

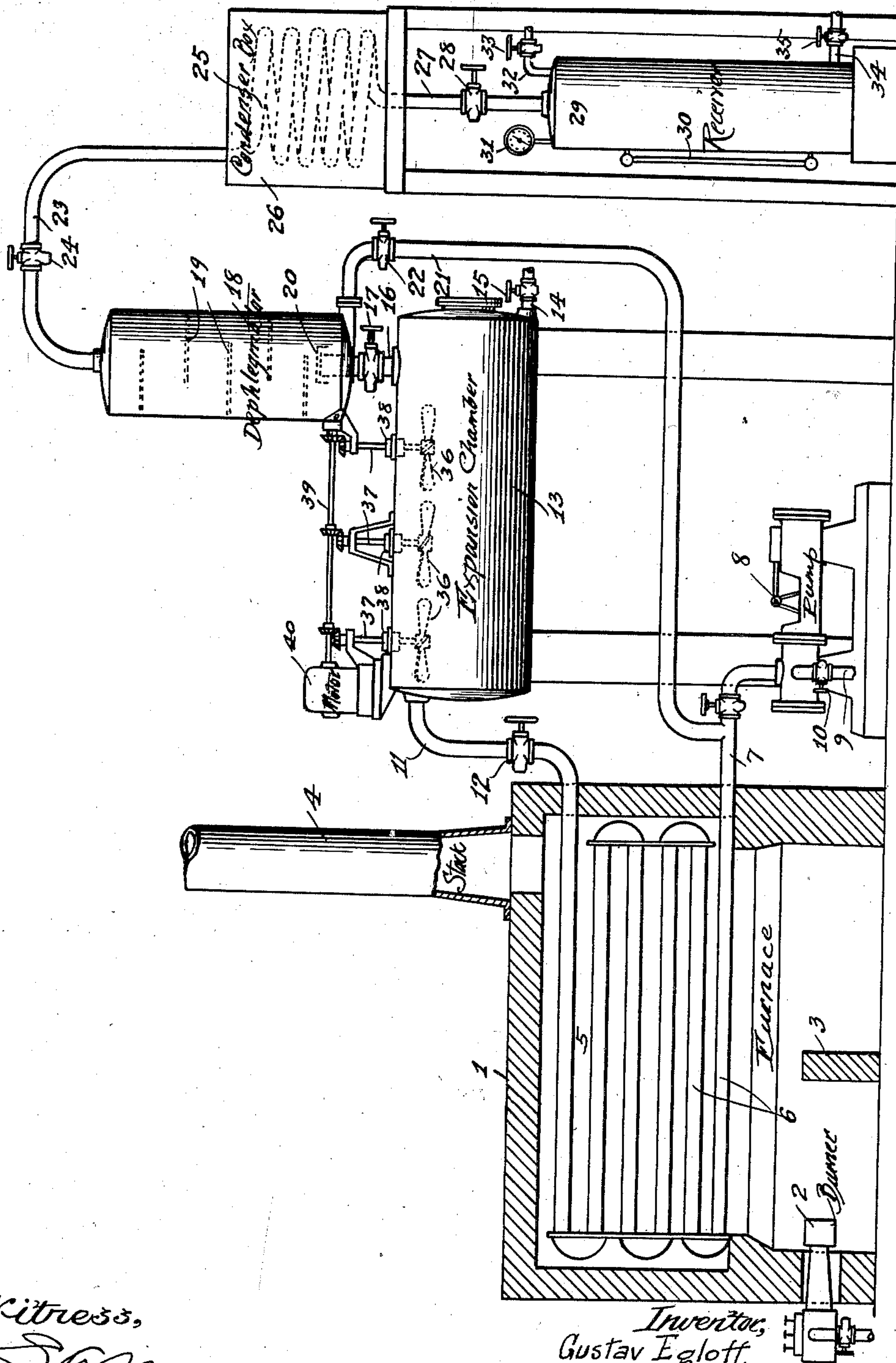
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PROCESS AND APPARATUS FOR CRACKING OIL

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UNITED STATES PATENT OFFICE.

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PROCESS AND APPARATUS FOR CRACKING OIL.

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This invention relates to improvements in process and apparatus for cracking hydrocarbon oils and has for its object to agitate the vapors to increase the speed and effectiveness of cracking.

In the drawing, the single figure represents a view, partly in vertical section and partly in side elevation, of my improved apparatus.

Referring in detail to the drawing, 1 designates the furnace, having burner 2, bridge wall 3, stack 4 and combustion chamber 5. In the combustion chamber is mounted the heating coil 6, which may take the form of a continuous coil of 4" pipe, the inlet side of which is connected by feed line 7 to charging pump 8. Charging pump 8 is connected at its suction side to line 9, having throttle valve 10 leading to any suitable source of raw oil supply. The discharge into the coil 6 is connected by transfer line 11, having throttle valve 12 to the upper part of a relatively large expansion chamber 13. This expansion chamber 13 is provided with liquid draw-off line 14 and throttle valve 15. The expansion chamber is also provided with the vapor outlet pipe 16 and throttle valve 17, which pipe 16 extends into the bottom of a dephlegmator 18, the dephlegmator being provided with suitable baffling material 19. The upper end of the pipe 16 extends above the lower end of the dephlegmator and is provided with the spaced cap member 20 which prevents the reflux condensate from flowing back into the pipe 16 while permitting the vapors to escape into the dephlegmator. The reflux condensate is drawn off from the bottom of the reflux condenser by reflux line 21 controlled by throttle valve 22, which line 21 is connected to the feed line 7 as shown. The upper end of the dephlegmator is connected to vapor outlet pipe 23 controlled by throttle valve 24 and leading to condenser coil 25 seated in condenser box 26. The lower end of the coil 25 is connected by pipe 27 controlled by throttle valve 28 to receiver 29. This receiver 29 has liquid level gauge 30, pressure gauge 31, liquid drawoff pipe 32 controlled by throttle valve 33 and uncondensable gas outlet pipe 34 having throttle valve 35.

Referring now to the salient feature of the invention, I provide in the upper part of the expansion chamber a plurality of mechanical agitator members which may take the form of fans 36 spaced apart and extending longi-

tudinally of the expansion chamber. These fans 36 are carried by shafts 37 mounted in suitable oil tight bearings 38 and are actuated from the main drive shaft 39, connected to motor 40. The arrangement is such that as the oil enters the expansion chamber, vaporization takes place and the vapors agitated by means of the fans shown. These fans serve to keep the vapors in constant agitation and rapid and rather violent contact with each other.

The process may be carried out as follows: Mexican crude oil having little or no gasoline content, is fed continuously into the heating tubes and heated to a temperature of say, 680 degrees F., and a pressure of say, 90 pounds. It is delivered in substantially liquid phase to the expansion chamber where vaporization takes place. The vapors pass to the dephlegmator where the heavier portions are condensed and continuously returned as reflux condensate to the heating tubes. The uncondensed portions pass out of the upper end of the dephlegmator to the final condenser where they are condensed and thence to the receiver.

A uniform pressure may be maintained on the system, if desired. As the vapors enter the vapor chamber, they are, as heretofore stated, subjected to the violent agitation of the fans, which inasmuch as they tend to promote cracking, will tend to cause a higher percentage of the vapors to leave the dephlegmator in vapor form.

I claim as my invention:

1. A process of cracking oil, consisting in passing the oil through a coil of restricted cross-sectional area, disposed within a furnace wherein the oil is subjected to cracking conditions of temperature and pressure and in introducing said oil while at a cracking temperature to an enlarged expansion chamber wherein vaporization occurs, in mechanically agitating the vapors in said chamber by rotating elements disposed therein, and in then passing the vapors from the expansion chamber for dephlegmation, condensation, and collection.

2. A process of cracking hydrocarbon oil, consisting in continuously passing the oil in a stream of restricted cross-sectional area through a heating zone wherein it is subjected to cracking temperature while maintained under a superatmospheric pressure, in discharging said stream into an elongated

expansion chamber wherein vaporization occurs, in subjecting the vapors in the upper portion of said chamber to the action of mechanical rotary agitating members, in de-
5 phlegmating the vapors issuing from said expansion chamber, in continuously returning the reflux condensate resulting from such dephlegmation to said stream for treatment, in condensing the vapors resulting from said
10 dephlegmation and collecting the resulting distillate.

3. An apparatus for treating hydrocarbon oil, comprising a heating coil, an expansion

chamber, means connecting the said coil to said expansion chamber, said expansion 15 chamber having an oil inlet and a vapor outlet, a dephlegmator communicating with the vapor outlet, a plurality of agitating fans disposed within the upper portion of said vapor chamber, means for rotating said agitating 20 fans, a condenser connected to said dephlegmator, a receiver in communication with the discharge side of said condenser and means for maintaining a superatmospheric pressure upon the apparatus.

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