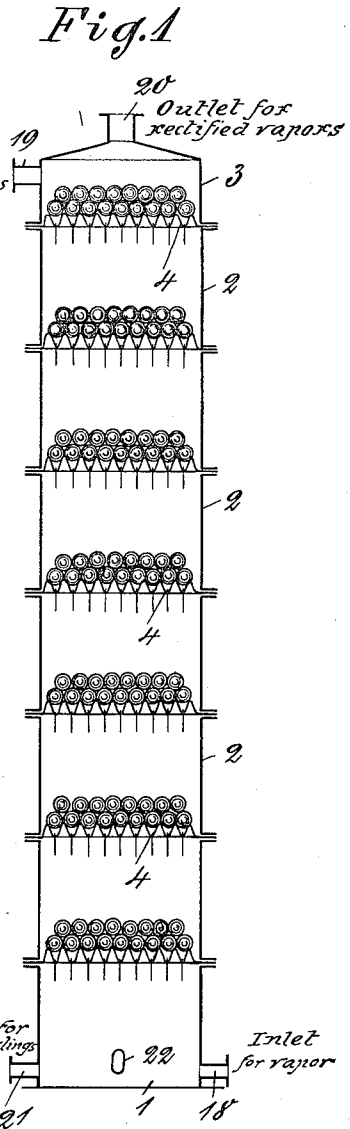
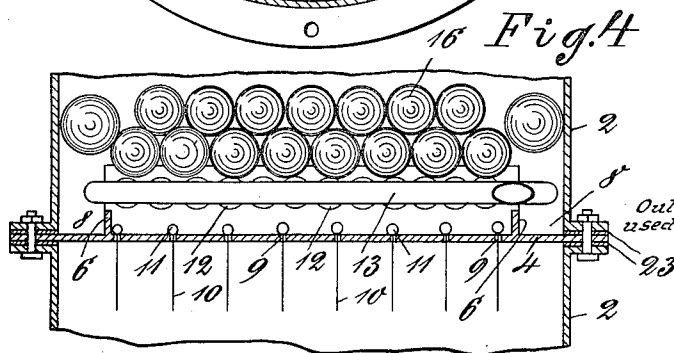
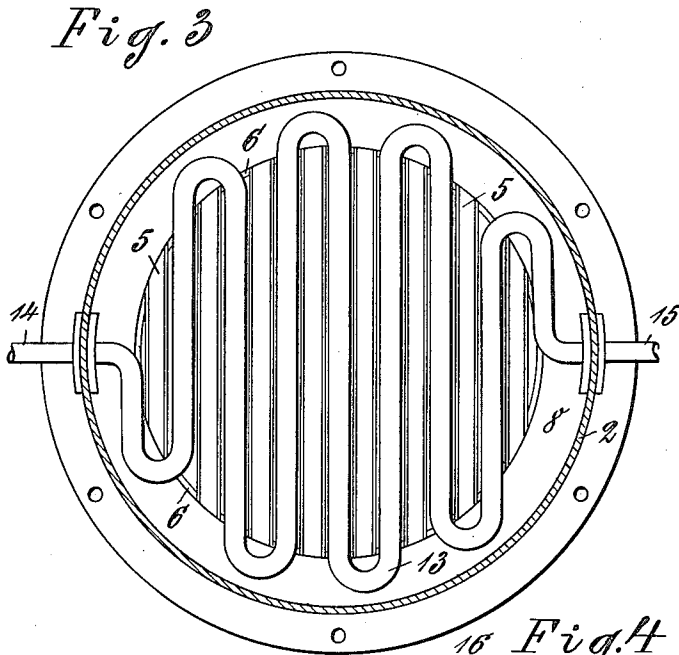
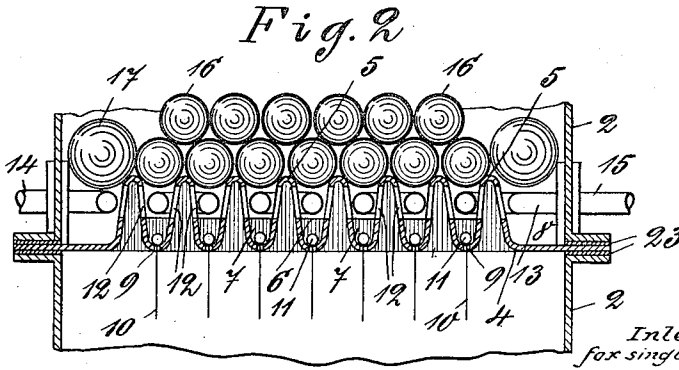


F. KYLL.  
RECTIFYING COLUMN.

APPLICATION FILED JULY 22, 1909.

999,320.

Patented Aug. 1, 1911.  
3 SHEETS—SHEET 1.



Witnesses:

Nikolai, Miller  
Carl Meyer

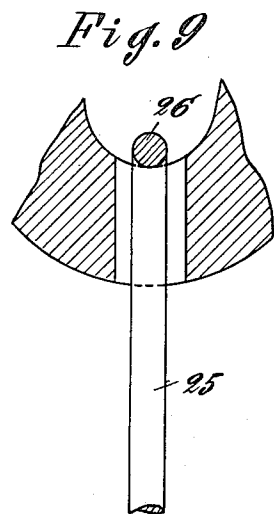
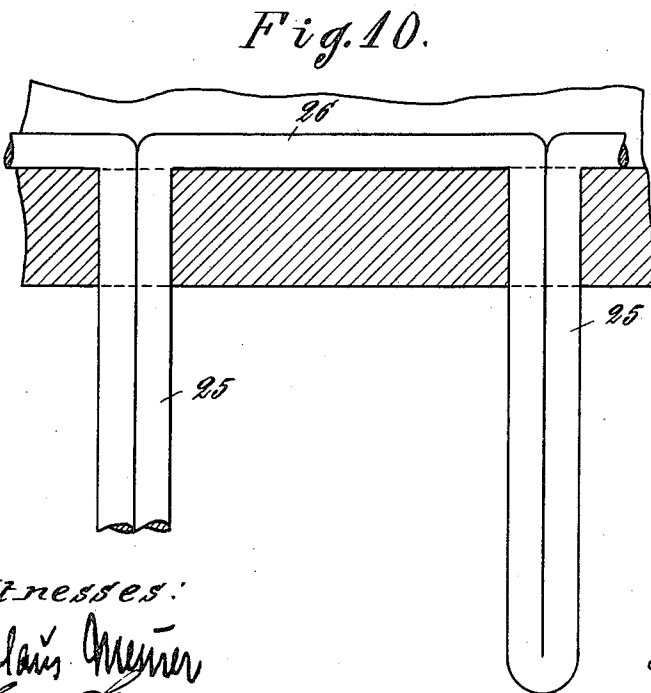
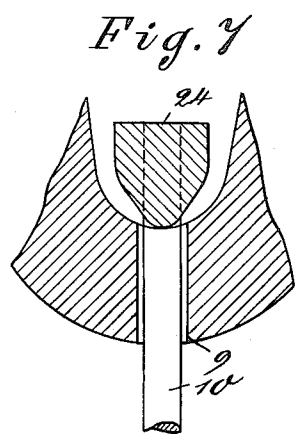
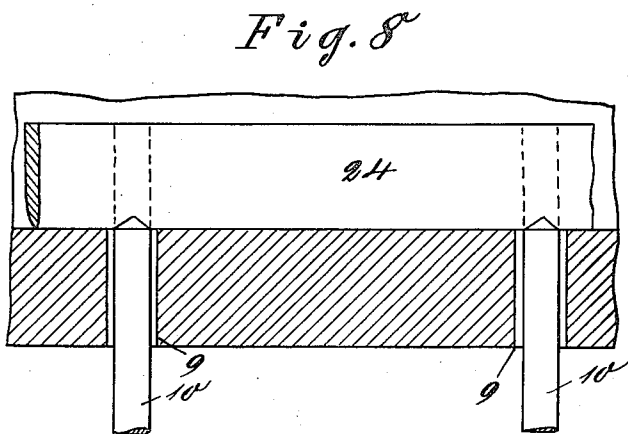
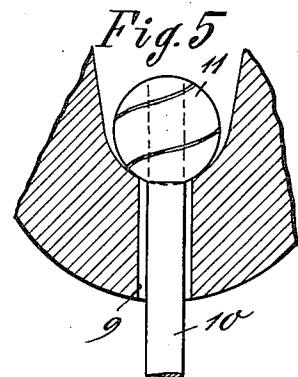
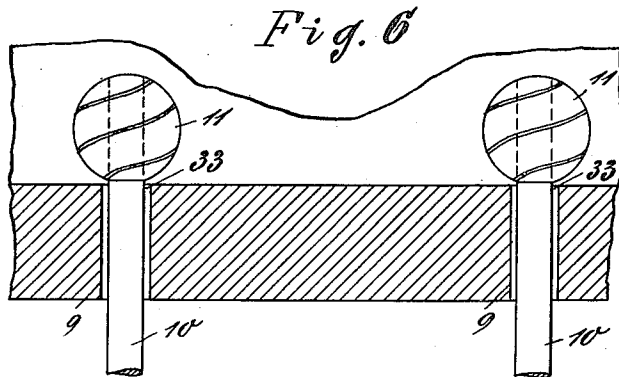
Inventor:

Frank Kyll

999,320.

F. KYLL.  
RECTIFYING COLUMN.  
APPLICATION FILED JULY 22, 1909.

Patented Aug. 1, 1911.  
3 SHEETS—SHEET 2.



Witnesses:  
Nikolai Meyer  
Carl Hagen

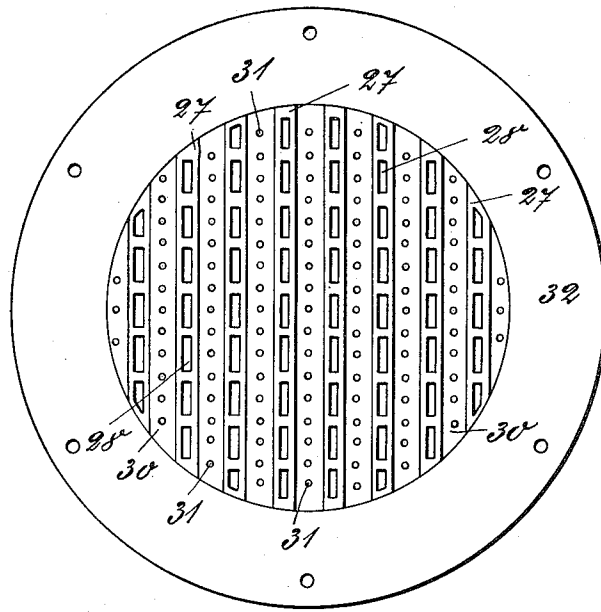
Inventor:  
F. Kyll

999,320.

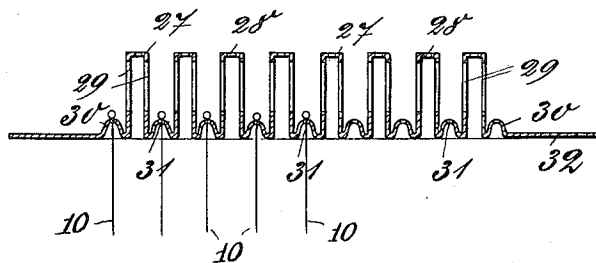
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Patented Aug. 1, 1911.  
3 SHEETS—SHEET 3.

*Fig. 11*



*Fig. 12*



Witnesses:

*Wm. L. Meier*  
*Carl Heggen*

Inventor:

*Fran. Kyll*

# UNITED STATES PATENT OFFICE.

FRANZ KYLL, OF COLOGNE, GERMANY.

RECTIFYING-COLUMN.

999,320.

Specification of Letters Patent.

Patented Aug. 1, 1911.

Application filed July 22, 1908. Serial No. 509,071.

*To all whom it may concern:*

Be it known that I, FRANZ KYLL, a citizen of the Empire of Germany, residing at Cologne-on-the-Rhine, in the Empire of Germany, have invented a new and useful Rectifying-Column, of which the following is a specification.

My invention consists in improvements in rectifying-columns of the kind in which the drip plates are arranged to carry balls on specially constructed vertical tubes, whereby a very fine division of the downwardly flowing singlings is obtained.

The chief improvement consists in new drip plates which are capable of supporting the balls and can be comparatively easily cleaned. Each drip plate has ribs of either an undulated or a serrate cross section, which ribs are provided with sufficiently numerous and large openings for the passage of the rising vapors, while between them holes are disposed for the singlings, their area being reduced by the insertion of needles or wires. The singlings running down the pendent needles or wires will necessarily be divided into a drizzling rain.

Other improvements will be hereinafter explained and pointed out in the claims.

I will now proceed to describe my invention with reference to the accompanying drawings, in which—

Figure 1 is a vertical section through an improved rectifying-column without a still, Fig. 2 is a part out of Fig. 1 on an enlarged scale and shows one drip plate with two rows of superposed balls, Fig. 3 is a horizontal cross section through the rectifying-column between any two of its drip plates, the balls being removed, Fig. 4 is a vertical section through a part of the rectifying-column in a plane at right angles to that of Fig. 2, Fig. 5 is a part out of Fig. 2 on a magnified scale and shows a needle inserted in a hole and supported by its head, Fig. 6 is a vertical section in a plane at right angles to that of Fig. 5 and shows two needles, Figs. 7 and 8 are similar to Figs. 5 and 6 respectively, the only difference being that the single needles are replaced by needles secured in a supporting rod, Figs. 9 and 10 are similar to Figs. 7 and 8 respectively, the rod with the needles being replaced by a repeatedly bent wire, the vertical doubled parts of which are inserted in the holes, Fig. 11 shows a modified drip plate, and Fig. 12 is a vertical central cross section through the same.

Similar characters of reference refer to similar parts throughout the several views.

The rectifying-column illustrated at Figs. 1 to 4 consists of a closed bottom section 1, several intermediate sections 2, 2, a covered top section 3, and several drip plates 4, 4 between the several sections, all these parts being bolted together. Each drip plate 4 has several (here eight) parallel hollow ribs, so that its cross section is undulated, as is shown at Fig. 2. The cavity of each rib 5 extends from a partition at one end to another partition at the other end of the rib. The furrows formed between the ribs are at the ends partly closed by partitions 6, 6 which extend upward to a certain height as shown at Fig. 4. Thus open channels 7, 7 are formed, which are separated from the annular channel 8 along the inside of the section 2 by the said partitions 6, 6. In each channel 7 the drip plate 4 is provided with a series of holes 9, 9, through which needles 10, 10 are introduced. These needles 10, 10 may be provided with heads 11, 11 (Figs. 5 and 6), by which they are supported. The heads are shown to have spiral grooves, as they are assumed to be formed from wire spirally wound around the upper ends of the shafts and afterward worked off. However, these spiral grooves are immaterial to my invention. The needles 10, 10 reduce the area of the holes 9, 9, so that very small passages 33, 33 are left for the singlings (Fig. 6). This is to be explained by the fact, that the upper edge of the hole 9 is not in a horizontal plane, but in the curved surface of the furrow, so that the spherical head of any needle 10 can come in contact with the edge of the hole 9 only in two opposite points (see Fig. 5) and consequently two crescent-shaped areas will be left between the edge of the hole 9 and the surface of the head. In the walls of the ribs 5, 5 are large openings 12, 12, which extend down to the height of the partitions 6, 6 or nearly so and permit the rising vapors to pass through the drip plate 4 upward. Where so preferred, a heating serpentine tube 13 may be secured in each section 2 at such a height above the drip plate 4, that its several turns passing between the ribs 5, 5 remain clear of the surfaces of the latter. Without the section 2 the serpentine tube 13 is connected with tubes 14, 15, which in turn by collecting tubes (not shown) are connected with some source of heating fluid. Balls 16, 17 are

placed on the drip plate 4 in a manner clearly shown. Packing rings 23, 23 are inserted between the flanges of the sections 2, 2 and the end sections 1 and 3, and the several drip plates 4, 4 for tightening the apparatus. The bottom section 1 by its connection 18 may be connected with some source of vapor, or it may be replaced by the respective chamber of the ordinary still. The top section 3 is provided with a connection 19, through which the singlings from any known source are admitted to the rectifying-column, while the other connection 20 of the section 3 serves as an outlet for the rectified vapors which are then further treated in any known manner.

During the operation of the rectifying-column the vapors entering it through the connection 18 (or direct from the still, as the case may be) pass upward consecutively through the several drip plates 4, 4 until they in their rectified state escape through the connection 20, while the singlings entering the apparatus through the connection 19 flow into the annular channel 8 in the uppermost chamber, where they flow over the partitions 6, 6 into the parallel channels 7, 7 whence they flow through the narrow passages 33, 33 around the needles 10, 10 and along the latter into the next lower chamber, where they fall on the balls 16, 16, 17. Thus they successively pass downward through the holes 9, 9 in the several drip plates 4, 4 and through the connection 21 of the bottom section 1 (or direct) into the still, as usual. Should some of the needles 10, 10 get jammed, it will be sufficient to turn on steam from some source into the bottom section 1 through a nozzle 22 or the like; then the steam will push all the needles 10, 10 upward against the serpentine tubes 13, 13, in other words move and thereby loosen them. Any dirt, such as grains of sand, or impurities or the like, that may happen to be deposited on the inside of the column, will be collected by the respective annular channel 8 and prevented by the partitions 6, 6 from getting into the channels 7, 7 and blocking up the holes 9, 9. The needles 10, 10 not only reduce the area of the holes 9, 9, but also facilitate the downward run of the singlings in thin layers and enable them to fall in a rapid succession in very small drops so that the singlings go downward in a drizzling rain.

Where so preferred, some heating fluid, for example superheated steam, may be passed through the several serpentine tubes 13, 13 for preventing the rising vapors from any or premature condensation, which latter according to experience takes place during the passage of the vapors through the openings 12, 12 in the several drip plates 4, 4.

It is an advantage of the new drip plates 4, 4, that the turns of the serpentine tubes

13, 13 can be placed between their hollow ribs 5, 5 and thus brought into close proximity to the openings 12, 12 for preventing any undesired condensation of the vapors. However the heating serpentine tubes 13, 13 may be dispensed with, if so desired.

The needles 10, 10 in every channel 7 may be rigidly connected with one another by means of a horizontal rod 24 (Figs. 7 and 8), to which they are attached. Of course the rod 24 requires to be so shaped as not to completely close the areas in the holes 9, 9 around the needles, see Fig. 7. Or the rod 24 with the needles 10, 10 may be replaced by a wire so repeatedly bent as to form several doubled vertical parts 25, 25 and several connecting horizontal parts 26, 26, as is shown at Figs. 9 and 10.

The drip plates may be modified in the manner shown at Figs. 11 and 12, in which case their hollow ribs 27, 27 are made rectangular in cross section and are provided in their tops with openings 28, 28 and in their side walls with openings 29, 29. Between the high ribs 27, 27 low undulated ribs 30, 30 with holes 31, 31 in their tops for the needles 10, 10 (or parts 25, 25) are provided on the drip plate 32, so that in a similar manner as before any impurity, which may fall on the plate 32, is prevented from blocking up the holes 31, 31.

The total area of the openings 12, 12 in the drip plates 4, 4 or of the openings 28, 29, 28, 29 in the drip plates 32 is preferably made as large as possible so as to facilitate the ascension of the vapors.

The rectifying-column, more particularly the drip plates, may be varied in many respects without departing from the spirit of my invention.

I claim:

1. In a rectifying-column a drip plate with upwardly projecting hollow ribs having openings for the passage of the vapors in the walls of the ribs and holes between the ribs, in combination with pendent needles inserted in the holes and leaving narrow passages for the singlings.

2. In a rectifying-column a drip plate with upwardly projecting hollow ribs having openings for the passage of the vapors in the walls of the ribs, holes between the ribs, and means for preventing the blocking-up of the holes, in combination with pendent needles inserted in the holes and leaving narrow passages for the singlings.

3. In a rectifying-column a drip plate with upwardly projecting hollow ribs having openings for the passage of the vapors in the walls of the ribs, partitions between the ribs at their ends and serving as overflows, and holes in the bottoms between the ribs and partitions, in combination with pendent needles inserted in the holes and leaving narrow passages for the singlings.

4. In a rectifying-column a drip plate with upwardly projecting high and low hollow ribs alternating with one another and having openings for the passage of the vapors in the walls of the high ribs and holes in the tops of the low ribs, in combination with pendent needles inserted in the holes and leaving narrow passages for the singlings.

5. In a rectifying-column, the combination with a top section having an outlet for the vapors and an inlet for the singlings, of a bottom section having an inlet for the vapors and an outlet for the singlings, intermediate sections, drip plates severally inserted between said top section, said intermediate sections and said bottom section, balls covering the drip plates, and pendent needles, each of said drip plates being provided with upwardly projecting hollow ribs and having openings for the passage of the vapors in the walls of the ribs and holes between the ribs in which holes said pendent needles are inserted while leaving narrow passages for the singlings.

6. In a rectifying-column, the combination with a top section having an outlet for the vapors and an inlet for the singlings, of a bottom section having an inlet for the vapors and an outlet for the singlings, flanged rings serving as intermediate sections, drip plates severally inserted between said top section, said flanged rings and said bottom section, balls covering the drip plates, and pendent needles, each of said drip plates being provided with upwardly projecting hollow ribs and having openings for the passage of the vapors in the walls of the ribs, holes between the ribs, in which holes said pendent needles are inserted while leaving narrow passages for the singlings, and means for preventing the blocking-up of the holes.

7. In a rectifying-column, the combination with a top section having an outlet for the vapors and an inlet for the singlings, of a bottom section having an inlet for the vapors and an outlet for the singlings, flanged rings serving as intermediate sections, drip plates severally inserted between said top section, said flanged rings and said bottom section, balls covering the drip plates, and pendent needles, each of said drip plates being provided with upwardly projecting hollow ribs terminating at a distance from the inside of the flanged ring and having openings for the passage of the vapors in the walls of the ribs, partitions between the ribs at their ends and serving as overflows, and holes in the bottoms between the ribs and partitions in which holes said pendent needles are inserted while leaving narrow passages for the singlings.

8. In a rectifying-column, the combination with a top section having an outlet for the

vapors and an inlet for the singlings, of a bottom section having an inlet for the vapors and an outlet for the singlings, flanged rings serving as intermediate sections, drip plates severally inserted between said top section, said flanged rings and said bottom section, balls covering the drip plates, and pendent needles, each of said drip plates being provided with upwardly projecting high and low hollow ribs alternating with one another and having openings for the passage of the vapors in the walls and tops of the high ribs and holes in the tops of the low ribs in which holes said pendent needles are inserted while leaving narrow passages for the singlings.

9. In a rectifying-column, the combination with a top section having an outlet for the vapors and an inlet for the singlings, of a bottom section having an inlet for the vapors and an outlet for the singlings, flanged rings serving as intermediate sections and having each a heating serpentine tube, drip plates severally inserted between said top section, said flanged rings and said bottom section, balls covering the drip plates, and pendent needles, each of said drip plates being provided with upwardly projecting hollow ribs between which the turns of said heating serpentine tube pass and having openings for the passage of the vapors in the walls of the ribs and holes between the ribs in which holes said pendent needles are inserted while leaving narrow passages for the singlings.

10. In a rectifying-column, the combination with a top section having an outlet for the vapors and an inlet for the singlings, of a bottom section having an inlet for the vapors and an outlet for the singlings, flanged rings serving as intermediate sections and having each a heating serpentine tube, drip plates severally inserted between said top section, said flanged rings and said bottom section, balls covering the drip plates, and pendent needles, each of said drip plates being provided with upwardly projecting hollow ribs between which the turns of said heating serpentine tube pass and having openings for the passage of the vapors in the walls of the ribs, holes between the ribs, in which holes said pendent needles are inserted while leaving narrow passages for the singlings, and means for preventing the blocking-up of the holes.

11. In a rectifying-column, the combination with a top section having an outlet for the vapors and an inlet for the singlings, of a bottom section having an inlet for the vapors and an outlet for the singlings, flanged rings serving as intermediate sections and having each a heating serpentine tube, drip plates severally inserted between said top section, said flanged rings and said bottom section, balls covering the drip plates, and

pendent needles, each of said drip plates being provided with upwardly projecting hollow ribs terminating at a distance from the inside of the flanged ring and between 5 which the turns of said heating serpentine tube pass and having openings for the passage of the vapors in the walls of the ribs, partitions between the ribs at their ends and serving as overflows, and holes in the bot- 10 toms between the ribs and partitions in which holes said pendent needles are inserted while leaving narrow passages for the singlings.

12. In a rectifying-column, the combina- 15 tion with a top section having an outlet for the vapors and an inlet for the singlings, of a bottom section having an inlet for the vapors and an outlet for the singlings, flanged rings serving as intermediate sec-

tions and having each a heating serpentine 20 tube, drip plates severally inserted between said top section, said flanged rings and said bottom section, balls covering the drip plates, and pendent needles, each of said drip plates being provided with upwardly 25 projecting high and low hollow ribs alternating with one another and between which high ribs the turns of said heating serpentine tube pass and having openings for the passage of the vapors in the walls 30 and tops of the high ribs and holes in the tops of the low ribs in which holes said pendent needles are inserted while leaving narrow passages for the singlings.

FRANZ KYLL.

Witnesses:

LOUIS VANDORN,  
F. KINGUM.