

No. 719,360.

PATENTED JAN. 27, 1903.

O. OPPELT.  
GAS PROCESS.

APPLICATION FILED NOV. 22, 1901.

NO MODEL.

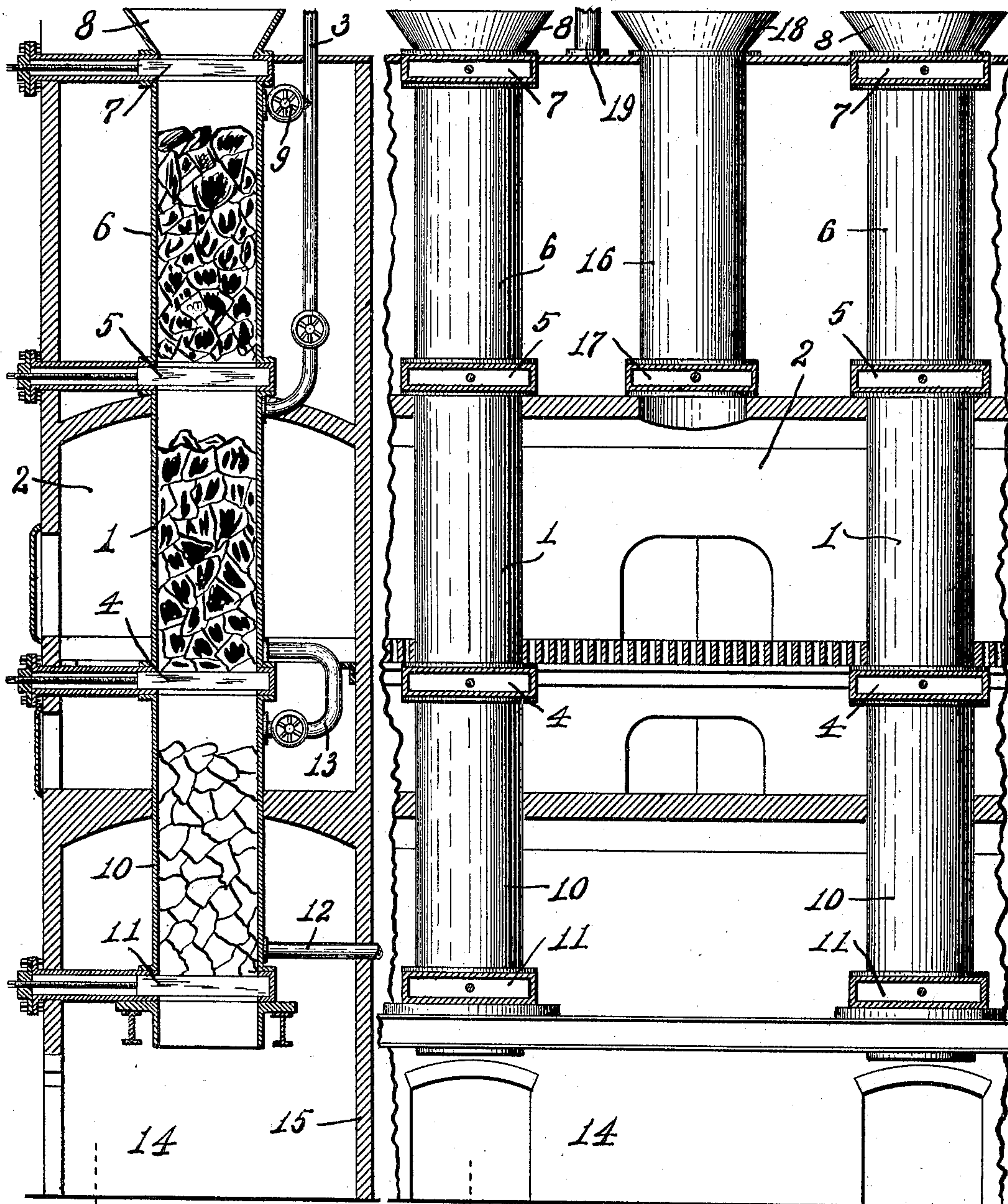


FIG. 1.

FIG. 2.

Witnesses:  
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# UNITED STATES PATENT OFFICE.

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## GAS PROCESS.

SPECIFICATION forming part of Letters Patent No. 719,360, dated January 27, 1903.

Application filed November 22, 1901. Serial No. 83,225. (No specimens.)

*To all whom it may concern:*

Be it known that I, OTTO OPPELT, a citizen of the United States, residing at New Albany, Floyd county, Indiana, (post-office address No. 604 State street, New Albany, Indiana,) have invented certain new and useful Improvements in Gas Processes, of which the following is a specification.

A certain hydrocarbonaceous material known as "Devonian bituminous shale" consists, mainly, of a clay-stone soaked with oil. It is often spoken of as "slate." It is clearly distinguishable from the shales of the coal measures, which latter are carbonaceous minerals and merely poor coal. The shale in question is sixty-five to eighty per cent. hard stone, mostly silicate of alumina, with some iron pyrites, the remainder being oil, with three to five and occasionally eight per cent. of fixed carbon. Practically these shales are clay-stones saturated with paraffin-oils, with small quantities of asphalt, having absorbed the oil as sponges do. It is the purpose of my invention to produce a combined fixed gas from these shales, and thus utilize for gas purposes a vast quantity of material not hitherto found useful. The Devonian shales in question are found extending from Nashville, Tennessee, to North Vernon, Indiana, and are known locally as "New Albany black shale."

No process employed for the production of gas from coal, so far as such processes have come to my knowledge, are at all available in dealing with the Devonian shales under consideration on any satisfactory commercial basis, and, on the other hand, my process, satisfactorily suited to dealing with Devonian shales, is not of utility in connection with coal as a gas-producing material.

In carrying out my process I apply to the shale in any suitable retort a degree of heat sufficiently high to effect destructive distillation and drive off the hydrocarbons and coke the oil and render porous the shale and charge the shale with sufficient heat to decompose superheated steam and generate water-gas. A cherry red may be considered as representing the minimum degree of heat satisfactory in the process. The shale thus highly and

solely heated is then subjected to the action of superheated steam, thus generating water-gas, which water-gas is to be combined with the evolved hydrocarbons, thus producing a combined fixed gas. It is preferable that the water-gas generated from a given mass of the hot material as the second stage in the process be sent through the retort dealing with a mass in the first stage of the process, the combined fixed gas thus leaving the retort as the result of both steps of the process. The process also results in a refuse or ash from which is obtainable a silicate of alumina, sulfate of alumina, and sulfate of iron, which are soluble and salable, and also phosphoric acid from the decomposition of the fossil bones of the shales.

My present invention does not concern itself with any special apparatus for the execution of the process; but I have thought it best to illustrate a practical apparatus adapted for the purpose.

In the accompanying drawings, Figure 1 is a vertical transverse section of a suitable apparatus, and Fig. 2 is a vertical longitudinal section.

The shale is distilled, rendered porous, and highly heated in the retort 1, the retort being heated by furnace 2. The hot porous charge is then dropped through valve 4 into generator 10, subjected to injection of superheated steam through pipe 12. The water-gas from the generator goes through pipe 13 to and through the new charge being distilled. The combined fixed gas leaves through pipe 3. The generator is emptied through valve 11 into pit 14. Green charges of shale are charged into preheater 6 and discharged therefrom into the retort through valve 5. The hydrocarbons evolved from the preheater go through connection 9 to pipe 3. The furnace of the retort is supplied with fuel from the reservoir 16, having a foot-valve 17, and this reservoir and the preheater may be heated by hot air supplied through pipe 19. The devices may be used in battery, as illustrated in Fig. 2.

I claim as my invention—

The improved process for making a combined fixed gas from Devonian bituminous

shale, which consists in subjecting a mass of the shale to a degree of heat sufficiently high to effect destructive distillation and drive off the hydrocarbons and render the shale porous and coke the oil therein and charge the porous shale with heat sufficient for the decomposition of superheated steam, then subjecting the mass of porous and oil-coked shale while yet at the heat of its distillation and at

that heat solely to an injection of superheated steam whereby water-gas is generated, and then conveying the evolved water-gas while hot into admixture with the hot hydrocarbons resulting from distillation.

OTTO OPPELT.

Witnesses:

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