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PROCESS OF THE DISTILLATION OF HYDROCARBONS FROM OIL SHALE.

APPLICATION FILED JUNE 21, 1918.

1,317,514. Patented Sept. 30, 1919.

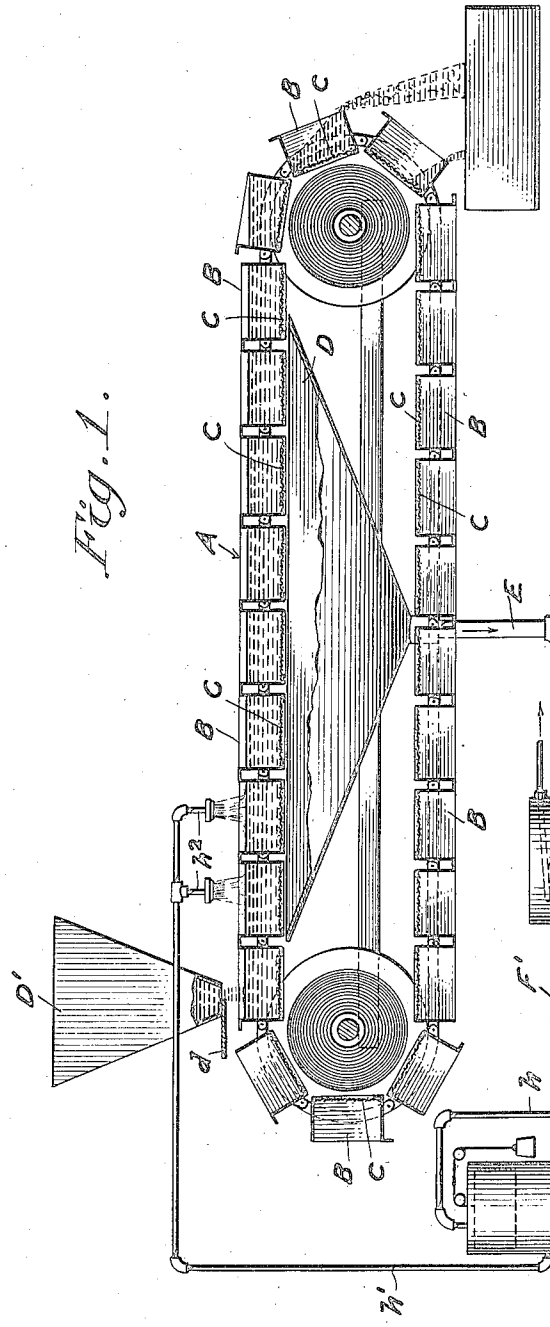


Fig. 1.

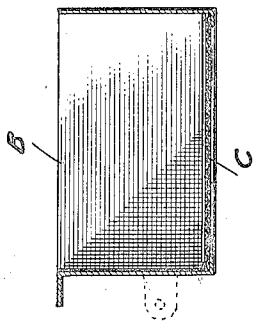


Fig. 2.

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PROCESS OF THE DISTILLATION OF HYDROCARBONS FROM OIL-SHALE.

1,317,514. Specification of Letters Patent. Patented Sept. 30, 1919.

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To all whom it may concern:

Be it known that I, JASPER A. McCASKELL, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Processes of the Distillation of Hydrocarbons from Oil-Shale, of which the following is a specification.

This invention relates to an improved process for the recovery of oil from oil shales, oil sands, etc.; in other words, it relates to the distillation of hydrocarbons from shale and like materials, and the process consists of the steps and combination of steps which I will hereinafter more fully point out in the claims.

In the accompanying drawing I have illustrated one embodiment of apparatus which may be successfully used in carrying out the process, but manifestly my invention is not limited to this particular apparatus or in fact to any precise type of apparatus since it is capable of use with apparatus of different forms, as will be readily understood by those skilled in the art.

In said drawing—

Figure 1 represents a side elevation partially in section of an endless traveling bucket carrier whose upper run forms the top of a suction chamber, certain accessories being associated with the chamber.

Fig. 2 is an enlarged sectional view of one of the buckets of the conveyer.

The endless traveling conveyer, A, is shown as of the bucket type, being composed of a series of buckets or receivers, B, having permeable bottoms, C, which travel over and substantially form the top of the suction chamber, D, said chamber having an outlet pipe, E, leading from its lowest portion and connecting with a receiver, E′, in which is located a coil, G, for the circulation of water, said receiver, E′, having an oil outlet, *c*, and connecting also in its upper portion with a pipe, F′, leading to some appropriate form of centrifugal or other pump, F, whose discharge is connected to a pipe, *h*, leading into a tank or gasometer, H, said tank having a delivery pipe, *h′*, having appropriate burners, h^2, located in proximity to the upper open ends of the buckets of the conveyer.

A hopper, D′, is suitably positioned above the conveyer so as to deposit the oil shale, oil sands, etc., into the buckets, as they successively arrive below the discharge end of the hopper, the feed of material from the hopper being controlled by some suitable slide or other valve, *d*.

The operation of the process is substantially as follows:

The shale or other material to be treated is delivered from the hopper into the traveling buckets, B, of the conveyer as they successively pass beneath the valve controlled bottom of the hopper, and the loaded buckets thence pass beneath and in proximity to the burners, h^2, which are intended to supply a gas-flame for the purpose of igniting the shale in the buckets. The pump, F, having been started, as the shale is ignited in the manner before stated, the gases are sucked through the bed of shale in the buckets through the medium of the aforesaid pump, and the liberated oil and gases induced by the ignition of the shale pass inversely through the body of shale and through the permeable bottom of the buckets and into the suction chamber, D, and finally they are led through the pipe connections into the receiver or condenser, E′. The gas which passes through this condenser is delivered by the pump, F, into the gas tank, H, and is in turn utilized to supply fuel to the burners, h^2, for the ignition of further charges of shale. In other words, after the apparatus is once started there is sufficient gas derived from the shale under treatment to supply the necessary fuel for the distillation of fresh shale, the oil and gases being removed from the shale during the travel of the upper run of the conveyer over the top of the suction chamber, and while the shale is in a state of ignition, and the spent shale being discharged from the buckets over one of the end drums and into an appropriate receiver, as indicated in Fig. 1. I have, therefore, a continuous process, as the successive pans are discharged at the end of their travel after all the volatile hydrocarbons have been distilled off and the lighter gases generated by the ignition of the shale is in turn collected and utilized as fuel for igniting further charges of shale. Accordingly the present method has two distinct advantages: In the first place the burning of the residual carbon that is left in the shale after the distillation of the latter hydrocarbons, produces sufficient fuel to distil the heavier hydrocarbons as the fire zone advances toward the bottom layer of

the shale bed. In other words, I utilize the heat produced by the burning of the shale to cause the desired distillation without the necessary addition of coal as is used in some processes. The other advantage is the simplicity of the operation, and the continuous action instead of an intermittent action which has sometimes been employed for the distillation of hydrocarbons from shale. These results are largely due to the fact that I employ a naked flame which ignites the shale and utilize the residual carbon in the shale for the production of heat to distil the heavier hydrocarbons and do this by a continuous action.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. The continuous method herein described of extracting oil from hydrocarbon-bearing material, said method consisting, essentially, in firing the surface of a charge of said material in an open receiver exposed to the atmosphere; imparting a continuous travel to said receiver and during such travel continuously drawing the liberated gases and hydrocarbons inversely through the body of the material and discharging the heavier hydrocarbons by heat as the fire zone advances toward the bottom layer of the said material; discharging the spent material from the receiver during the travel of the latter and returning the empty receiver for a fresh charge of material; and finally and continuously separating and recovering the liberated oils and gases.

2. A continuous method of extracting oil from shale or hydrocarbon material, said method consisting, essentially, in igniting the surface of successive charges of shale or oil bearing material, while freely exposed to the atmosphere; maintaining the charges of ignited material in continuous travel; sucking the liberated lighter hydrocarbons and gases inwardly through the moving charges of shale and at the same time burning the residual carbon in the shale as the fire zone advances toward the bottom layer of the shale bed and thereby continuously generating sufficient heat to distil the heavier hydrocarbons in the shale; continuously discharging successive charges of spent shale and returning the empty shale-receivers successively to a common loading point; continuously and separately collecting the liberated hydrocarbons and gases; and utilizing the collected gases as fuel for the ignition and distillation of fresh charges of shale or material.

In testimony whereof I affix my signature.

JASPER A. McCASKELL.