The present invention relates to the art of distillation, particularly in connection with operations on materials which are subject to thermal decomposition unless the distillation is properly controlled. The invention will be fully understood from the following description, reference being had also to the accompanying drawing, in which

The figure represents a side elevation partly in section, of one form of apparatus contemplated in the invention.

The present types of vacuum stills have not shown as good results as could be desired, for the reason particularly, as we have found, that too much resistance is interposed in the path of the vapoors and the effective vacuum realized at the surface of the vaporizing liquid is correspondingly not what the pump efficiency would lead one to expect. In the case of decomposable materials, as for example lubricating-oil distillates, this results in increased decomposition or cracking, with a lowered viscosity and flash.

In proceeding in accordance with the present invention, we provide a suitable still or vaporizing receptacle for the liquid being heated in the example illustrated in the drawing, this taking the form of a cylindrical shell 1 mounted over a suitable heater chamber. Such still may be set up and used as an individual unit if desired, or more advantageously, as shown, a plurality, to the number desired, may be arranged to operate in a battery; in this latter case a flow line F having valves F' and branch connections to and from the stills is provided for furnishing the feed and removing the residuum. A separate residuum pipe may be added if desired and in the case of an individual still simple feed and residuum pipes may be used connecting directly to respective tanks.

In the top of the still means is provided for condensing the vapors and taking away the condensate. This comprises a cooling or chilling coil 9 with connections 10 arranged to be supplied with a suitable cooling fluid and below the coil a drip deflector 12, and a collector pan 14 to catch the condensate and discharge by pipe 15 into a suitable receiver (not shown, for simplification) having vacuum connections for use when desired.

A conduit 20 leads from beyond the cooling zone to a vacuum pump (not shown, for simplification); and a manometer and thermometers are located on the still as desired.

In operation, liquid to be distilled is admitted from the feed tank in the case of an individual still or from the flow line in the case of a battery, and in continuous running as the distillation proceeds feed liquid is supplied as desirable by regulating the valve. The residuum is withdrawn either to the tank or to the next still according as operating singly or in battery. Vapors rising from the distilling liquid proceed to the cooling zone in the top of the still and are condensed and by reason of the path from the liquid surface to the condenser being relatively short and without constriction an effective vacuum is realized through the system down to the liquid surface.

The path of the vapors is comparatively short and the cooling being controlled and restricted to a predetermined zone arranged to handle the condensate, refluxing run-back to the still may be correspondingly avoided, a matter which is of importance in the comparatively low-temperature operations with extreme vacua very low absolute pressures, for example 25 mm. or less of mercury.

While in describing the invention, we have referred to certain specific details it will be understood that this is for the purpose of illustration and not limitation, and the invention is to be regarded as limited only as defined in the following claims in which it is our intention to claim all inherent novelty as broadly as the prior art permits.

The present application is a division of our co-pending application Serial No. 609,872.

We claim:
1. In the distillation of high boiling oil, the improvement that comprises distilling a body of the oil by direct fire heat under very low absolute vapor pressure and below a temperature at which substantial cracking occurs in the oil body, taking off the vapors through a passage substantially without con- striction between the surface of the oil and a condensing zone, preventing substantial drop in the temperature of the vapors until they approach said zone, whereby refluxing is
minimized, and collecting the condensate formed in said zone.

2. In the distillation of high boiling oil, the improvement that comprises distilling a body of the oil by direct fire heat under very low absolute vapor pressure, and below a temperature at which substantial cracking occurs in the oil body, passing the vapors through a passage substantially without constriction between the surface of the oil and a condensing zone, jacketing the passage with a hot medium to avoid substantial drop in the temperature of the vapors, thereby substantially preventing refluxing, and collecting the condensate formed in said zone.

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