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APPARATUS FOR FLUIDIZING AND CARBONIZING PULVERIZED COAL

Filed Jan. 11, 1929

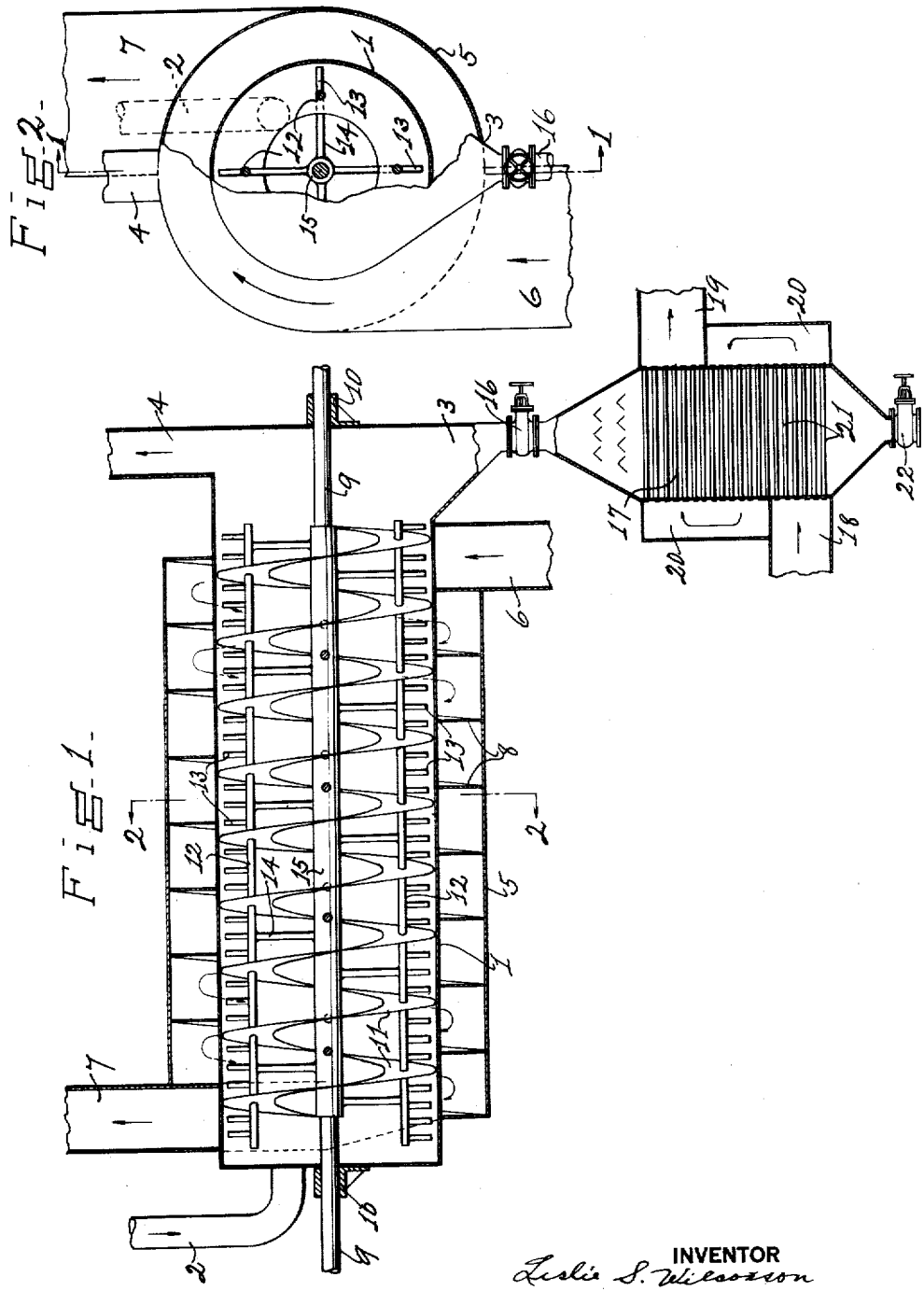

Fig. 2.

Fig. 1.

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UNITED STATES PATENT OFFICE

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APPARATUS FOR FLUIDIZING AND CARBONIZING PULVERIZED COAL

Application filed January 11, 1929. Serial No. 331,861.

This invention relates to an apparatus for fluidizing and carbonizing pulverized coal in a continuous manner.

The invention will be understood from the description in connection with the accompanying drawings in which Fig. 1 is a longitudinal section through an illustrative embodiment of the invention, and Fig. 2 is a view partly in section along the line 2—2 of Fig. 1.

In the drawings reference character 1 indicates a stationary cylinder that may be horizontal or slightly inclined in one direction. An inlet 2 for the pulverized coal enters one end of the cylinder 1. An outlet 3 for solid residue is provided at the lower side of the other end of the cylinder 1, and an outlet 4 for volatile products is provided at the upper side of the outlet end of the cylinder.

A jacket 5 surrounds the cylinder 1 and is provided with a hot gas inlet 6 near the outlet end of the cylinder 1 and a spent gas outlet 7 is provided at the other end. A helical partition 8 is provided between the cylinder 1 and the jacket 5 to direct the hot gases several times around the cylinder 1, as indicated by the arrows.

A shaft 9 extends through the center of the cylinder 1 and is journaled in bearings 10 near opposite ends. This shaft may be driven in any convenient way. Radial spokes 14 are connected to the sleeve 15 surrounding the rotatable shaft 9, and attached to the outer extremities of the spokes 14 are longitudinal rods 12, to which are attached stirring fingers 13. A helical vane scraper 11 which fits the inside of the cylinder 1 is maintained in position by the longitudinal rods 12 so that it rotates when the shaft 9 is rotated. The fingers 13 attached to the rods may be of any desired shape, but it is preferred that they have angular faces, so that when the shaft 9 is revolved, and consequently the arms 14, rods 12, stirrers 13 and helical vane 11, the angular faces will tend to move the material in the cylinder 1 away from the outlet end and towards the inlet end. The helical vane 11 is so constructed that it also imparts this motion to the material in the cylinder 1, with the result that when pulverized material is being treated its fluidity is ensured.

A hand-controlled valve 16 is provided in the outlet 3 which leads to the tubular coke cooler 17. Air enters one side of the cooler at 18 and passes out through the outlet 19. Compartments 20 are provided to cause the cooling air to flow through groups of tubes 21 in counter-current direction to the solid material that descends along the outside of these tubes 21, the direction of the air being indicated by the arrows. A valved outlet 22 is provided at the bottom of the coke cooler 17.

The gases and volatile products resulting from the heat treatment of the material in the cylinder 1 together with any gases or vapors that might have been impregnated to assist the process and also some finely divided material in suspension will pass through the outlet 4 for further treatment before storage or use.

The operation is as follows: Pulverized coal is introduced through the inlet 2 and is subjected to heat in the cylinder 1 while the shaft 9 (with the sleeve 15, arms 14, longitudinal rods 12, stirring members 13 and helical vane 11) is rotated, thus thoroughly stirring and fluidizing the charge, at the same time the helical vane 11 and the stirring members 13 tend to move the material away from the outlet 3, in this manner ensuring the complete fluidity of the material as it passes to the cylinder 1. The volatile products that are distilled off by the heat, together with any gases or vapors impregnated to assist in the process and some fine solid material in suspension pass out through the outlet 4 and may be cleaned or scrubbed in well known manners, and the condensible products may be recovered by passing the volatile products through a condenser, if desired. The residue or solid particles move gradually towards the outlet end of the cylinder 1, and pass through the outlet 3 and then through the coke cooler 17 where it is cooled below the ignition temperature before it passes out through the outlet 22 to a place of storage or use.

I claim:

1. The combination in a device for fluidizing pulverulent material including a cylinder, an inlet for introducing unfluidized material to one end thereof, an outlet for fluidized material at the opposite end thereof, a helical vane within said cylinder and extending longitudinally thereof formed so as to feed unfluidized material away from said outlet whereby only completely fluidized material reaches said outlet, and stirring arms mounted upon said vane and movable with said vane relatively to said cylinder for fluidizing the material therein.

2. The combination in a device for fluidizing pulverulent material including a cylinder, an inlet for introducing unfluidized material thereto, an outlet for fluidized material, a helical vane rotatably mounted within said cylinder and operable so as to feed unfluidized material away from said outlet whereby only completely fluidized material reaches said outlet, and stirring mechanism supported on said vane and including arms extending longitudinally of said cylinder and outwardly projecting fingers on said arms.

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CERTIFICATE OF CORRECTION.

Patent No. 1,858,796. May 17, 1932.

LESLIE S. WILCOXSON.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, line 68, for "impregnated" read introduced; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of September, A. D. 1932.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)

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