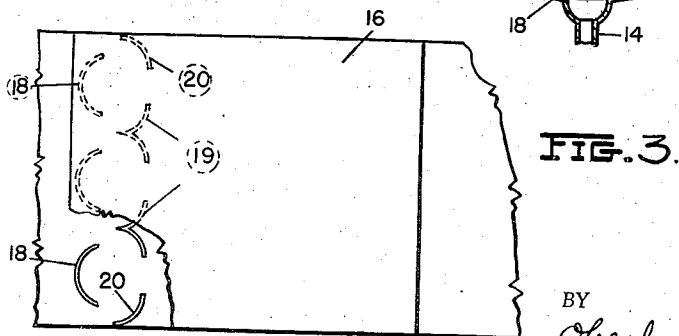
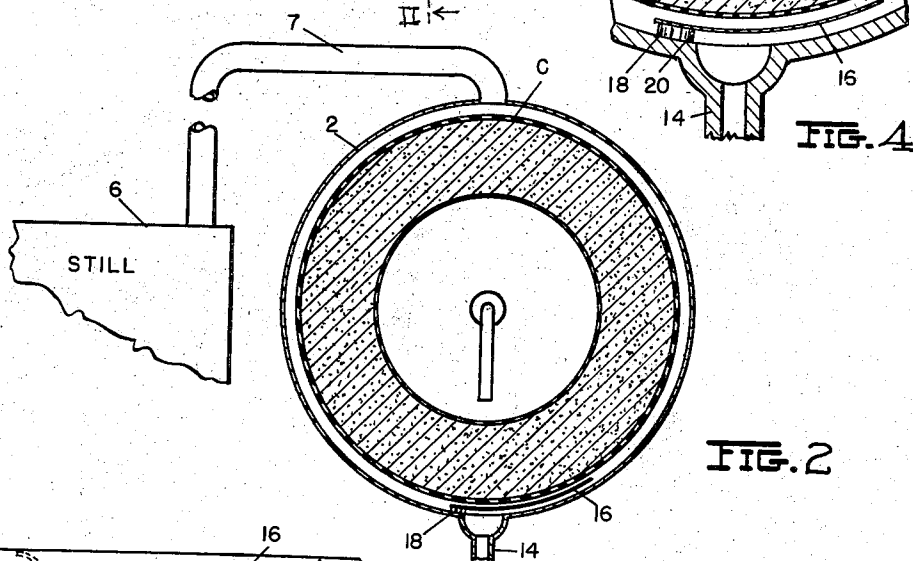
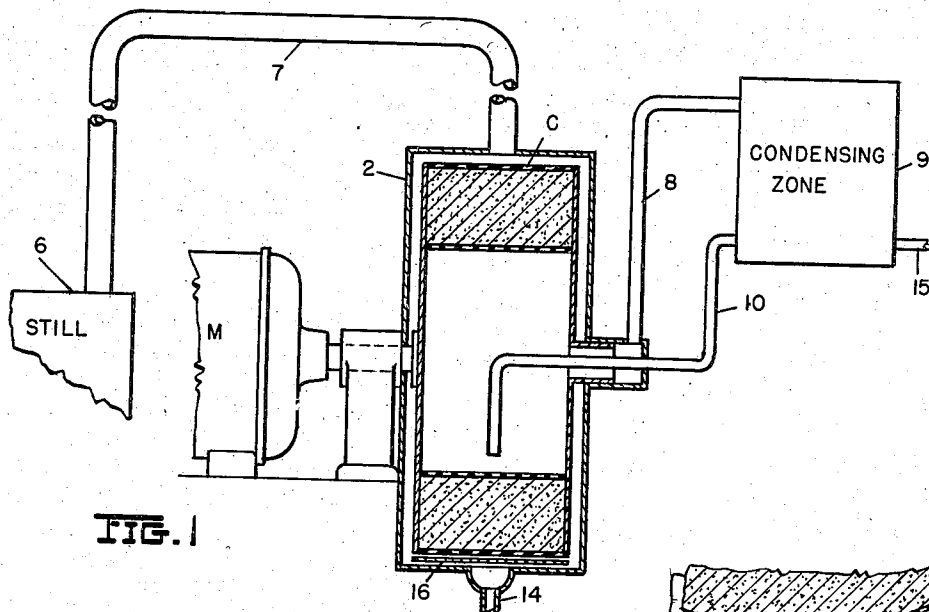


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FRACTIONAL DISTILLATION
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FRACTIONAL DISTILLATION

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6 Claims. (Cl. 261—83)

This invention, relating to liquid and gas contact or fractional distillation has more particular reference to mechanical contactor apparatus and especially of the type involving a rotary porous body, as set forth in the patent of Arthur G. McKee 2,259,762; and it is among the objects of the invention to improve the throughput rate of such apparatus.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is an axial sectional view of apparatus embodying the invention; Fig. 2 is a transverse section taken on a plane substantially indicated by line II, Fig. 1; and Figs. 3 and 4 are enlarged fragmentary detail views, Fig. 3 being in plan, of the lower portion of Fig. 2.

A rotatable annular mass or body C of porous character for vapor and liquid is arranged in a suitable housing 2 and rotated by convenient means, for instance a motor M. A connection 7 is provided for gas or vapor, and for instance for supplying vapors there may be a suitable distillation zone or still 6, such that vapors may pass to and through the porous contact body C and into the central space within the annular body, and thence on through an outlet connection 8 to a condensing zone 9; and from the latter reflux liquid may be returned in controlled amount through the connection 10 to discharge onto the inner periphery of the annular body C. The detail construction of the annular body may be as desired in any instance, whether of mesh material or of packed particles or shapes suitably held in annular form by a carrier pervious at its outer and inner peripheries. It is thus seen that vapors may pass counter to liquid, the vapors proceeding from the outer periphery center-ward and the liquid proceeding from the center toward the outer periphery, and enormously multiplied contact is provided, both by the extended small surfaces and passages in the porous filling and by the multiplied minute bubbles which escape through the inner periphery of the porous body and further contact in the layer of liquid which may be controllably maintained on the inner periphery of the rotating annular body. Liquid discharge from the rotor housing is provided by

an outlet connection 14; and final product discharge from the condensing zone is provided by an outlet connection 15. Where rotors are driven at high rates of speed, the windage created thereby interposes a hindrance against the liquid leaving the housing, and the throughput is limited. By the present construction however, over the outlet connection 14 in the housing I arrange a spaced cover baffle 16, which extends somewhat beyond the opening in both directions, and particularly in the direction of rotation of the annular body C. Under the cover baffle at the leading edge, are baffle elements 18, 19 and 20, in staggered positioning, the forward set 18 spaced apart in a transverse row, and diverting to the rearward elements of which the elements 19 as paired wings are spaced in the center and the elements 20 as single wings are at each side. With this arrangement, it is found that the circumferential velocity of the liquid from the rotor is decreased, and there is a low pressure area over the outlet or discharge opening, and the liquid runs out freely, thereby permitting the feeding of very large amounts without blockage or hindrance of the throughput of the apparatus.

As readily understood from the foregoing, in the practice of fractionation, the vapors entering the housing 2 pass into the rotating porous body C, while reflux liquid returning from the condensing zone 9 to the center passes out counter to the vapors, and particularly intimate and thorough contact is had through the porous mass, uncondensed vapors finally escaping at the center space of the rotary body and thence to the condensing zone, a sufficient drop of pressure in the condenser system allowing proper flow thereto. Liquid proceeding outwardly through the rotating contact body C runs into the baffle system at the outlet and thence discharges freely through connection 14, and the rotor may be driven at high speed as desired.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In apparatus of the character described, an annular body porous for vapor and liquid, means for rotating said body, a housing enclosing said body, means for introducing vapors into the housing, an outlet for vapors from the central space inside the annular body, an outlet for liquid from the housing near and concentric with

the cylindrical periphery of said annular porous body, and means promoting discharge through said outlet.

2. In apparatus of the character described, an annular body porous for vapor and liquid, means for rotating said body, a housing enclosing said body, means for introducing vapors into the housing, an outlet for vapors from the central space inside the annular body, an outlet for liquid from the housing near and concentric with the cylindrical periphery of said annular porous body, and means for discharge of liquid from said housing, including an outlet and a baffle in relation with the outlet.

3. In apparatus of the character described, an annular body porous for vapor and liquid, means for rotating said body, a housing enclosing said body, means for introducing vapors into the housing, an outlet for vapors from the central space inside the annular body, an outlet for liquid from the housing near and concentric with the cylindrical periphery of said annular porous body, and means for discharge of liquid from the housing, including an outlet and a baffle over said outlet and extending in the direction of rotation of the rotary annular body.

4. In apparatus of the character described, an annular body porous for vapor and liquid, means for rotating said body, a housing enclosing said body, means for introducing vapors into the housing, an outlet for vapors from the central space

inside the annular body, an outlet for liquid at the lower portion of said housing near and concentric with the cylindrical periphery of said annular porous body, an arcuate baffle over said outlet extending in the direction of rotation of said rotating body, and staggered directing baffles under the leading edge of said baffle.

5. In a process of separating substances having different boiling temperatures by moving liquid in film form by centrifugal force over irregular surfaces traveling in annular path and forcing vapors of higher temperature than the liquid through the interstices between the films on the irregular surfaces, promoting discharge of liquid, which has passed over the irregular surfaces and on escape therefrom tends to be swept along with the annular movement, by interposing a region of resistance to annular fluid current movement external to the irregular surfaces.

6. In a process of separating substances having different boiling temperatures by moving liquid in film form by centrifugal force over irregular surfaces traveling in annular path and forcing vapors of higher temperature than the liquid through the interstices between the films on the irregular surfaces, promoting discharge of liquid, which has passed over the irregular surfaces and on escape therefrom tends to be swept along with the annular movement, by checking windage and providing lessened pressure at a desired point.

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