

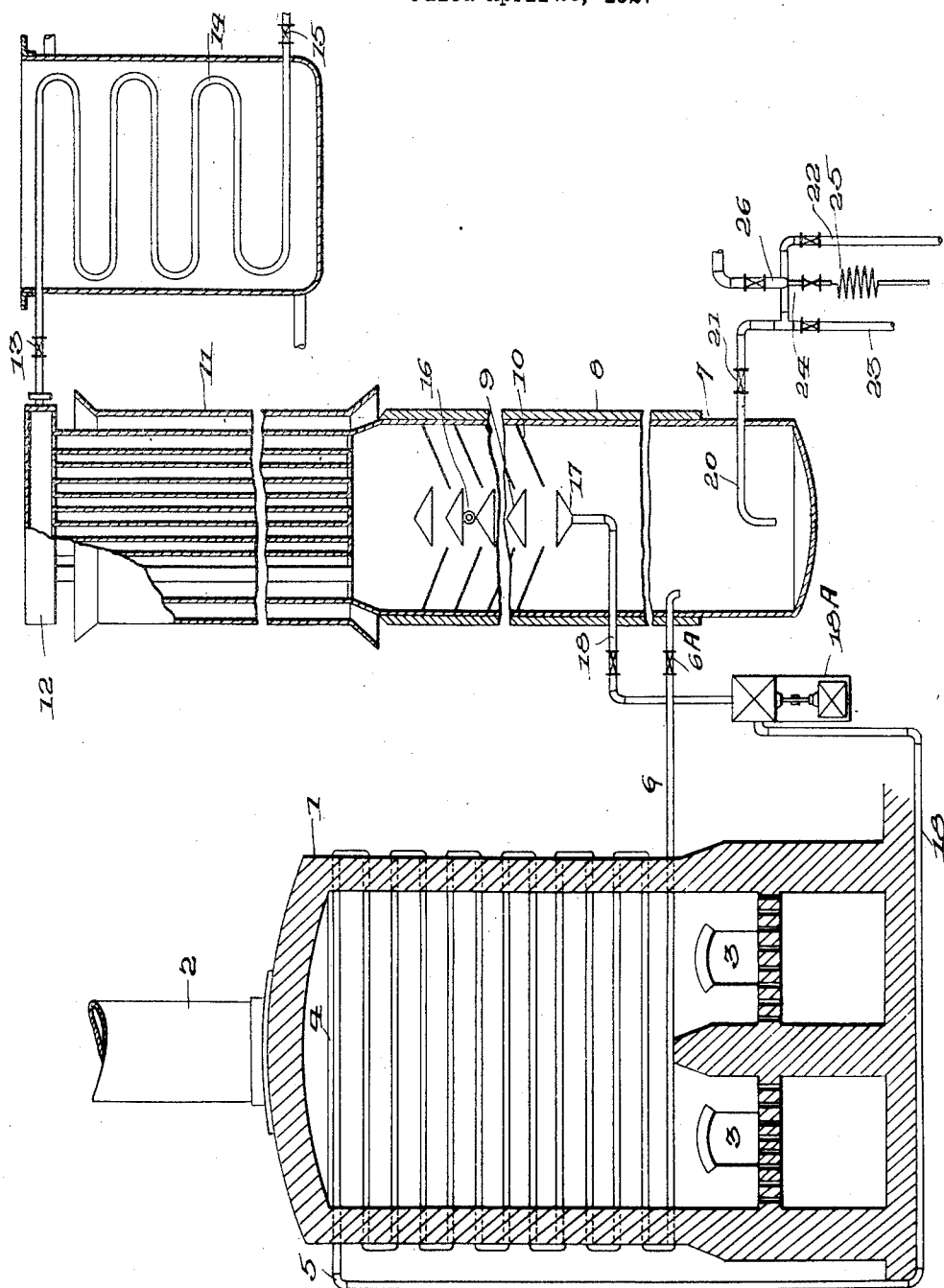
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PRESSURE STILL PROCESS

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PRESSURE-STILL PROCESS.

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This invention relates to pressure still processes; and comprises a process of flushing out the tar draw-off of a pressure still by the introduction under pressure through such draw-off and at intervals of a quantity of solvent, advantageously some of the pressure still distillate; all as more fully hereinafter set forth and as claimed.

According to some commercial methods of cracking petroleum hydrocarbons now in use, oil is passed continuously through a heating zone and then delivered to a chamber from which vapors are continuously removed. Usually the process is performed under pressure and usually unvaporized oil is continuously removed from the chamber. Particularly in processes in which the chamber is used as a reaction zone where vaporization and conversion occur, there is an accumulation in the chamber of tar, tarry matters, asphaltic matters, coke and heavy residuum. These tend to clog the draw-off pipe and to that extent shorten the length of a run. In a process where a large part of the cracking and vaporization occurs in the tubes and where the products of the cracking and vaporization are delivered to a separating chamber, there is some small accumulation of heavy residuum, tar and coke in the chamber. In such a process where the chamber receiving the heated products is kept substantially empty of liquid oil the same tendency to clog the draw-off pipe exists. Attempts have been made to keep the draw-off open by using mechanical scraping, cutting or drilling devices at intervals, but there are inherent disadvantages in the use of such appliances. It is difficult to operate them and keep the stuffing boxes used in connection with them leak-proof and the operation involves the loss of considerable time as well as the employment of several workmen.

In accordance with my invention, during the pressure distillation, I intermittently force through the draw-off line into the chamber a quantity of oil capable of dissolving and loosening the asphaltic materials formed in the draw-off line. The flushing oil used may be a light gasoline or a solvent naphtha, but is advantageously the pressure still distillate itself. It should be forced through the draw-off line by a pump pressure slight-

ly greater than the pressure prevailing in the chamber.

In the accompanying illustration I have shown more or less diagrammatically a cracking unit in which pressure distillation may be carried on, provided with connections adapting the unit for the performance of my process.

The invention is illustrated in combination with an oil cracking process in which charge oil is heated and vaporized in tubes, the products of such heating are delivered from such tubes to a separating chamber, resulting vapors are dephlegmated, and outgoing vapors scrubbed with charge oil, the charge oil and reflux condensate delivered to the inlet side of the heating coils, the vapors passing reflux condensation are condensed, and residual oil is withdrawn from the separating chamber substantially as fast as it accumulates therein.

In the drawing 1 indicates a furnace provided with a stack 2 and with means for heating, such as oil burners or the like, located at 3. In the furnace is mounted the coil 4 which, for the purpose of illustration, is shown as a continuous coil having the feed end 5 and discharge 6. The charge oil is vaporized in the coils 4 and the vapors with, perhaps, a slight amount of unvaporized oil, are delivered by the discharge 6 to the lower end of a separating chamber 7, heat-insulated particularly at its upper part by insulation 8. The upper part of the chamber is provided with a plurality of baffles 9 and 10 and with the air cooled condenser 11. From the header 12 of the air cooled condenser the vapors pass through pressure release valve 13 to the condensing coil 14 and by means of line 15 to the receiving house. Oil to be cracked is forced by means of pump pressure into the separating chamber, preferably at a mid-point through inlet 16 and serves to scrub the ascending vapors in such chamber. The baffles provide for good contact of oil and vapors and deliver charge oil and condensate to a collecting trap 17 which is provided with pipe 18 leading to the inlet end 5 of the heating and vaporizing coil. Pump 18^a is provided for forcing the oil through the coil. The separating chamber 7 need not be insulated at the lower end since it is not the purpose to cause any reaction or

conversion of any incidental oil which may accumulate in the lower section of the separating chamber. At the lower end of the separating chamber there is provided residuum or tar draw-off 20 leading past valve 21 to the pumping-out line 22. 23 indicates the charging line leading to a source of raw oil supply and is used when the still is first put on a run. The valve line 24 leading through cooler 25 may be used as a sampling connection. This may be of smaller diameter than the other lines. In communication with the draw-off line 20 there is provided inlet line 26 leading to a source of solvent which may well be, and preferably is, pressure distillate usually of about 54° Bé. gravity.

The cracking process may be run in any commercial way, necessary pressures being maintained by means of pressure valve 13 or 15. In fact, the pressure on the vapors from the cracking tubes may be released before such oil and vapors enter the separating chamber 7 by valve 6^A.

During the continuous run the discharge line 20 becomes clogged. This is particularly so with some classes of charging stock containing a relatively high proportion of carbon to hydrogen, or in other words generally heavy gravity stocks. The clogging occurs because of the formation of granular coke, solid asphaltic binder and tarry matters, referred to as residuum. I have found that the formation of the residuum in the draw-off in such operations often clogs the pipe in anywhere from 75 to 200 hours and correspondingly limits the length of a run. By pumping in a dissolving form of distillate through the inlet 26 I can dissolve this asphaltic binder and flush the solid carbon back into the still. This cleans out the pipe and can be done while the still is in operation without interfering at all with the normal operation, thereby prolonging indefinitely the length of a run, or at least preventing limitation of a run due to clogging of the draw-off.

In practice I pump back pressure still distillate which is about 54° Bé. gravity and I have found a good practice is to pump back about 5 barrels of such distillate at eight-hour intervals. Of course, the pump pressure for delivering the flushing distillate must be greater than the pressure prevailing in the separating chamber 7. While it is sometimes advantageous to preheat the pressure still distillate I have found that it is not necessary to do so because of the small amount of oil in the separating chamber. In the separating chamber there is only sufficient oil to cover the inlet of the draw-off 20. But if the process is run in such a way that there is a substantial quantity of oil in the chamber 7, I preheat the solvent oil somewhat, and where a high degree of preheat is

advisable I use a higher boiling solvent oil.

The exact character of distillate, the interval of time for flushing, and the amount of distillate pumped in, can of course be varied and need not be closely limited, as all these conditions vary according to the nature of the still operation, the size of the pipe and connections, the working temperature, the particular time of the run and the character of charging stock.

I have found that during the first part of the run it is not necessary to frequently flush out the tar draw-off but after a duration of about a day, and in some cases a little less, the draw-off line 20 commences to clog. This can be ascertained by observing the operation of the pump-out line 22 or by observations of samples from line 24. When it is desired to flush the draw-off line the valve on line 22 is closed (the valves on lines 20, 23 and 24 are normally open during a run) and the valve on line 26 is opened, whereupon the solvent—best pressure still distillate—is pumped in through line 26 and through the draw-off line 20. This pressure still distillate dissolves the asphaltic binder which is formed, loosens coke, tar and heavy residuum and forces them back into the still. It takes only a few minutes to pump in the necessary amount of pressure still distillate, an average of 5 barrels each time being about all that is necessary. As soon as this pressure still distillate is flushed out of the tar draw-off the valve on line 26 is closed and the valve on line 22 is opened and the draw-off of the pressure still tar or residuum through lines 20 and 22 is continued.

What I claim is:—

1. In an oil cracking process in which pressure still tar or residuum tends to clog the draw-off line, the process which comprises intermittently, during the pressure distillation, forcing through the draw-off line in a direction opposed to the normal draw-off, a quantity of solvent at a pressure greater than that prevailing at the point of normal draw-off.

2. In an oil cracking process in which pressure still tar or residuum tends to clog the draw-off line, the process which comprises intermittently, during the pressure distillation, forcing through the draw-off line in a direction opposed to the normal draw-off, a quantity of pressure still distillate at a pressure greater than that prevailing at the point of normal draw-off.

3. In an oil cracking process in which pressure still tar or residuum tends to clog the draw-off line, the process which comprises intermittently, during the pressure distillation, forcing through the draw-off line in a direction opposed to the normal draw-off a quantity of solvent oil of about 54° Bé. gravity at a pressure greater than

that prevailing at the point of normal draw-off.

4. In the distillation of petroleum oils by a pressure process in which oil accumulates in a chamber and from which chamber the oil is drawn off by means of a draw-off line, the step of cleaning the draw-off line by

forcing therethrough into the chamber an oil capable of dissolving asphaltic binding material tending to clog the draw-off line.

In testimony whereof, I have hereunto affixed my signature.

CHARLES B. BUERGER.