

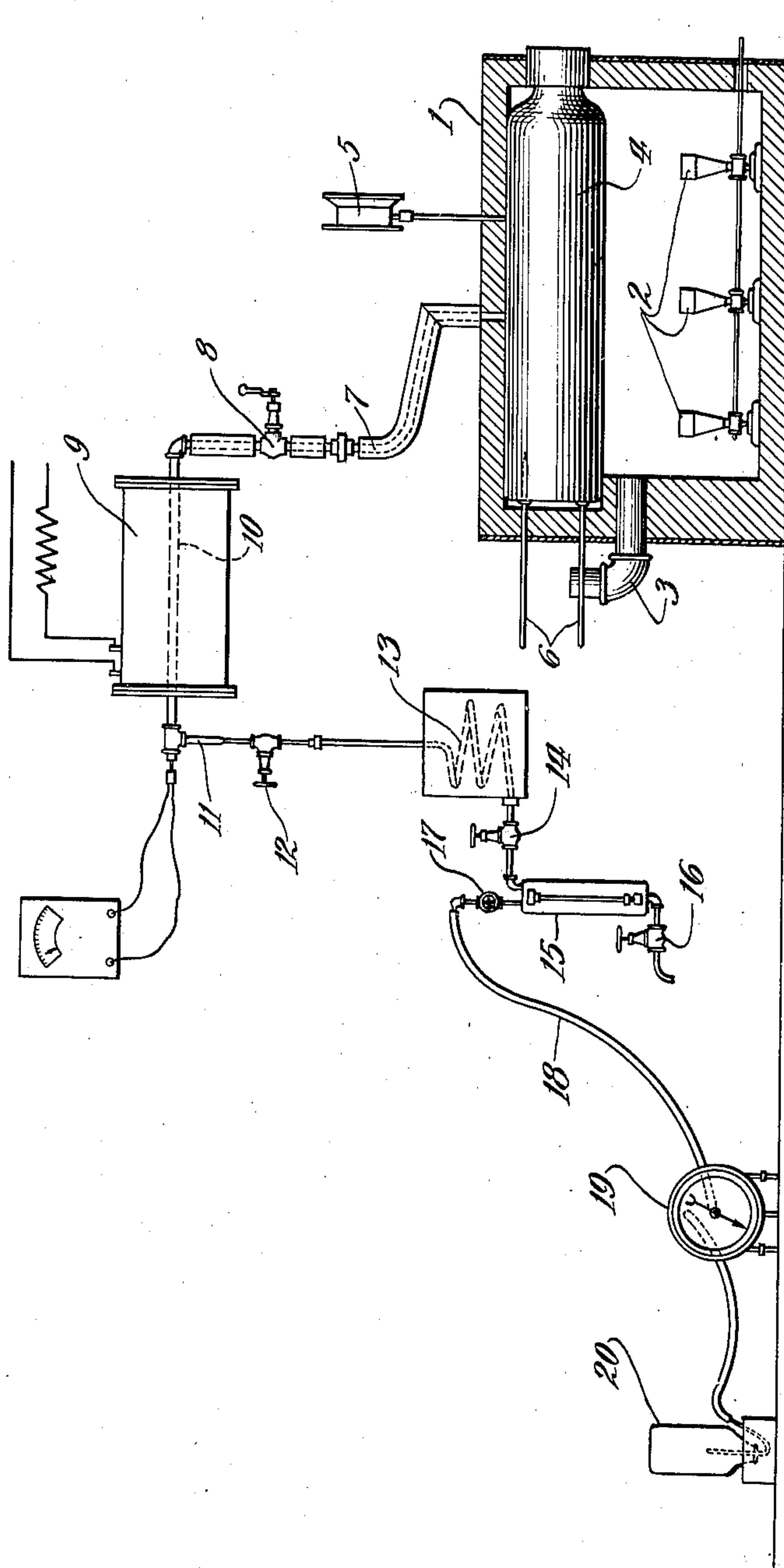
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G. EGLOFF

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PROCESS OF CRACKING PETROLEUM OIL

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Inventor:
Gustav Eglöf.
By Frank L. Belknap
Atty.

UNITED STATES PATENT OFFICE

GUSTAV EGLOFF, OF CHICAGO, ILLINOIS, ASSIGNOR TO UNIVERSAL OIL PRODUCTS COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF SOUTH DAKOTA

PROCESS OF CRACKING PETROLEUM OIL

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This invention relates to improvements in process of cracking petroleum oil, and refers more particularly to the production of ethylene gas. By means of the present invention, a substantial portion of the petroleum oil is converted into olefine and more particularly, ethylene products. This is accomplished by first cracking the oil so as to produce a substantial percentage of cracked vapors, and thence passing said vapors preferably without cooling them, to a superheating zone where they are further heated preferably under superatmospheric pressure, so as to further decompose the vapors and form the desired quantities of the so-called fixed gases of the olefine series, and more particularly the ethylene series.

In order to more readily understand the invention, I show the accompanying drawing, in which the apparatus is shown in a somewhat diagrammatic side elevational view, and partly in vertical section, in which the invention may be carried out.

Referring now to the drawing, 1 designates a furnace in which are positioned the burners 2 and the flue 3. In the furnace is mounted the still 4 which in the present instance, is shown as a shell, but may take the form of a coil and tank if desired. The shell is provided with the usual residuum draw-off, not shown, pressure gauge 5, thermostat 6, an insulated vapor pipe 7 having a throttle valve 8, which pipe leads to an electric furnace 9 in which is positioned the pipe or coil 10, as may be desired. Of course, the superheating furnace does not need to be electrically heated, but may be the ordinary furnace, if desired. The vapors pass out of the furnace 9 through the pipe 11 having throttle valve 12 into the condenser coil 13, thence through valve 14 to receiver 15 which receiver 15 is provided with liquid drawoff valve 16, gas outlet line 17, to which is connected the pipe 18, the gas meter 19 and a suitable gas holder 20.

The process may be carried out as follows: Mexican gas oil of 20.9 Baumé may be heated in the still 4, while subjected to a pressure of say 150 pounds, which pressure may prevail throughout the entire system,

to-wit: from the still 4 to and through the receiver 15. The distillation in the still 4 is continued until more than half of the oil passes out of the still in the form of vapors, the temperature of the oil being from 800 to 850° F. more or less. The vapors pass through the pipe 7 into the furnace 9 where they were heated to a temperature from 1200° to 1300° F., where a large part of the vapors are broken down into fixed gases of the olefine series. The gas produced in one instance, was 1110 cubic feet per barrel of oil treated. Of this 1110 cubic feet of gas, 21.89% by volume was olefine and 9.46% by volume, was ethylene. The cubic feet per barrel of ethylene produced was 105, and the pounds of ethylene per barrel (42) was 8.1 pounds.

In addition to the ethylene and olefine series produced, propylene, butylene and amylenes were also produced.

The invention may be carried out having the system under uniform pressure, but a differential pressure may also be maintained on various parts of the system, or the still alone may be maintained under pressure, while the superheating is maintained at atmospheric.

As an illustrative run, the following table is cited:

Chg. stock	Bé. Gr.	Pressure conditions	Gas, cu. ft. per bbl.	Olefine, vol. of gas	Ethylene, vol. of gas	Ethylene	
						cu. ft. bbl.	lbs. bbl.
Mex. gas oil....	20.9	150 lbs.	1,110	21.89	9.46	105	8.1
Mex. gas oil....	20.9	150 lbs.	980	20.89	12.43	117.5	9.06
Mid. Cont.....	33.6	150 lbs.	695	23.00	7.0	48.7	3.75
Mid. Cont. fuel	33.6	150 lbs.	533	39.10	9.10	48.5	3.74
Mid. Cont. fuel	23.3	150 lbs.	700	21.60	9.2	64.4	5.0
California fuel	21.1	150 lbs.	746	18.68	9.64	71.9	5.61
California fuel	21.1	150 lbs.	646	20.65	10.00	64.6	4.97

I claim as my invention:
1. A process for treating hydrocarbon oil to produce a product containing at least 15% hydrocarbons of the olefine series comprising initially subjecting the liquid oil to pressure distillation so controlled as to yield cracked vapors representing an excess of 50% of the oil treated, subjecting the cracked vapors in a zone free from liquid or steam to a tem-

perature in excess of 1200° F. while under superatmospheric pressure.

2. A process for treating hydrocarbon oil to produce a product containing hydrocarbons of the olefine series, comprising initially
6 subjecting the liquid oil to pressure distillation so controlled as to yield cracked vapors representing in excess of 50% of the oil treated, and subjecting the cracked vapors in a
10 zone free from liquid or steam to a temperature of at least 1200° F.

GUSTAV EGLOFF.

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