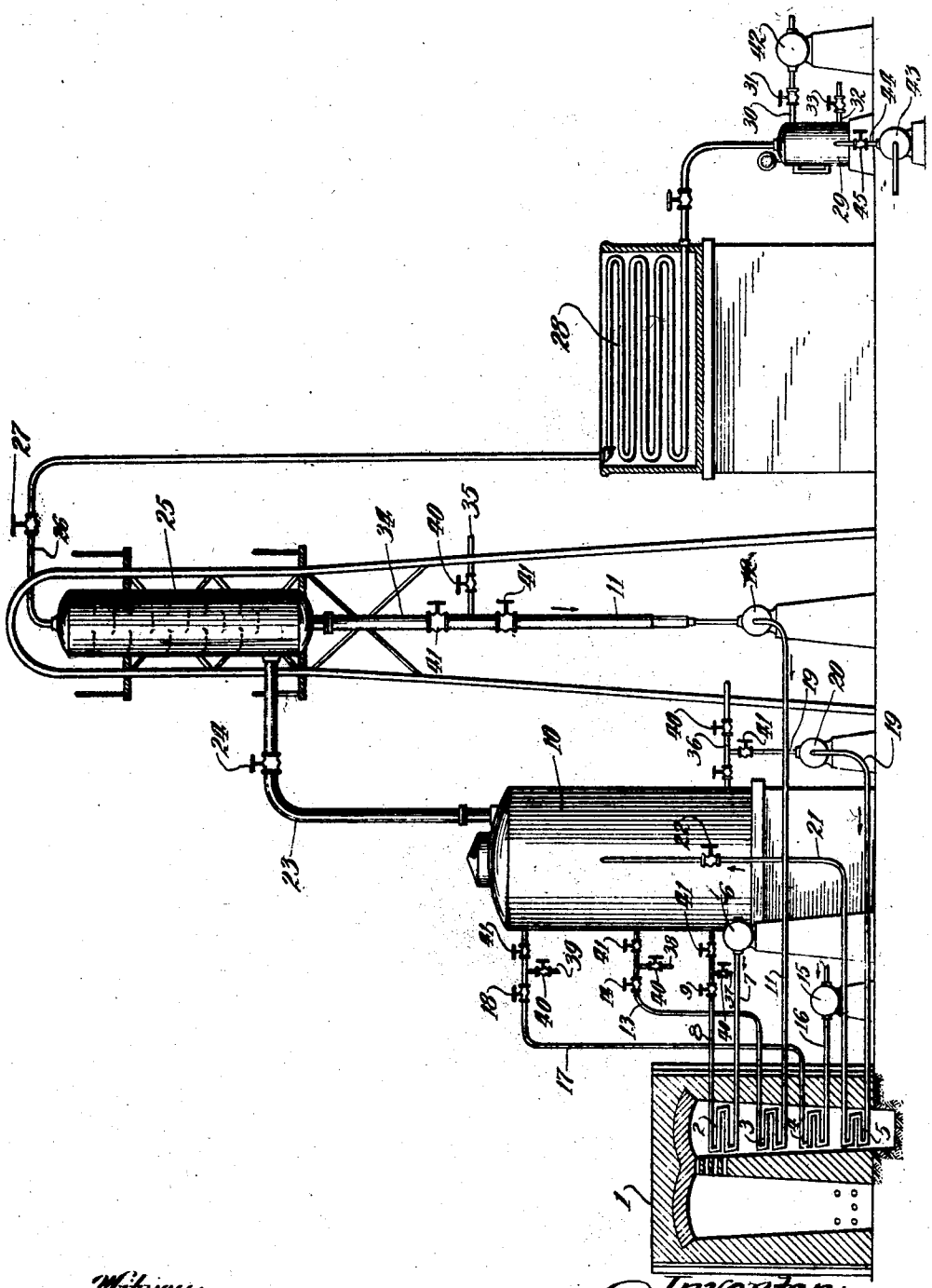
Sept. 1, 1931. G. EGLOFF 1,821,750

PROCESS OF CRACKING OIL

Original Filed Dec. 21, 1925



Witness:
Stephen P. Nelson

Inventor:
Gustav Egloff
by Frank L. Belknap
Atty.

Patented Sept. 1, 1931 1,821,750

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 OIL

Application filed December 21, 1925, Serial No. 76,639. Renewed July 3, 1928.

This invention relates to improvements in process of cracking oil, and refers more particularly to that type of process in which the oil is subjected to an initial heating, preferably in a suitable coil, and thence delivered to an expansion chamber, the vapors removed therefrom subjected to suitable dephlegmation and the reflux preferably recracked.

The present invention is adapted to treat in one process various cuts of oil, each of which has a certain optimum condition of cracking which is different from that of the other cuts, and the present invention is adapted, for example, to crack kerosene or kerosene and light gas oil, reflux condensate, fuel oil and residuum obtained from the cracking process itself. All these are preferably subjected to different conditions of temperature and pressure in the heating coil.

In order to more readily understand the invention I have shown the accompanying drawing, in which the single figure is a somewhat diagrammatic view, partly in side elevation and partly in vertical section, of an apparatus suitable for carrying out the present invention.

Referring to the drawing 1 designates a furnace in which are mounted coils 2, 3, 4 and 5 adapted to respectively receive kerosene, reflux condensate, fuel oil and residuum. If desired the coils may be mounted in separate furnaces so as to more accurately control their temperatures. By having them in separate furnaces as stated, the temperature can be more accurately controlled. But for the purpose of illustration they are here shown in one. Kerosene or kerosene and gas oil, or special distillate bottoms are fed to the coil 2 by means of the pump 6 and line 7 and delivered from the coil 2 to transfer line 8 having throttle valve 9 to the expansion chamber 10 at a temperature of, say, 1000 deg. F., and a pressure of 1200 pounds. Reflux condensate is fed through line 11, pump 12 to the inlet side of the coil 3, and delivered through transfer line 13 having throttle valve 14 to the expansion chamber 10 at a temperature of, 900 degree F., and a pressure of, say, 800 pounds. Fuel oil is delivered by means of pump 15 and feed line 16 to the fuel oil coil 4, and thence through transfer line 17 having throttle valve 18 to the expansion chamber 10 at a temperature of, say, 850 deg. F., and a pressure of, say, 300 pounds. The residuum is delivered by means of line 19 and pump 20 to the inlet side of the coil 5, and then through transfer line 21 having throttle valve 22 to the expansion chamber 10 at a temperature of, say, 800 deg. F., and a pressure of, say, 250 pounds. This expansion chamber 10 may be insulated or it may be independently heated.

Vapors pass out of the top of expansion chamber through vapor pipe 23 having throttle valve 24 to the side of a dephlegmator 25. The top of the dephlegmator 25 is connected by vapor pipe 26 having throttle valve 27 to condensor coil 28, thence to the top of receiver 29. This receiver 29 has gas outlet pipe 30 controlled by throttle valve 31, and liquid draw-off pipe 32 controlled by valve 33. The lower end of the dephlegmator is connected by line 34 to the line 11.

If desired, more or less of any of the cuts of oil, including the residuum and the reflux condensate, may be bypassed out of the system through the bypass pipes 35, 36, 37, 38 and 39 through the control of suitable valves 40 and 41.

In carrying out the process, the various cuts of oil including the reflux and residuum, are heated to the temperatures and subjected to the pressures heretofore described, and are delivered to the expansion chamber 10. They may all be delivered at different points in the expansion chamber or more or less adjacent to the same points. As the various cuts enter the expansion chamber 10 the temperatures of the various cuts will be equalized, thus the highest temperature cut tending to facilitate the vaporization of the lower cuts which are at a less elevated temperature. The temperature of the dephlegmator 25 may be controlled by any one of the methods now well known to those skilled in the art. The temperature of the vapors leaving the top of the expansion chamber may be, say, 900 deg. F., but this temperature, or course, may be varied, as

may be the temperature at which the various cuts enter the expansion chamber as well as the pressure at which the cuts enter such expansion chamber.

That part of the system which is beyond the heating coils, to wit, beginning with the expansion chamber is maintained under a vacuum of, say, from 25 millimeters absolute pressure up. This is accomplished by connecting a suitable vacuum pump or battery of pumps 42 to the gas outlet pipe 30, or other portion of the system. Liquid may be drawn out of receiver while under such vacuum through the draw-off pump 43 and line 44 having control valve 45, as shown in drawing. By means of this vacuum a maximum amount of the oil will be flashed into vapor in the expansion chamber and it will be possible for the distillation to proceed under a lower temperature in the expansion chamber than were it under pressure in order to get the same amount of vaporization. However, by holding the temperature in the expansion chamber so that the vapors leave the expansion chamber at, say, 900 deg. F., while maintaining a vacuum on such expansion chamber, so much of the oil in the expansion chamber will flash into vapors as to in effect leave nothing but a clean, dry coke in the expansion chamber. This, of course, may result in a very large amount of reflux condensate, and it may be desirable to bypass part of the reflux condensate, or treat it elsewhere.

I claim as my invention:

1. A process of cracking petroleum oil, consisting in subjecting charging stock, residuum and reflux condensate separately and independently to such cracking conditions of temperature and pressure as are best suited for the conversion of the particular materials, delivering the same to a common expansion chamber, where the various constituents are intermingled, taking off vapors, subjecting them to reflux condensation and returning the residuum and reflux condensate formed in the process to be again subjected to cracking conditions of temperature and pressure, and maintaining a vacuum on the contents of the expansion chamber.

2. A process as defined by claim 1 characterized in that the charging stock consists of a light cut and a heavy cut which are separately heated to different degrees of temperature before they are delivered to the expansion chamber.

GUSTAV EGLOFF.