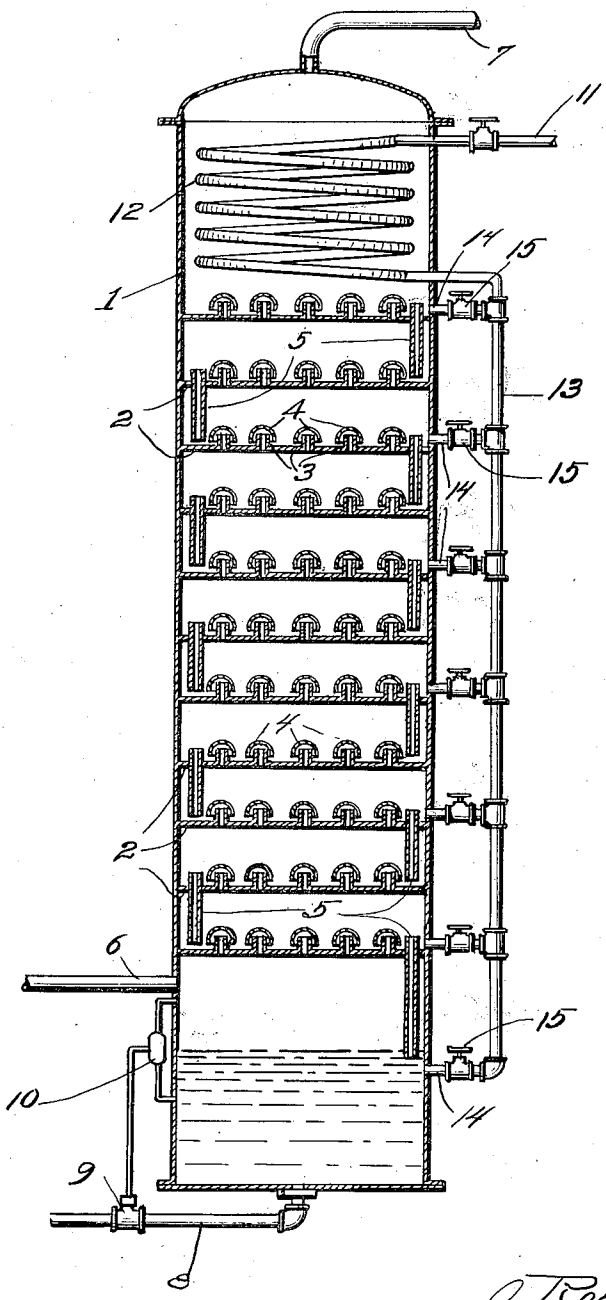
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REFLUXING TOWER

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REFLUXING TOWER.

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This invention relates to improvements in refluxing towers, and refers more particularly to a refluxing tower or dephlegmating means whereby oil vapors may be relieved of their higher boiling point fractions prior to final condensation.

Among the objects of the invention are, to provide a construction in which are positioned a plurality of stages or compartments wherein separate pools are maintained and through which the vapors are caused to bubble or percolate in rising from the bottom to the top of the tower; to provide a bubble tower construction wherein the vapors rising from the lower to the upper part of the tower pass in an opposed direction to the liquid which gravitates downwardly from pool to pool and is drawn off from the bottom of the tower; to provide a construction in which, in addition to being percolated through a relatively cool oil, the vapors are subjected also to the dephlegmating action of a closed coil through which is circulated a relatively cool medium such as a raw charging stock or distillate which is desired to be rerun.

The single figure is a sectional side view of the apparatus.

The tower is adapted for use on a skimming plant or on a plant utilizing atmospheric conditions and may also be used in connection with a cracking still in which the vapors are treated under pressure.

Referring to the drawings, the tower 1 is preferably of a cylindrical steel shell type having a plurality of pans 2 which are removably supported in the tower, each pan having a number of risers 3 through which the vapors pass in their travel from the lower part to the upper part of the tower. These risers are covered by caps 4 which serve to reverse the travel of the vapors, causing them to pass beneath the liquid level of the separate pools maintained on the pans due to the height of the overflow pipes 5 whose upper extremities are level with the risers on the pans. The lower extremities of these overflow or downcomer pipes are immersed in the pool carried by the pan below. The vapors from the still which are to be treated in the tower are introduced through the vapor inlet line 6 and pass up through the successive pools where they are percolated through the oil in each pool and finally pass off through the gooseneck 7 which is connected to a final condensing stage not shown. The reflux material collected in the bottom of the tower is drawn off through the pipe 8 which may be controlled by a manually operated valve or a valve 9 controlled by an automatic liquid level regulating device such as is diagrammatically shown at 10.

A further means for dephlegmating the vapors is the introduction of a relatively cooler medium, such as the raw oil charging stock or a rerun distillate circulated through the inlet line 11 connected with the closed coil 12 positioned in the top of the tower. The discharge end of this coil connects with a vertical pipe 13 which has a plurality of secondary connections 14 in which are interposed valves 15. The function of these secondary connections is to supply the oil circulated through the closed coil and introduced through the line 11 to any of the pools desired. The pool into which this oil is to be introduced can best be ascertained by its temperature as it is discharged from the closed coil 12, that is, should the oil, as it is discharged from the closed coil, have substantially the same endpoint temperature as the oil in the top pool, then the valve 15 in the upper secondary line may be opened and the lower valves closed in order to direct this preheated liquid into the top pool. By so doing, it will receive the treatment in the tower the same as the reflux material from the oil vapors.

A further method of operation would be to permit a portion of the oil to be charged to the upper pool and the remainder to the lower stages. The main principal is to preheat the oil in a coil in the top of the tower which assists in the refluxing treatment to which the vapors are subjected in the bubble tower. This preheated oil is then admitted to the tower in a tray or pan containing the oil corresponding, in a general way, or having substantially the same endpoint as that discharged from the closed preheating coil. Several different points of introduction are provided in the tower for the purpose of affording an entrance to the tower at the most advantageous point.

The tower has the advantage that any kind of proudct may be introduced. A pressure distillate requiring rerunning can be circulated through the coil and then introduced into the tower below, thus greatly

increasing the output of the tower. In case the charging stock is being preheated in the closed coil, it is decidedly advantageous to introduce it lower down than the upper pan in order to prevent certain of the objectionable fractions from being carried overhead either mechanically or due to insufficient dephlegmation. In a typical instance, oil charged was admitted at 80° F. and passed out of the coil 12 at 400° F. This oil was introduced in one of the trays wherein the endpoint of the oil was at substantially 450° F. By so doing, the final distillate was not radically affected by the introduction of the oil nor was there any objectionable fractions which are invariably present where the charging stock is introduced directly into the top of the tower. Also, the yield of the tower was noticeably increased.

An ordinary bubble tower will have from twenty to thirty trays or pans and the temperature decreasing from below upward at the rate of about 5° F. per tray. As mentioned, the purpose of the invention is not only to increase the capacity of the tower and improve the heat interchange, but to prevent any of the heavier products of the charged stock, when it is being circulated through the closed coil, from being carried over without thorough fractionation in the tower. If the product pumped in has the same endpoint as the product being recovered, then it is unnecessary to introduce the oil to a lower tray or may be charged directly into the upper part of the tower.

I claim as my invention:

A refluxing tower of the character described, comprising a bubble tower construction, trays adapted to support pools of oil, said pools having relatively different temperatures, positioned at different levels in the tower, a vapor supply line and perforations in said trays for permitting the vapors to rise and percolate through the pools of oil maintained on the trays, a closed coil in the upper portion of the tower wherein a cool medium is introduced and circulated and connections to the discharge end of the coil for passing the preheated medium to predetermined trays having thereon oil of substantially the same temperature and to a pool of oil maintained beneath the lowermost tray.

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