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DISTILLING APPARATUS

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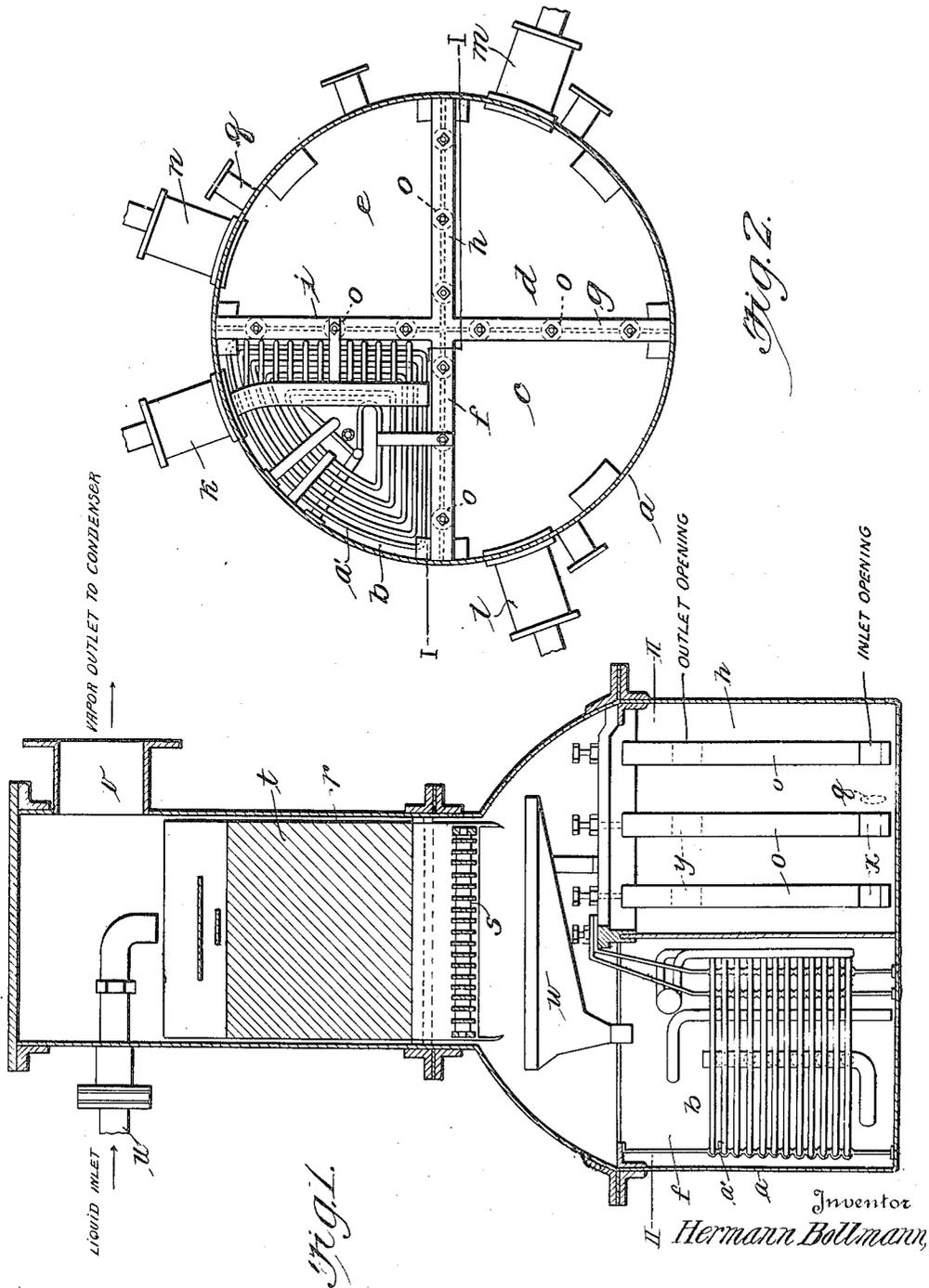


Fig. 1.

Fig. 2.

By

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DISTILLING APPARATUS.

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To all whom it may concern:

Be it known that I, HERMANN BOLLMANN, a citizen of Hamburg, Germany, residing at Hamburg, State of Germany, have invented certain new and useful Improvements in Distilling Apparatus, of which the following is a specification.

The present invention relates to a distilling apparatus and more particularly refers to an improved still with still-head for continuously evaporating solutions.

Evaporating-apparatus with several separate heating-chambers have already become known. In these apparatus the temperature of the several chambers is gradually increased according to the concentration of the liquid to be evaporated. These apparatus are usually of the sprinkler or circulation type in which the liquid to be evaporated contacts with the heating element in the form of a thin film. Such apparatus, however, are not very appropriate for treating liquids from which when being evaporated there result solid matters or residues, which unfavorably influence the heat-conducting power and are themselves decomposed by direct heating and superheating.

The object of the invention is now to produce a still provided with a head or dome and subdivided into several compartments furnished with overflow-pipes, the said compartment having heating means adapted to heat the liquid in the said compartments to successively increasing degrees of temperature in the direction of the flow of the liquid to be evaporated. According to this invention, the liquids in the several compartments are heated only up to the boiling point of these several liquid-portions to be evaporated.

Furthermore the compartments are always entirely filled up with liquid to be evaporated as the same continuously flows in and out, whence it follows that the heating means, heating coils for example, are always covered with liquid and separated solid matters are prevented from depositing on the said heating coils and from being decomposed by the direct heat.

In the accompanying drawings I have shown by way of example a distilling apparatus constructed in accordance with and embodying my invention.

Fig. 1 shows a sectional elevation of the improved still with head and

Fig. 2 a horizontal cross-sectional view taken on the line II—II of Figure 1.

Similar letters of reference refer to like parts throughout the several figures.

The lower-part of the still *a* is subdivided into four compartments *b, c, d, e*, by suitable partitions *f, g, h, i*, each of said compartments being provided with a heating coil, only one of which is shown in the drawing, in compartment *b*, this coil being indicated at *a'*. The heating-steam is supplied to the heating coils by means of suitable inlet valvss *k l m* and *n*. In connection with each of the supply-pipes leading to the said steam-inlet valves is placed a suitable device (not shown) for controlling the temperature. According to the boiling points of the liquid mixture to be evaporated, a temperature may be chosen for the first compartment, for example of 60°, for the second of 70°, for the third of 80°, and for the fourth of 100° C.

Between the several compartments there are arranged overflow-pipes *o* having each an inlet opening *x* from one compartment and a discharge opening *y* into the next compartment. The solid matters or residues from the evaporation may discharge from the last compartment *e* through an outlet *q*. Over the upper end of the still proper *a* is erected a head or dome *r* provided at its base with a suitable grating *s* preferably of flat-bar iron and filled with a retardation-filling as indicated by the letter *t*.

The fresh solution enters through the inlet *u* and drops after having traversed the dome *r* in downward direction, onto a collecting pan *w* or the like by means of which it is directed into the compartment *b*. The vapors formed in the apparatus rise up into the uppermost part of the dome and escape through the discharge neck *v*.

The operation of the apparatus is as follows:

The solution enters (as a continuous slow current) into the first compartment *b* least heated, flows then into the second compartment *c*, thence into the third compartment *d*, and finally into the fourth compartment *e* most highly heated. The extract freed from the solvent escapes from the bottom of the still *a* through the outlet neck *q*, whereas the

solvent-vapors formed in the several compartments are collected in the uppermost part of the common dome *r* and escape therefrom through the outlet neck *v*. The said dome *r* serving at the same time for the supply of fresh solution.

The retarding filling *t*, arranged in the dome *r* below the inlet of the solution supply pipe and the outlet neck for the vapors, renders possible the utilization of the heat of the vapors for preheating the fresh solution.

The pipes *o* serve as overflow outlets by means of which the specifically heavier parts of the liquid resting on the still-bottom are passed into the next compartment.

I claim:

In a distilling apparatus the combination of a closed evaporator structure having a

boiler and a head, of vertical partitions, subdividing the lower portion of the boiler into a plurality of compartments, such compartments being in vapor free communication with each other at their tops, pipes connecting the bottom of each of said compartments with the next succeeding compartment, whereby the liquid is delivered from the lower part of one compartment into the upper part of the next compartment of the series, such pipes being of substantial smaller cross section than such compartments and being free from heating coils therein, and of means for separately heating the liquid in the successive compartments to successively higher temperatures.

In testimony that I claim the foregoing as my invention, I have signed my name.

HERMANN BOLLMANN.