

955,127.

Patented Apr. 19, 1910.

3 SHEETS—SHEET 1.

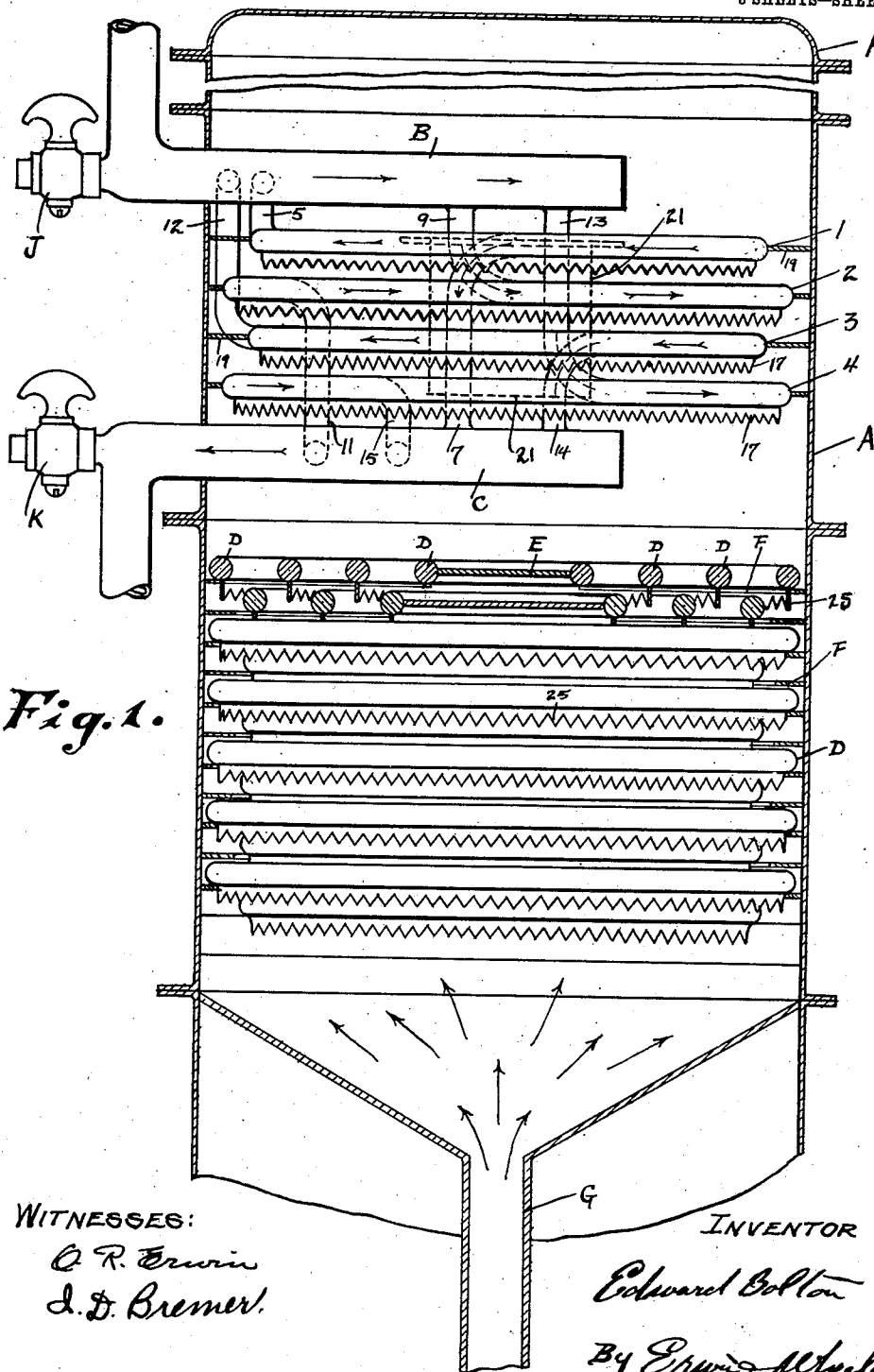


Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 2.

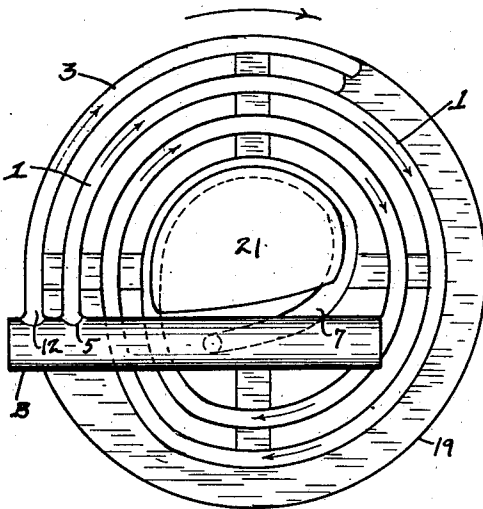


Fig. 3.

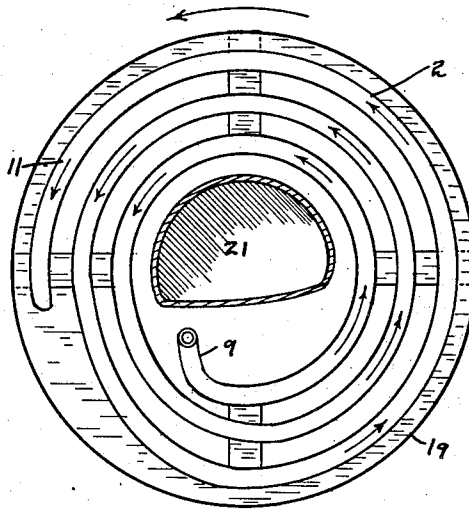
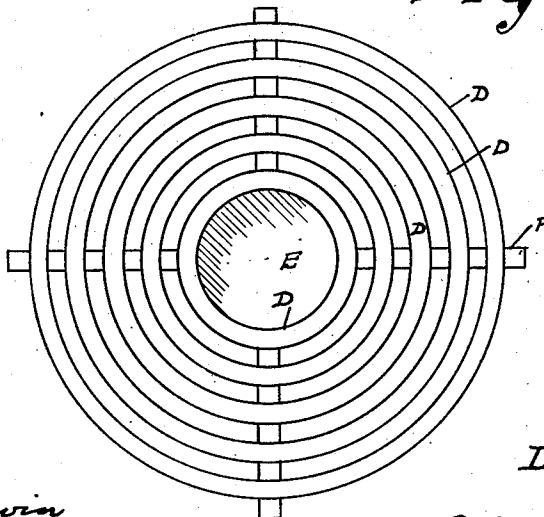


Fig. 4.



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Patented Apr. 19, 1910.

3 SHEETS—SHEET 3.

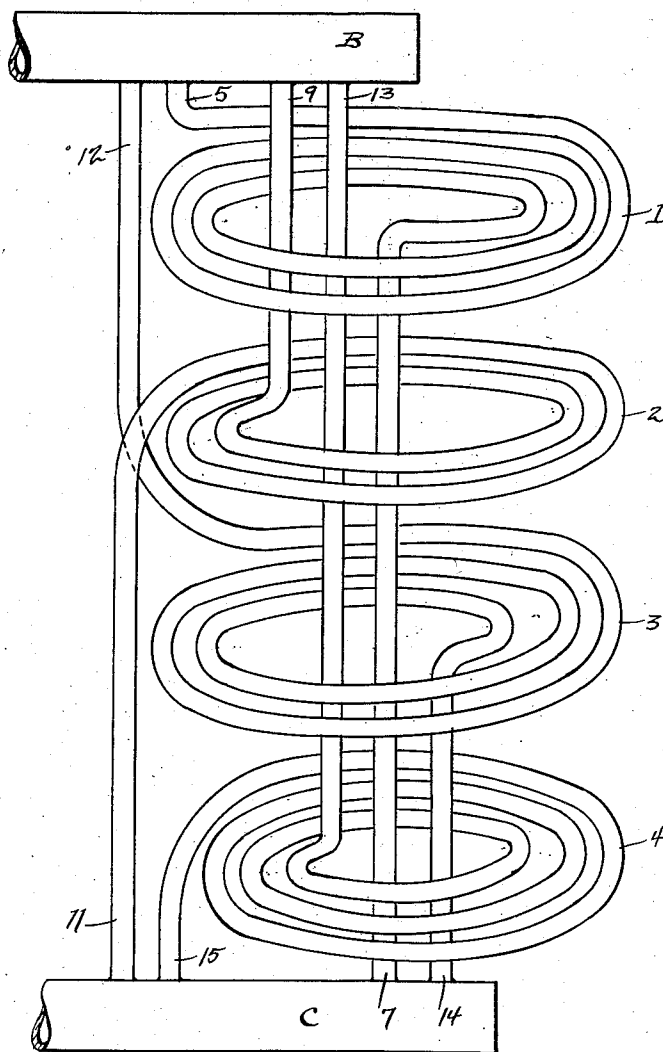


Fig. 5.

Witnesses

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DISTILLING-COLUMN.

955,127.

Specification of Letters Patent.

Patented Apr. 19, 1910.

Application filed October 26, 1908. Serial No. 459,532.

To all whom it may concern:

Be it known that I, EDWARD BOLTON, a citizen of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Distilling-Columns, of which the following is a specification.

My invention relates to improvements in distilling apparatus.

10 The object of my invention is to provide a more effective means for condensing vapors than those heretofore employed for such purposes; also to provide means for utilizing a portion of the heat of the ascending vapors to repeatedly revaporize the condensing or condensed liquids, or a portion thereof, whereby the impurities may be more effectually separated.

20 In the drawings, Figure 1 is an elevation of one unit of a distilling column embodying my invention, the casing being shown in vertical section. Fig. 2 is a plan view of the upper condensing coil in its relation to the supply main. Fig. 3 is a plan view of the next lower condensing coil. Fig. 4 is a plan view of one of the reheating frames. Fig. 5 is a diagrammatic perspective view illustrating the arrangement of the several coils of the condenser.

30 Like parts are identified by the same reference characters throughout the several views.

The casing A incloses the lower unit of a distilling column embodying my invention. 35 It will be understood that a considerable number of these units may be employed, each constructed in a manner similar to the one illustrated, the entire column being covered by a cap plate A'. Within each unit, I have provided a set of coils 1, 2, 3 and 4 respectively, each of which is provided with end extensions connected with supply and exhaust mains B and C. The supply main B is preferably located above 45 the coils and the exhaust main C below them. The coils are preferably wound alternately in opposite directions, thereby providing an opposite circulation of the condensing fluid. For example, the fluid enters the coil 1 50 through the extension 5 which connects with the outside turn of the coil and then inwardly through the several turns to a point near the center, from which it flows downwardly through the extension pipe 7, which passes through the space at the center of 55 each subsequent coil to the exhaust main C.

The fluid entering the second coil, however, is delivered from the supply main B through the extension 9 to the inner turn of such second coil and flows in a direction opposite 60 the flow in the first coil until it reaches the outer turn of the coil and is delivered downwardly through the spiral extension pipe 11 along the inner surface of the casing A to the exhaust main C. The fluid in the coil 65 3 flows in the same direction as in the coil 1, and the fluid in the coil 4 flows in the same direction as in the coil 2, the coils 3 and 4 being supplied from the main B through the branches or extensions 12 and 70 13 respectively, and the fluid is delivered from these coils through the extensions 14 and 15 respectively, the extensions being merely continuations of the pipes forming the several coils. 75

The pipes composing the several coils are each provided with a continuous or substantially continuous downwardly projecting, toothed flange 17, the teeth forming drip points which deliver the condensed fluid 80 and prevent it from concentrating by flowing longitudinally along the pipe. The outer turn of each coil is provided with a flange 19 extending to the casing wall at all points where the coil is not in actual 85 contact, thus preventing a circulation of the vapor exterior to the coils. The central portion or space inclosed by the inner turns of the coils and not occupied by the extensions above described, is filled by a plug 21 90 to prevent the ascent of a column of vapor through this space.

Below the coils I provide a series of reheating frames, each of which frames is preferably composed of concentric rings D 95 located in a horizontal plane and encircling a central disk E. The rings are secured together by connecting strips F, these strips being soldered or otherwise secured to each of the rings composing the frame. These 100 strips also serve to separate the frames vertically a distance equal to the thickness of the strips. The rings of the second series are slightly different in diameter from those of the first series, so that each ring in the 105 second series is located directly below one of the spaces between two rings of the first series, whereby the vapor is caused to take a circuitous path in passing between the rings of the several series. The coils 1, 2, 3 and 4, 110 above described, are similarly arranged, the successive turns of the coil 2 being located

below the spaces between the successive turns of the coil 1.

The vapor enters the lower unit of the distilling apparatus through a pipe G and passes upwardly between the concentric rings D until it reaches the condensing pipes 1, 2, 3 and 4. The condensed liquids drip from the teeth of the flanges 17 and fall back upon the rings D and the rising vapors continuously give up heat to these rings and they in turn give up heat to the liquid dripping from said teeth, thus causing the lighter portions of the liquids to re-vaporize. The rings D are also provided with toothed drip flanges 25, which prevent concentration of the liquid along the surfaces of these rings. It is not material to my invention whether the rings D are solid or tubular in form.

By using relatively large mains B and C and connecting each coil in the condenser directly with these mains instead of serially with each other, it is obvious that the temperature of each coil will be substantially the same as that of the others, and a large supply of the fluid refrigerant, such as water, air, or any other suitable fluid, can be passed through the coils, a comparatively low temperature being thus maintained in each coil.

In practice, the coils 1, 2, 3 and 4 will be brought as closely together as possible, the spaces between them being somewhat exaggerated in the drawings, in order that the arrangement of the coils may be clearly understood.

The supply and exhaust mains are provided with valves J and K respectively, whereby the flow of the fluid refrigerant may be accelerated or retarded by permitting the discharge of a portion thereof to the exterior. By opening the valve J tem-

porarily, the rapidity of the circulation may be checked, while by opening the valve K, it may be accelerated.

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

1. In a distilling column, the combination with a set of heat absorbing and heat radiating frames, of a set of superposed continuous coils, each having independent connection with a common source of condensing fluid supply and with a common exhaust main, each alternate coil in the set being connected at its outside with the supply main and at the center with the exhaust main, and the intermediate coils being connected at the centers with the supply main and at the outside with the exhaust main, the several condensing coils comprising a substantially uniform temperature condensing section mounted above the reheating frames.

2. In a distilling column, the combination of a series of coils adapted to convey a circulating fluid refrigerant, of a supply main separately connected with each of said coils, and an exhaust main having separate connection with each of said coils, the alternate coils of said set having their outer ends extended and connected with the supply main and their inner ends projected downwardly through the center of the coils to the exhaust main, and the intermediate coils having their inner ends extended upwardly in said central space to the supply main and their outer ends projected downwardly to the exhaust main.

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

EDWARD BOLTON.

Witnesses:

LEVERETT C. WHEELER,
O. R. ERWIN.