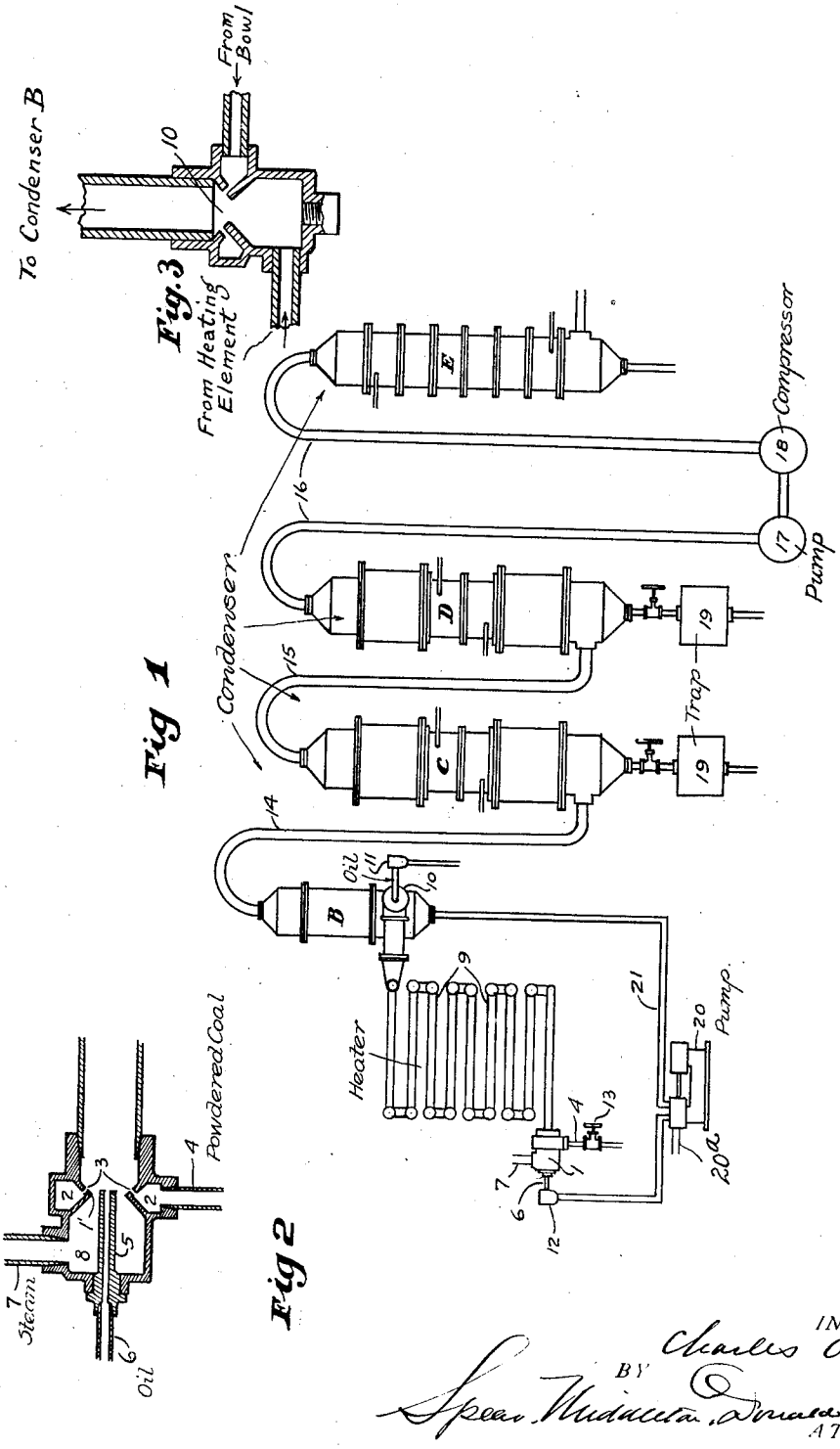
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COAL FRACTIONATING AND OIL REFINING PROCESS

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COAL FRACTIONATING AND OIL REFINING PROCESS

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My invention relates to the refining of coal in a finely pulverized state, to the refining of crude oil, to the cracking of heavy distillate into lighter more volatile elements, to the providing of means whereby any one of the above may be carried on as a separate independent operation and to the providing of means whereby two or more of the above operations may be carried on simultaneously within the same system, by which simultaneous action the successful carrying out of one of the operations may assist in carrying out the other.

My present invention is an improvement of the co-pending application Owens and Lyle Serial No. 609,029 filed Dec. 26th, 1922, as related to the refining of coal, coal and oil or oil alone.

The purpose of this invention is:

(*a*) To employ the principle of treating the coal in a finely divided state in suspension with heat.

(*b*) The feeding of the coal in a finely divided state by steam, or steam atomized oil, whereby the feeding elements may serve as a carrier for the finely divided coal until the carrier element or elements become disassociated by the heat thus allowing a reassociation between themselves and the lighter fractions of the coal.

(*c*) To employ the hot vapors produced by the heat and vacuum on the powdered coal and steam, etc. to subsequently atomize and refine crude oil as a means of blending and recovering the refined products of both the coal and oil in a single operation.

(*d*) To provide a feeding or carrier means for the powdered coal composed of certain elements capable of uniting with the elements of the coal in the presence of heat instead of throwing down as a tar or other gummy substance while being treated.

(*e*) To make provision whereby powdered coal may be fed by and commingled with, steam, oil vapor or gas and treated by heat, where both the degree of heat and the duration of the heat exposure may be regulated as a means of fractionating and recovering the by-products of the coal and preserving the value of the coke for subsequent use.

Fig. 1 is a side view of my apparatus while Fig. 2 is a view in section of my feeding nozzle.

Fig. 3 is a sectional view of nozzle 10.

In my present invention I provide a nozzle 1 as shown in section Fig. 2. This nozzle has a venturi 1′ surrounded by an annular chamber 2 having ports 3 opening into the venturi just beyond the restricted portion.

A pipe 4 for supplying powdered coal from a source of supply, not shown, leads into the annular chamber 2.

A nozzle 5, having an oil supply pipe 6 terminates just beyond the restricted portion of the venturi 1′, and a steam pipe 7, open to the atmosphere, for delivering steam at atmospheric pressure leads into the chamber 8 surrounding the nozzle 5.

From the foregoing it is clearly apparent that both the ports 3 and the nozzle 5 are subject to the increased vacuum produced by the velocity of the steam just beyond the restricted portion of the venturi and it is equally apparent that powdered coal could be fed through nozzle 5 and oil through ports 3 if so desired or that the feeding of one of the elements alone, i. e. coal through ports 3 or oil through nozzle 5 could be carried on without interfering with the functioning of the apparatus so long as the steam was being supplied through pipe 7.

9 is the heat treating element composed of a series of tubes to the lower end of which the nozzle 1 is connected, the discharge end of this heat treating element leading into a condenser B. Oil is fed through an atomizing nozzle 10 similar to the nozzle 1, into the chamber B from a float bowl 11 by the velocity of the hot vapors passing through its venturi nozzle from the heat treating element 9. That is to say at the nozzle 10 the terminal of the tube would connect with a part corresponding to 7, Fig. 2 while bowl 11 would supply oil through a nozzle or chamber corresponding to nozzle 5 or to annular chamber 2.

A float bowl 12 supplies oil through pipe 6 to nozzle 5 when desired.

A valve 13 for regulating the supply of coal is provided.

A pipe 14 leads the commingled vapors from the condenser B into condenser C while a similar pipe 15 conducts the vapors from condenser C into condenser D, and pipe 16 conveys the vapors to pump 17, through compressor 18 to condenser E.

19, 19 are traps for the recovery and removal of the condensates from their respective condensers. The pump 20 through the pipe 21 conveys the condensate of the condenser B to the heat treating element 9 or to storage through pipe 20*a* as may be desired. When feeding coal and refining crude oil the pump is operated continuously to pump coke and carry residue to storage.

The tubes of the heat treating zone or element 9 are of uniform diameter.

As is well known, the blending of benzol with gasoline, has become a common practice as a means of eliminating the knock from the present low grade gasoline. As stated under item *c*, this is one object of our invention, i. e. to blend the benzol of the coal with the light vapor from the oil, as part of the manufacturing process. When the apparatus is thus used pulverized coal is fed through pipe 4 and atomized by steam from pipe 7 and oil is fed to the nozzle 10 leading into the bottom of the condenser B, the volatile matter from the coal—benzol—blending with the light volatile matter from the oil, while the ash, coke and heavy fractions of the oil are precipitated, together with the tar, to the bottom of the condenser B and thence pumped to storage as residue while the commingled, light vapors are conveyed, by the continued action of the vacuum, through pipe 14 into condenser C as stated above.

It is when being used as an oil cracking process, on oil alone, that the oil is pumped to the bowl 12 to be cracked into gasoline, that bowl 12 is used and when so used the oil becomes, in time, too heavy to crack well that it occasionally becomes necessary to pump this heavy residue to storage.

The temperature maintained in the heat chamber or coil is approximately from 600° to 900° F.

In carrying out this process for treating coal the lumen of the conduit of the heater is substantially uniform. This is because of the larger carbon content of coal and the slow rate of expansion of the larger percentage of its volatile content.

When feeding oil the pump 20 is operated intermittently, i. e. topped crude from the bottom of condenser B is pumped to the bowl 12 as cracking stock until the residue becomes too heavy for further cracking, at which stage the topping operation and cracking of the topped crude is suspended while the heavy residue is being pumped to storage, but the apparatus operates continuously when being used in the low temperature carbonization of coal and topping of crude oil simultaneously, the residue in this case being pumped continuously to storage.

I claim:

1. The hereindescribed process comprising supplying steam and finely divided coal to commingle in advance of a heating zone, inducing flow of said steam by suction applied in rear of said heating zone and acting through said heating zone to convey the steam with the finely divided coal in suspension through said heating zone to be acted on by the heat therein, supplying oil to the hot vapors leaving the heating zone and inducing atomization and flow of said oil by said hot vapors and recovering the desired product, substantially as described.

2. The hereindescribed process comprising supplying steam at atmospheric pressure together with finely divided coal to commingle in advance of a heating zone, inducing flow of said steam from said state of atmospheric pressure by suction applied in rear of said heating zone, and acting through said heating zone to draw the steam with the finely divided coal in suspension through said zone to be acted on by the heat therein, supplying oil to the hot vapors leaving the heating zone and inducing atomization and flow of the said oil by said hot vapors and recovering the desired product, substantially as described.

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