

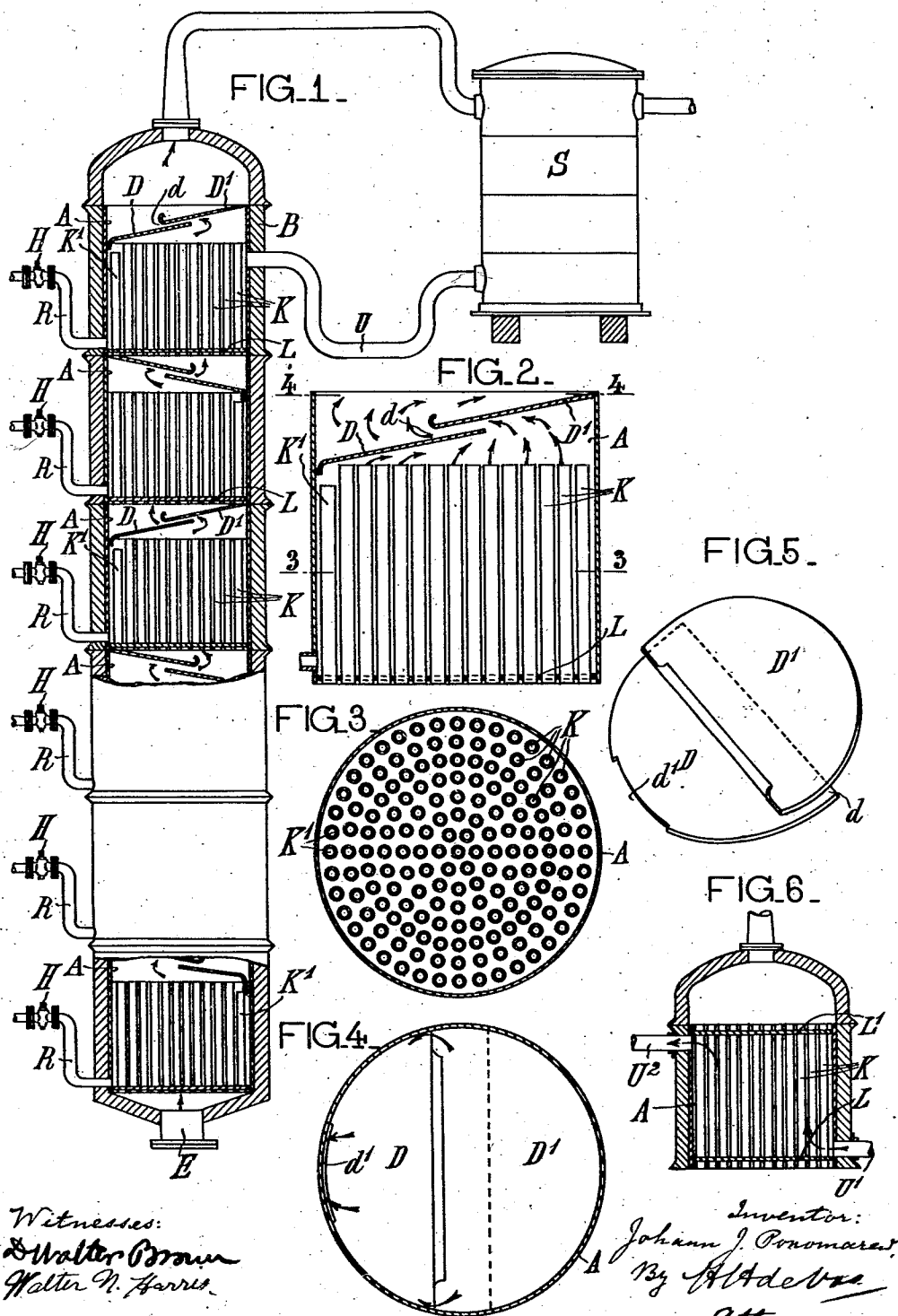
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J. J. PONOMAREW.

APPARATUS FOR RECTIFYING AND DEPHLEGMATING VAPOR MIXTURES.

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APPARATUS FOR RECTIFYING AND DEPHLEGMATING VAPOR MIXTURES.

No. 865,933.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHANN JAKOWLEW PONOMAREW, a subject of the Emperor of Russia, residing at Terskaja Oblast, Grosny, in the province of Caucasus and Empire of Russia, have invented new and useful Improvements in Apparatus for Rectifying and Dephlegmating Vapor Mixtures, of which the following is a specification.

My invention relates to improvements in apparatus designed for rectifying and dephlegmating vapor mixtures.

In the apparatus constructed according to my said invention the vapor mixture comes as little as possible in direct contact with the condensate, the multiple separation and production of condensates of different quality may be effected and the condensate itself may be employed as a cooling agent acting on the counter-current principle and at the same time again repeatedly distilled and dephlegmated. For this purpose the vapor mixture passes in succession through a number of groups of tubes, which are separated from each other by inclined intermediate partitions arranged in pairs and extending partially one over the other. The lower ends of the several tubes pass through the bottoms of the chambers, wherein these combinations of groups of tubes and inclined partitions are inclosed. The condensate is conducted from the tubes of each group into the chamber for the preceding tubes, and as the upper ends of the groups of tubes are detached, the condensate can fill up the spaces between the tubes so as to serve as a cooling agent for the vapors passing upwards through the tubes. Accordingly it is possible to withdraw at will from each chamber a condensate of definite quality, for instance through laterally arranged swan's necks provided with cocks. The chambers may however also be furnished with overflow pipes, through which the excess, after filling the chambers up to the overflow level, is conducted into the preceding chamber, so that the condensate passing successively through all the preceding chambers, acts as the counter-current to the vapor, thus cooling the latter and becoming at the same time heated again.

In the accompanying drawing I have represented a preferred constructional form of my improved apparatus.

Figure 1 is a diagram showing the whole apparatus partly in vertical longitudinal section and partly in elevation. Fig. 2 is a vertical section through an element of the same. Fig. 3 is a transverse section on the line 3—3 of Fig. 2. Fig. 4 is a transverse section on the line 4—4 of Fig. 2. Fig. 5 is a diagram, showing a perspective view of the inclined intermediate partitions. Fig. 6 is a vertical transverse section of the upper chamber of the apparatus with a water cooling device.

It is expedient to surround the superposed chambers

A for the groups of tubes with a casing B of insulating material (Fig. 1).

The combined systems of groups of tubes and inclined intermediate partitions are arranged in the chambers A (Figs. 1 to 4). The tubes K of equal length stand upright; they are open above and below, and their lower ends pass through the bottom L of the corresponding chamber. Above each group of tubes I arrange a two-part inclined intermediate partition D D', the upper or more elevated part D of which extends at a short distance *d* from the lower part D' a little over the latter, this second part having at its lowest point a slot-shaped aperture *d'*. One or more tubes K' of the groups, which are opposite to these apertures *d'*, are shorter than the others. They determine the level of the liquid in the chambers A and serve as an overflow for the collecting condensate or phlegm.

The improved apparatus differs from the dephlegmating or rectifying apparatus heretofore known in that the vapors come in contact with the phlegm as little as possible. This is accomplished, because of—

1. The arrangement of the inclined intermediate partitions D D' extending partly one over the other and placed above the several groups of tubes, whereby the phlegm, dripping down in the form of a thin layer over the partitions, offers only a slight resistance to the vapors rising from the tubes. This resistance may be entirely obviated in case the drip edge of the upper part D' of the intermediate partition is made in the shape of a gutter, as shown in the drawing (Figs. 2, 4 and 5).

2. The phlegm which drips down being prevented by the inclined two-part intermediate partitions D D' from passing into the interior of the tubes.

3. The large evaporating or cooling surface of the groups of tubes enabling an intense and complete rectification of the phlegm and of the vapors to be effected;

4. The vapors not having to pass any layer of the phlegm or condensate collecting at the bottom of the chamber, so that the several unrectified parts of the phlegm are not liable to be carried away or spurted.

All this helps to enable the distillation to proceed regularly without jerks and without agitation.

The vapors of the distillate pass through the inlet pipe E into the chambers A, which may for example be superposed (Fig. 1). The condensation of such parts of the mixture as can be condensed more easily takes place at the walls of the tubes. The condensate runs down at the inner walls of the tubes on to the intermediate partition D D', over which it passes to the aperture *d'*, in order to enter the chamber A below for the preceding group of tubes K where it collects. The vapors pass upwards through the space *d* between the parts D D' of the intermediate partition and through

the condensate dripping over the same. The diameters of the several tubes are such that the condensate dripping into the same cannot exert any pressure upon the rising vapors; it will also be freed from its lighter parts by the respective temperatures of the vapors and of the phlegm collecting between the tubes in the chamber and will be dephlegmated as it were in dripping down.

In case the phlegm is not separately withdrawn during the working from the chambers A containing the tubes through the swan's necks R furnished each with a cock H, the said chambers will become filled up to the top of the overflow tubes K', the excess passing through these overflow tubes on to the bottoms D D' and through the aperture d' into the preceding chamber A until it has flown through all the chambers and returns from the lowest chamber in the heated condition into the distilling apparatus, in order to be evaporated again. The condensate flowing back becomes not only preliminarily heated for the repeated evaporation, but forming the counter-current acts also as a cooling agent upon the vapor mixture. By this reciprocal action the condensation is promoted and fuel for the distilling apparatus is saved. This reciprocal action is particularly intense in the present combination of groups of tubes.

The outlet tubes R with the cocks H are so constructed and arranged that in the discharge of the phlegm through them the phlegm will always remain at a certain level in the chambers A. If the phlegm is to pass through the overflow tubes K' into the lower chambers the cocks H are closed. The level then rises and the condensate can flow off through K' without hindrance. The siphoning through the discharge tubes R is rendered impossible by making them of suitable diameters.

When stopping the working the several chambers A are emptied through water gage cocks or special cocks arranged immediately above the bottom of the chambers.

At the commencement of the working the several chambers are filled with the product to be distilled.

The uppermost chamber is cooled by the phlegm conducted through the tube U from the dephlegmator S. As shown in Fig. 6, the uppermost chamber A may also constitute a condenser comprising a number of tubes inclosed in a chamber and passing above and below through the two bottoms L' and L; in the intermediate spaces the water inclosed by the bottoms circulates, being admitted through the inlet tube U' and leaving through the outlet tube U².

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In apparatus of the character described, superposed chambers, bottoms closing these chambers below, groups of upright tubes open above and below, the lower ends of the tubes of each group extending through the bottom of the chamber inclosing such group, and inclined intermediate partitions consisting of two parts extending partially one over the other, the lower part having an aperture at its lowest point.

2. In apparatus of the character described superposed chambers, bottoms closing these chambers below, groups of upright tubes open above and below, the lower ends of the tubes of each group extending through the bottom of the chamber inclosing such group, overflow tubes provided in each group of upright tubes and having a shorter length than the latter, and inclined intermediate partitions consisting of two parts extending partially one over the other, the lower part having an aperture at its lowest point.

3. In apparatus of the character described, superposed chambers, bottoms closing these chambers below, groups of upright tubes open above and below, the lower ends of the tubes of each group extending through the bottom of the chamber inclosing such group, and inclined intermediate partitions consisting of two parts extending partially one over the other, the lower part having an aperture at its lowest point, and a gutter extending over nearly the whole lower edge of the upper part of said partition.

4. In apparatus of the character described, superposed chambers, bottoms closing these chambers below, groups of upright tubes open above and below, the lower ends of the tubes of each group extending through the bottom of the chamber inclosing such group, swan's necks connected with the lower part of the aforesaid chambers and adapted to be closed, and inclined intermediate partitions consisting of two parts extending partially one over the other, the lower part having an aperture at its lowest point.

5. In apparatus of the character described, superposed chambers, bottoms closing these chambers below, groups of upright tubes open above and below, the lower ends of the tubes of each group extending through the bottom of the chamber inclosing such group, overflow tubes provided in each group of upright tubes and having a shorter length than the latter, swan's necks connected with the lower part of the aforesaid chambers and adapted to be closed, inclined intermediate partitions consisting of two parts extending partially one over the other, the lower part having an aperture at its lowest point, and a gutter extending over nearly the whole lower edge of the upper part of said partition.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHANN J. PONOMAREW.

Witnesses:

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