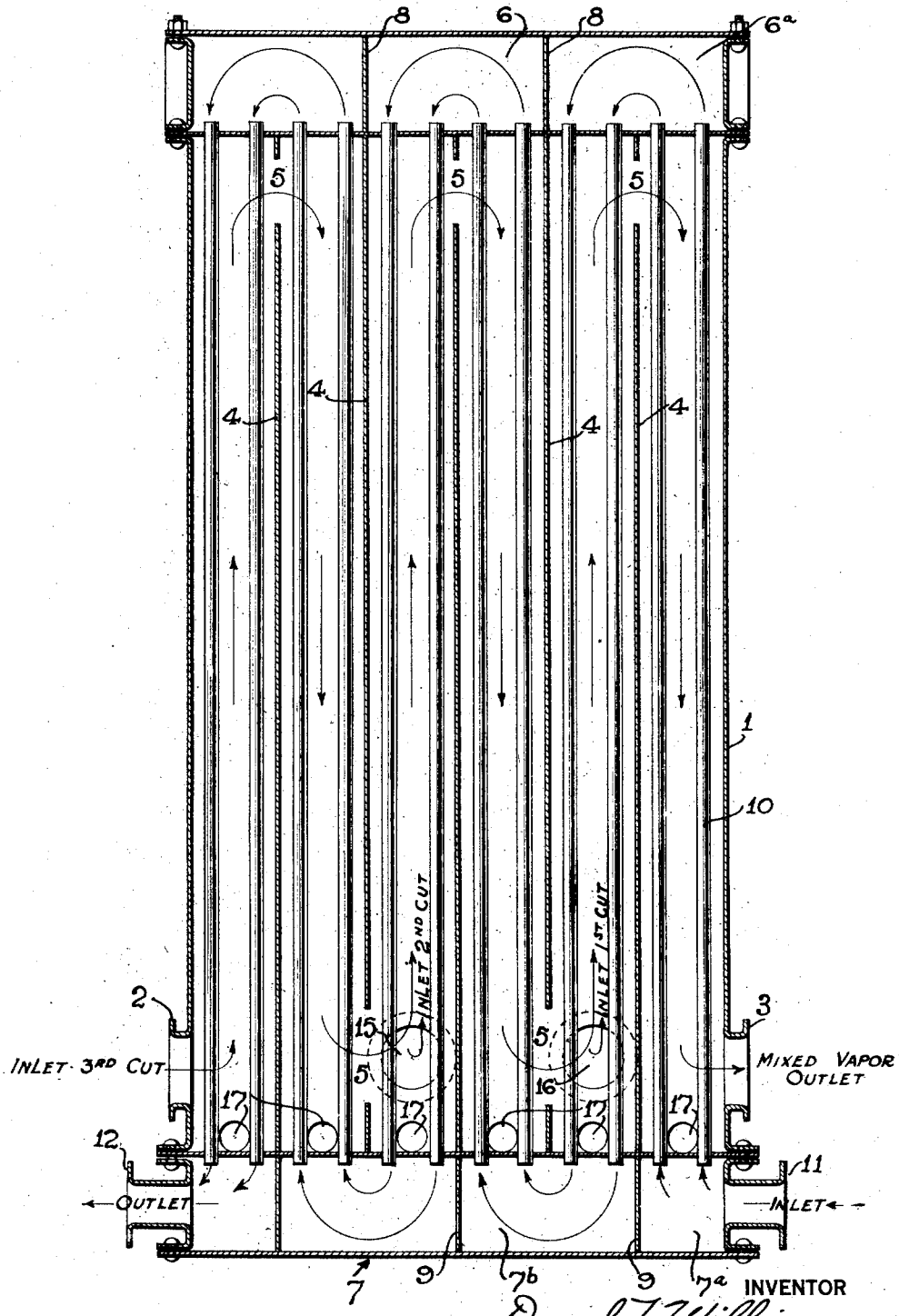
Aug. 6, 1929. D. T. WILLIAMS 1,723,637

FRACTIONATING CONDENSER

Original Filed Dec. 26, 1924



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FRACTIONATING CONDENSER.

Application filed December 26, 1924, Serial No. 758,039. Renewed January 2, 1929.

This invention relates to condensers, and pertains more particularly to a frictionating condenser adapted for use in connection with fractional distillation apparatus.

It is an object of the present invention to provide a condenser in which vapors of fractions of different characteristics may be separated and condensed efficiently and accurately, and in which the tendency of vapors of a given boiling point to condense with vapors of different boiling points may be minimized.

A preferred embodiment of the invention selected for purposes of illustration is shown in the accompanying drawing, in which,

The figure is a semi-diagrammatic longitudinal section through the condenser.

Referring to the drawing, an outer shell or casing 1 is provided which is supplied with inlet and outlet openings 2 and 3 respectively. The casing is provided with a plurality of longitudinal partitions 4 having openings 5 therethrough for the passage of vapors, the openings of alternate partitions being arranged at the top and bottom of the casing in order that the vapors in passing through the condenser from the inlet 2 to the outlet 3 may follow an elongated, circuitous path.

The top and bottom of the casing are provided with headers 6 and 7 which are divided by the partitons 8 and 9 respectively into a plurality of smaller chambers, the partitions 8 and 9 being arranged in such manner that the chambers at the top of the casing are in staggered relation to those at the bottom of the casing. Alternate top and bottom chambers are connected by means of a plurality of tubes 10 which may be provided in any number, depending on the cooling surface desired.

The header 7 is provided with an inlet opening 11 and an outlet opening 12. The cooling medium, which may comprise any suitable fluid, enters the chamber 7^a and passes upwardly through the tubes 10 to the chamber 6^a and thence downwardly through the tubes 10 to the chamber 7^b and so on through the circuitous path provided until the outlet 12 is reached which may be located in either the top or bottom header as dictated by constructional requirements. It will be observed that the path of the cooling medium is a circuitous path following in general the circuitous path taken by the vapors to be condensed except that the flow of vapors is in a direction opposite to that of the cooling medium. As will be apparent, the coolest portion of the condenser will be adjacent the vapor outlet 3 and the point of maximum heat will be adjacent the vapor inlet 2, while intermediate degrees of temperature will be maintained therebetween. As a specific example, the temperature of the incoming cooling medium may be approximately 70 degrees while the temperature at which it leaves the condenser may approximate 400 degrees. Thus the intermediate portions of the condenser would be maintained at temperatures between these two limits.

Between the inlet opening 2 and the outlet opening 3 and arranged at points having different intermediate temperatures as set forth above are the inlet openings 15 and 16 which are used in a manner described hereinafter.

At the bottom of each of the sections of the condenser is arranged an outlet opening 17 through which the condensed liquid may escape for collection.

The apparatus described is adapted to be used in connection with distillation apparatus in which a plurality of cuts or fractions are obtained simultaneously. It has been common practice heretofore to either condense each of these fractions separately in a separate condenser or to run them together through a single inlet into a frictionating condenser in which they were separated as they were condensed.

According to the present invention it is proposed to introduce vapors of different cuts at different points of the same condenser, and to introduce a vapor of high boiling point at a relatively hot portion of the condenser and to introduce vapors of lower boiling points at points of lower temperature. Thus, in the present apparatus the third cut vapors, being of relatively high boiling point, are introduced through the inlet 2 to the warmer part of the condenser while the second cut vapors being of somewhat lower boiling point are introduced through the inlet 15 into a zone of somewhat lower temperature. Similarly the first cut vapors being of still lower boiling point are introduced into a zone of still lower temperature.

By this means it is found that greater condensing efficiency is obtained in each of the

sections of the condenser in that vapors having a relatively narrow range of boiling points are admitted to each section, and danger of contamination of distillate of one cut by vapors of other cuts is thereby minimized. At the same time the expense of separate condensers for each cut is eliminated.

It will be apparent that while in the embodiment of the invention illustrated only three vapor inlets are shown, the number may be increased as particular operating conditions may warrant.

It is to be understood that the invention may be variously modified and embodied within the scope of the subjoined claims.

I claim as my invention:

1. A fractionating condenser having separate inlet openings for vapors of different boiling points at points in said condenser at which different temperatures are maintained.

2. A fractionating condenser of the contraflow type in which progressively decreasing temperatures are maintained in the cooling medium in the direction of vapor flow, having a plurality of inlets at points of different temperature for vapors of different boiling points.

3. A fractionating condenser in which progressively varying temperatures are maintained in the cooling medium, having a plurality of inlets at points of different temperature for vapors of different boiling points, whereby high boiling point vapors may be introduced at a point at which a high temperature is maintained, and progressively lower boiling point vapors may be introduced at points at which progressively lower temperatures are maintained.

4. A fractionating condenser having an elongated conduit for vapors to be condensed, a coextensive conduit for a cooling medium associated therewith, said conduits having inlet and outlet openings arranged to provide a flow of cooling medium in a direction opposite to the direction of flow of vapors, said vapor conduit being provided at intervals with inlet openings for vapors of different boiling points.

5. The method of fractionally condensing a plurality of vapor streams, each of different average boiling point, which comprises introducing said vapor streams simultaneously into a single condenser stream at intervals therealong, said single stream being maintained at progressively lower temperatures from the first inlet to the outlet opening.

6. The method of fractionally condensing a plurality of vaport streams, each of different average boiling point, which comprises introducing said vapor streams simultaneously into a single vapor stream maintained at progressively lower temperatures from one end to the other at points having temperatures substantially proportional to the average boiling point of each vapor stream.

In testimony whereof, I have signed my name to this specification this 23rd day of December, 1924.

DAVID T. WILLIAMS.