No. 710,974. Patented Oct. 14, 1902.

H. HIRZEL.

DISTILLING APPARATUS.

(Application filed Sept. 17, 1900.)

(No Model.)

Fig. 1.

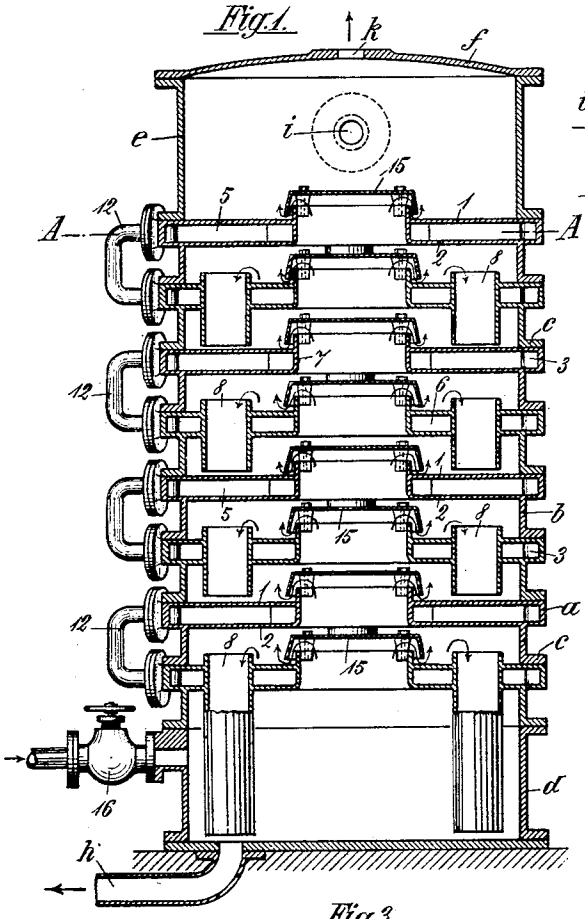


Fig. 2.

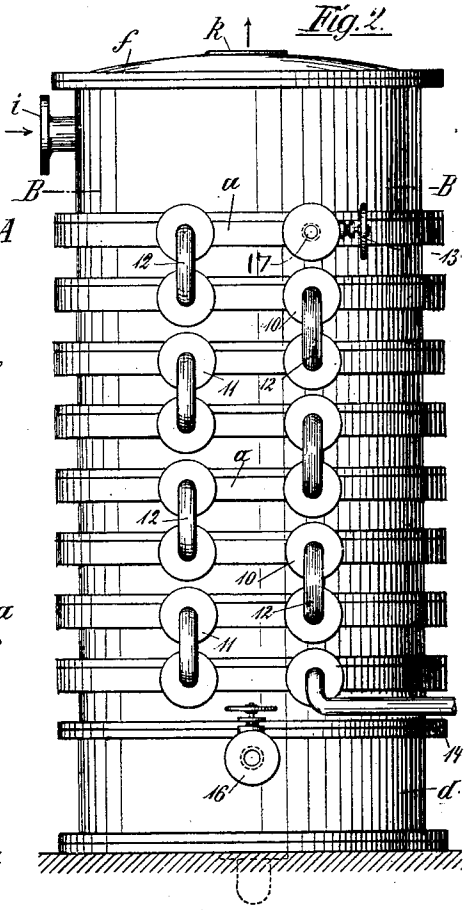


Fig. 3.

Section: A-A.

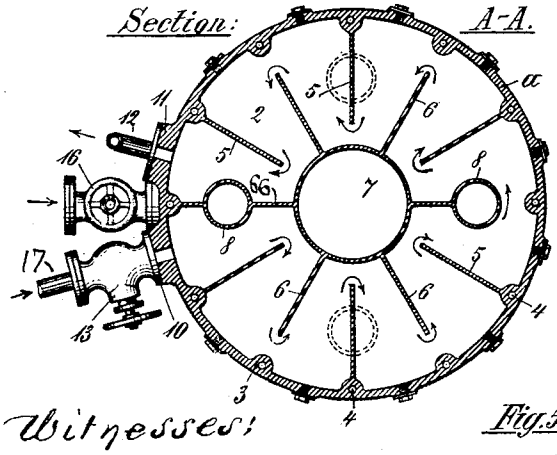


Fig. 4.

Section: B-B.

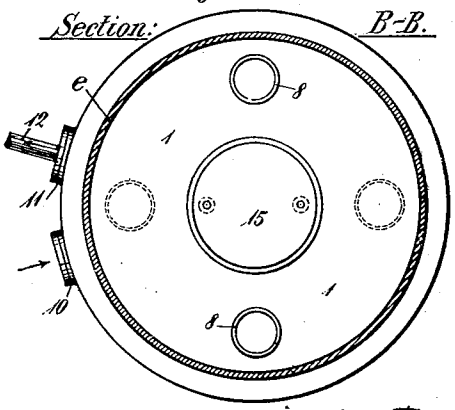
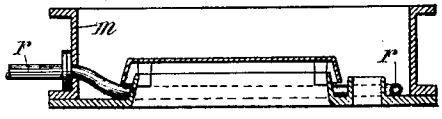


Fig. 5.



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UNITED STATES PATENT OFFICE.

HEINRICH HIRZEL, OF LEIPSIC-PLAGWITZ, GERMANY.

DISTILLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 710,974, dated October 14, 1902.

Application filed September 17, 1900. Serial No. 30,320. (No model.)

To all whom it may concern:

Be it known that I, HEINRICH HIRZEL, a citizen of the German Empire, residing at Leipsic-Plagwitz, in the Empire of Germany, have invented certain new and useful Improvements in Distilling Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to distilling apparatus, and in particular to the heating of distilling-columns for the purpose of enabling the distiller to raise the column-trays to any desired temperature and to make said temperature uniform for all the trays.

The object of my invention is to provide means for passing the heating medium through each of the trays in succession from the uppermost one downwardly.

A further object of my invention is to provide means for conveying the residual liquid from each tray into the lower part of the next lower tray.

I will now describe my invention in detail, referring to the accompanying drawings, in which—

Figure 1 is a vertical central section; Fig. 2, a side elevation on a plane at right angles to the plane of section of Fig. 1; Fig. 3, a horizontal section on line A A, Fig. 1; Fig. 4, a similar section on line B B, Fig. 2; Fig. 5, a vertical central section of a tray of somewhat-modified construction.

Each column-tray consists of the hollow heating-chest *a*, whose upper and lower walls 1 and 2 are connected by vertical radial or substantially radial partitions or ribs 5 and 6, the ribs 5 reaching from the periphery of the bottom not quite to the inner annular wall of the same, while the ribs 6 reach from the inner circular wall not quite to the periphery of the chest. Thereby the hollow chest is divided into a number of communicating cells or chambers. One of these ribs, 66, reaches entirely across the hollow chest, thus closing the same off. On one side of this rib 66 is arranged a steam-inlet 17, Fig. 3, controlled by a steam-valve 13, so that the steam may be permitted to enter or be cut off at will. The steam enters in the direction indicated by the arrow in Fig. 3 and passes through the circuitous path made by the ribs 5 and 6, as indicated by the arrows in Fig. 6, until it returns to the rib 66, near which is arranged the steam-outlet formed by a suitable pipe 12, screwed to the flange 11, formed at this portion of the tray-chest. From the outlet the steam may then be conducted to the next tray-chest, (in case the trays are not to be heated independently,) and so on until the same has passed through all the trays, whereupon it will be carried off through the waste-pipe 14, Fig. 2.

Manifestly the entire series of trays—for example, two, three, four, or more—or the entire column may be heated from one pipe.

Each tray-chest, as shown in Figs. 1, 3, and 4, is provided with two overflow-pipes 8, which are so arranged that the overflow-pipes of one tray do not lie vertically above and below the overflow-pipes of the tray above or below. These overflow-pipes are of such a length that their lower ends reach nearly to the bottom of the next tray below. By this arrangement the overflow from each tray is caught by the tray next below. Each tray-bottom is, moreover, provided with a central opening or flue 7, whose upper edges are somewhat higher than the upper edges of the overflow-pipes 8. Over these openings 7 are arranged bell-shaped covers 15, whose lower edges extend below the upper edges of the flue 7, so that the dry steam, hot air, or the like which is to be let into the column through the valve 16 in passing through the annular opening between the cover 15 and the flue 7 is forced to pass successively through the liquid in the series of trays.

The liquid or other matter to be distilled is introduced through the inlet *i* in the uppermost portion *e* of the column, and passing from the first tray down to the one next below and from the latter to the next one in succession, and so on, the residual liquid gradually reaches the lowermost portion *d* of the column. From this the residues are carried off through the waste-pipe *h*. The distillate escapes through the outlet *k* in the cover *f* of the column.

The column-trays are preferably so constructed that the heating-chest *a*, the lateral wall *b*, and the flange *c* of each tray are integral. However, each column-tray may also

be made of two or more parts—for example, the heating-chest in one integral part and the lateral walls in another—these two portions being then suitably fastened or screwed together.

The form of the heating-passages in the tray-chest may also be made in any desired or suitable way, although I consider the form represented in the drawings as the most suitable for general purposes, because by the same the path of the heating-fluid is made as circuitous as possible.

Where already existing column apparatus or columns having no heating-chest are to be employed in connection with my novel system of individual heating of the trays, the parts may be advantageously arranged in the manner indicated in Fig. 5, in which a heating coil or pipe *r* is arranged at or near the bottom of each tray *m*.

As already set forth in connection with the first-described heating arrangement, each tray under the latter construction is adapted to be individually heated according to the accuracy of temperature that may be demanded for all of the trays, or any desired number of columns or trays may be heated together.

It will be observed that under my invention each column is one complete closed distilling apparatus, in which the raw material is introduced from above and which yields only one distillate or fraction corresponding to the temperature employed.

It will be seen from the above that my invention resides, essentially, in providing a series of heating elements consisting each of a single or a set of trays, each of which elements is individually heated or connected with the source of heat independently of the other elements. The preferable form of trays embodying this idea is that in which each tray is provided with a hollow chest having a circuitous passage for the heating fluid, as shown.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a distilling-column, the combination of a series of superposed trays, each having an annular hollow heating-chest and a central aperture, said chest having one radial vertical partition closing the annular space, and also a series of radial partitions extending from the inner vertical wall outwardly, and a series of radial partitions extending from the peripheral wall axially, the latter said partitions alternating with the former partitions; the chest also having an inlet near the said closing-partition, and an outlet also near said closing-partition but on the opposite side of the same from said inlet.

2. In a distilling-column, the combination of a series of superposed trays, each having an annular hollow heating-chest and a central aperture, said chest having one radial vertical partition closing the annular space, and also a series of radial partitions extending from the inner vertical wall outwardly, and a series of radial partitions extending from the peripheral wall axially, the latter said partitions alternating with the former partitions; the chest also having an inlet near the said closing-partition, and an outlet also near said closing-partition but on the opposite side of the same from said inlet, one or more overflow-pipes in said trays, a flange extending upwardly in said tray around said central aperture and having its upper edge above the level of the upper edge of the overflow-pipe, and a bell overhanging said flange and having its lower edge projecting into the tray and disposed below the level of the upper edge of said overflow-pipe.

In testimony whereof I affix my signature in presence of two witnesses.

HEINRICH HIRZEL.

Witnesses:
ORWIN HELBING,
RUDOLPH FRICKE.