

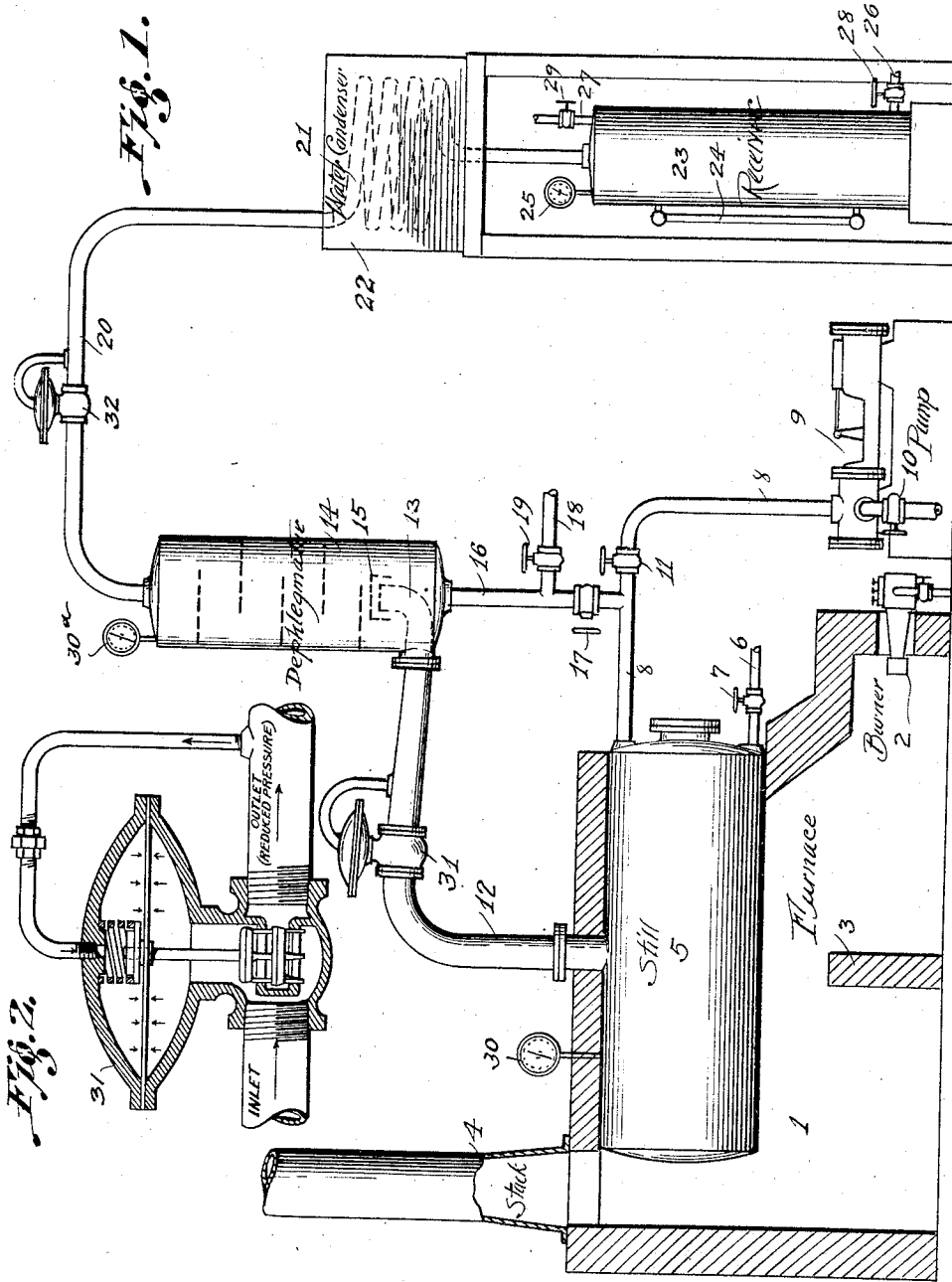
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PROCESS FOR CRACKING OIL

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PROCESS FOR CRACKING OIL

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This invention relates to a process for cracking oil and refers more particularly to the cracking of relatively heavy petroleum or petroleum distillates into light hydrocarbons such as gasoline, kerosene or the like.

The present invention consists in providing a process in which the oil is treated at successively decreasing pressures which drops in pressure are always at the same rate, relative to each other and are all controlled from the outlet side of the receiver or final condenser. This is accomplished by inserting automatic pressure valves in the desired parts of the system.

The following illustration will clearly show the essence of the invention: Assume the still is initially subjected to 300 lbs. pressure, then the automatic valves may be so adjusted that the pressure on the dephlegmator is say, 290 pounds and on the receiver and water condenser 280 pounds. By suitably regulating the outlet valves from the receiver, pressure on the still may be reduced to 290 pounds, which will automatically reduce the pressure on the dephlegmator to 280 pounds and on the water condenser to 270 pounds. This arrangement may permit of subjecting the vapors to condensing action in more expanded or attenuated form than where they are condensed under the same pressure as the still pressure.

Figure 1 is a diagrammatic illustration in side elevation of the apparatus employed in carrying out the process shown partly in section.

Fig. 2 is a sectional view of the pressure valve employed.

In the particular embodiment of my invention shown in the drawings, 1 designates the furnace having burner 2, bridge wall 3 and stack 4. In this furnace is mounted the still 5, which in the present instance is shown on the cylindrical or shell type. This still is provided with residue drawoff 6, controlled by throttle valve 7 and with charging line 8 connected with feed pump 9, this pump 9 being provided with suitable valves 10 and 11 on its inlet and discharge sides respectively. Vapors pass out of the still 5 through the gooseneck or vapor outlet 12, which va-

por outlet extends as shown at 13 into the lower end of a dephlegmator 14. A spaced cap member 15 is mounted above the pipe 13, the arrangement being such as to permit the oil or vapors to pass into the dephlegmator while preventing the reflux condensate from falling back into the pipe 12. Instead, the reflux condensate is drawn off from the bottom of the dephlegmator through pipe 16 leading to the charging line 8 and provided with throttle valve 17.

If desired, the reflux condensate may be drawn off through the branch line 18 controlled by throttle valve 19 to any other receptacle or still. The upper end of the dephlegmator is provided with a vapor outlet pipe 20, which leads to water condenser coil 21 seated in condenser box 22. This condenser coil 21 in turn connects to the upper end of receiver 23. This receiver 23 is provided with liquid level gauge 24, pressure gauge 25, liquid drawoff 26 and gas outlet pipe 27. The pipes 26 and 27 are provided with throttle valves 28 and 29 respectively. The still 5 is provided with pressure gauge 30 and the dephlegmator with a pressure gauge 30a.

As a feature of my invention, I insert in the vapor line 12 an automatic regulating pressure valve 31 and I also insert in the line 20 a similar automatic regulating valve 32. The arrangement of these valves is such that a less pressure on one side of the valves, as for example, the side nearest the receiver, will balance a greater pressure on the other side of the valve, for example, a pressure of 300 pounds on the still will be balanced by a pressure of 290 pounds on the other side of the valve 31. This balancing of the unequal pressures being accomplished by the provision of a compensating spring as shown in Fig. 2, which spring acts in conjunction with the lower pressure to maintain the balanced condition. The pressure of 290 pounds on the dephlegmator will be balanced by a pressure of 280 pounds on the receiver. It will be apparent that by reducing the pressure on the receiver from 280 pounds to 270 pounds, there will be a corresponding drop of 10 lbs. on both the still and dephlegmator.

It is to be understood that this ten pound drop is merely illustrative of what the drop may be, but to whatever extent the pressure is reduced in the receiver, there will be a
 5 corresponding reduction of pressure on the dephlegmator and still.

The process may be operated as follows: The still may be charged with a mid-continent gas oil or fuel oil and subjected to a
 10 pressure of 300 pounds in the still for a period of say, three hours. At this time, the pressure on the dephlegmator may be 290 pounds and on the receiver 280 pounds, depending on the manner in which the automatic valves
 15 are adjusted. For the next hour, the pressure may be reduced ten pounds on each part of the system and a further reduction of ten pounds for every hour until the entire pressure has been reduced to say, 50 pounds.
 20 During all this time, the oil in the still may be heated to a temperature of say, 750 degs. F.

As a modified method of carrying out the process, the still temperature may be continuously reduced as the still pressure is reduced. The reflux condensate may be returned in either case continuously to the system or drawn off elsewhere.

As a further modification of the process, the automatic valve 32 between the dephlegmator and condenser may be cut out of the system altogether and the vapors allowed to pass freely from the dephlegmator to the water condenser. In such case, the different pressure will only be between the still and the remainder of the system.

As a still further modification of the process, the automatic valve 31 may be cut out of the system and the vapors allowed to pass freely from the still 5 to the dephlegmator.
 40 In this case, there will be a different pressure only between the still and dephlegmator on the one hand and the water condenser and receiver on the other.

I claim as my invention:

45 1. A continuous process for cracking oil, consisting in subjecting the oil in a heating zone to cracking conditions of temperature and pressure, in passing the generated vapors to a dephlegmator, in passing the dephlegmated vapors from the dephlegmator to a
 50 condenser and in collecting the resulting distillate, in maintaining an initial predetermined pressure on the oil in the heating zone and a predetermined lower pressure on the
 55 oil in the dephlegmator, in maintaining in the condenser a predetermined lower pressure than maintained in the dephlegmator, and in gradually reducing the pressure throughout the system as the treatment of the oil proceeds while maintaining constant the predetermined difference in pressure between the heating zone and the dephlegmator and between the dephlegmator and the condenser.

65 2. A process of cracking oil, consisting in continuously passing oil to a heating zone

where it is subjected to conversion conditions of temperature and pressure, in passing the evolved vapors to a dephlegmator, in passing the dephlegmated vapors to a condenser, in collecting the resulting distillate, in maintaining a lower pressure in the dephlegmator than in the heating zone, in maintaining a lower pressure in the condenser than in the dephlegmator, in gradually reducing the pressure on the system while maintaining constant the difference in pressure between the heating zone and the dephlegmator and between the dephlegmator and the condenser.

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