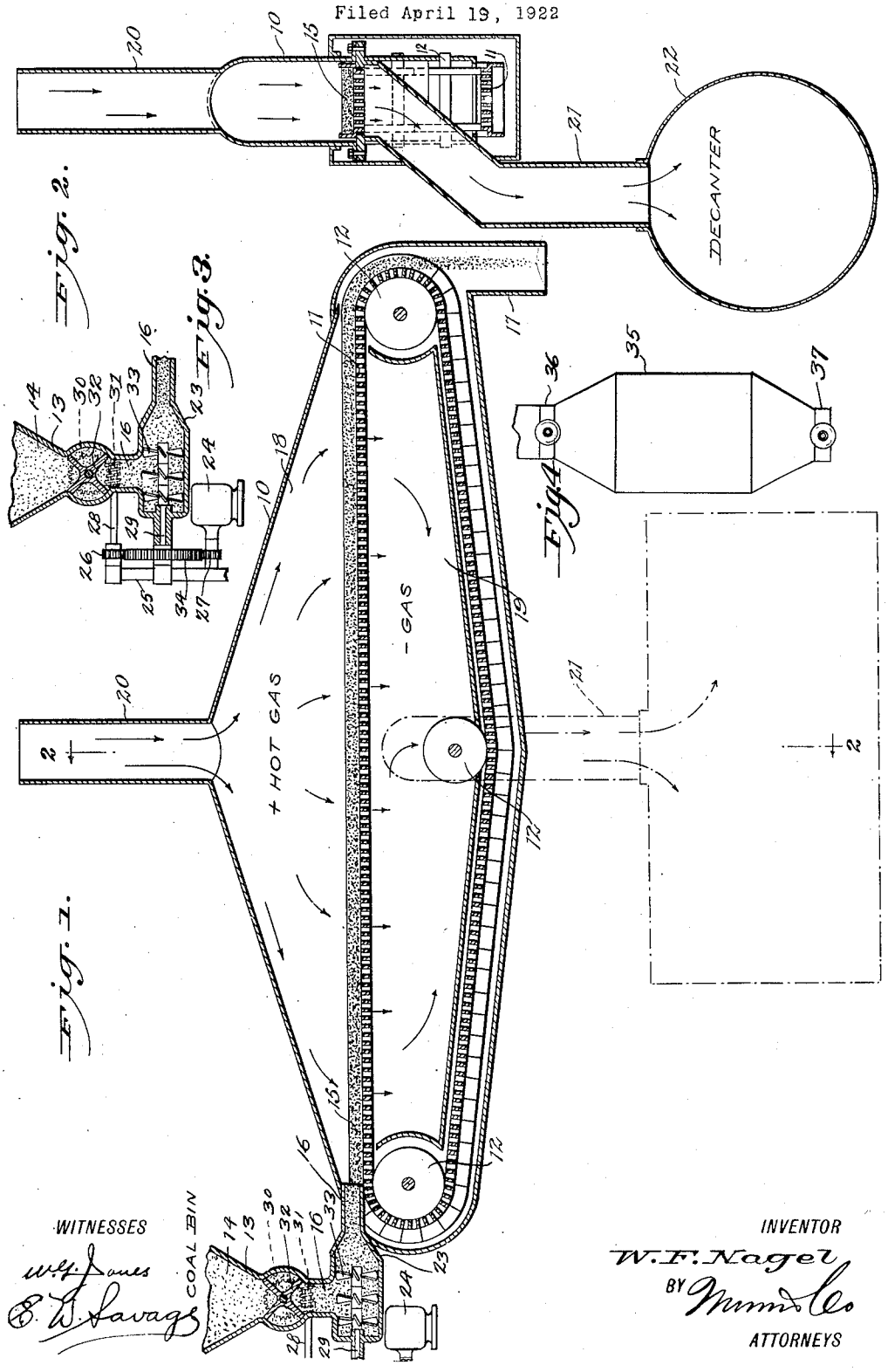


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 1.

WITNESSES

W. F. Jones

E. W. Savage

INVENTOR

W. F. Nagel

BY Munn & Co

ATTORNEYS

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WILLIAM FRANK NAGEL, OF ENSLEY, ALABAMA.

COAL-DISTILLING APPARATUS.

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To all whom it may concern:

Be it known that I, WILLIAM F. NAGEL, a citizen of the United States, and a resident of Ensley, in the county of Jefferson and State of Alabama, have invented new and useful Improvements in Coal-Distilling Apparatus, of which the following is a full, clear, and exact description.

This invention relates to a process for treating coal to increase its fuel efficiency and to obtain the volatile matter for the manufacture of coal by-products.

Experiments have been carried on for many years in order to increase the fuel efficiency of coal and to provide a fuel which burns without giving off a great volume of smoke. Coke is one of the fuels obtained by the treating of coal which does not give off a great volume of smoke on burning. Further, for the same weight of coke a greater number of calories of heat are obtained than from the burning of the same weight of coal. Processes for treating coal to obtain therefrom fuels having a high heating value per unit weight and which remove the volatile matter in a proper condition for the manufacture of coal by-products are of great importance.

The general object of this invention is the provision of a process for treating coal to remove certain volatile matter, thus increasing its fuel efficiency per unit of weight.

A further object is the provision of a process for treating coal to provide a high efficiency fuel by the removal of certain volatile matter and saving said volatile matter for the manufacture of coal by-products.

Another object is the provision of a process for treating coal to obtain an efficient fuel which on burning gives off practically no smoke.

These objects are accomplished by treating the coal with a gas to dissolve or separate the volatile matter therefrom and to carry it into a washing decanter where the volatile matter is removed from the gas.

These and other objects of the invention will be more clearly understood from the following detailed description and accompanying drawings.

Figure 1 is a vertical section across the apparatus used in the treating of the coal; and

Figure 2 is a section along the line 2—2, Figure 1.

Figure 3 is a vertical section through a feeding apparatus, showing one possible construction;

Figure 4 is a diagram of a fuel receiver for attaching to the pipe leading from the container shown in Figure 1.

Referring to the above-mentioned drawings, a container 10 is shown in which an endless foraminated conveyor 11 is mounted on rollers 12. The container 10 preferably has its top and bottom inclined downwardly and upwardly respectively from its center to the ends, as shown. A coal hopper 13 is associated with the container and serves to feed the coal 14 onto the conveyor, providing a layer of coal 15 of any desired thickness. The conveyor 11 is preferably formed of spaced slats or bars as shown. The mechanism which controls the feeding of the coal from the hopper 13 may be of a variety of constructions and it is not proposed to claim it as part of this invention. The feeding mechanism shown and hereinafter described is however preferably employed. A pipe 17 leads from the container 10 and it is through this pipe that the fuel, prepared by the treating of the coal, is removed.

The section of the conveyor 11 which carries the layer of coal 15 divides the container 10, forming two chambers 18 and 19. A pipe 20 leads into the upper chamber 18. An exhausting device 21 communicates with the lower chamber 19 and a decanter 22 is associated with the exhausting device 21.

In the operation of this apparatus, coal 14 from the hopper 13 is fed onto the endless conveyor 11 by a feeding mechanism 16. This feeding mechanism 16 includes a casing 23 connected to the lower end of the hopper. In the upper end of the casing 23 is a feed regulator 32 mounted on a common shaft with the worm wheel 30. A worm 31 for operating the worm wheel 30 is mounted on a shaft 28 by a support 25 and the casing 23. Mounted near the outer end of the shaft 28 is a gear 26, which meshes with a gear 34 fixed near the outer end of a shaft 29 also carried by the support 25 and the casing 23. This shaft 29 projects into the lower end of the casing 23 and has mounted thereon a plurality of blades 33. The shafts 28 and 29 are operated from a motor 24 through a gear 27 mounted on the motor shaft and the gears 34 and 26. In the operation of this device the coal is conveyed from the hopper 13 into the casing 23 by means of the feed regulator 32. After it

has been projected into the casing it is fed forward onto the conveyor by means of the blades 33. By controlling the speed of the motor the rate at which the coal is fed onto the conveyor may be controlled.

The thickness of the layer and the pressure on the coal projected onto the conveyor may be controlled by varying the speed of the feeding mechanism 16. Rollers 12 which operate the endless conveyor 11 may be driven at any speed by any suitable prime mover. As the coal is moved through the container 10 by the conveyor 11 it is treated with heated gases and by the time it reaches the pipe 17 through which it is removed from the container it has been converted into the desired fuel. The treated fuel passes through the pipe 17 into the fuel receiver 35. This receiver 35 is provided with two valves 36 and 37, one being located at the top and the other at the bottom, providing means for removing the fuel from the container without greatly affecting the gas pressure in the container. Gases used for treating the coal are forced into the container through the pipe 20 and pass down from the chamber 18 through the layer of coal 15 into the chamber 19 from which they are exhausted by means of the exhausting mechanism 21. The gases exhausted from the chamber 19 are then conveyed into the decanter 22 where they are washed by any usual method for removing the volatile matter which they have removed from the coal.

Coal in its normal state contains a large amount of volatile matter which when the coal is being burned passes off in the form of smoke, carrying with it a great amount of the heat generated in the burning of the coal. This smoke that passes off when the coal is being burned carries with it valuable coal by-products, or a great portion of the same from which so many by-products may be manufactured. From the above it will be seen that two losses occur when coal is burned in its natural state: first, the heat efficiency of the coal is reduced by the coal by-products which include the hydrocarbons of a low boiling point passing off in smoke carrying away by convection a certain amount of the heat generated in the burning of the coal. A considerable portion of the coal by-products are carried off in the smoke and thus the matter from which so many coal by-products can be made is lost.

In the process described above, the coal in its natural state, or after having been treated, is treated with a gas heated to any desired temperature depending on the final result desired so as to remove the volatile matter. The gas which contains the coal by-products is then washed by any of the usual methods and the coal by-products obtained therefrom. The fuel thus obtained by so treating the coal does not contain the volatile matter which tends to carry away by convection the heat generated in the burning and the coal by-products have been saved for manufacturing coal by-products.

I would state in conclusion that while the illustrated example constitutes a practical embodiment of my invention, I do not limit myself strictly to the exact details herein illustrated since manifestly the same can be considerably varied without departing from the spirit of the invention as defined in the appended claims.

Claims:

1. A device of the class described for treating coal to remove the volatile matter therefrom, comprising a container, an endless foraminated conveyor mounted to rotate in the container, means for feeding the coal onto the conveyor at uniform thickness, means for removing the coal from the container after it has been treated, means for projecting a gas under pressure into the container and forcing it through the coal located on the conveyor, means for exhausting the gas from the container, and decanter means for washing the gas to remove the volatile matter therefrom.

2. In a device for treating coal to remove the volatile matter therefrom, a container having a gas inlet in its top, and a coal outlet at one end, an endless foraminated conveyor mounted in the container and discharging into the outlet of the container, means for feeding coal onto the conveyor, and an exhaust pipe leading from the container out through one side and above the bottom thereof.

3. In a device for heating coal to remove the volatile matter therefrom, a container having its top and bottom inclined downwardly and upwardly respectively from its center to the ends, said container having a gas inlet in its top at the center of length, and a coal outlet at one end, an endless conveyor formed of spaced bars, and mounted in the container, means for feeding coal onto the conveyor, and an exhaust pipe leading from below the upper run of the conveyor out through one side of the container.

WILLIAM FRANK NAGEL.