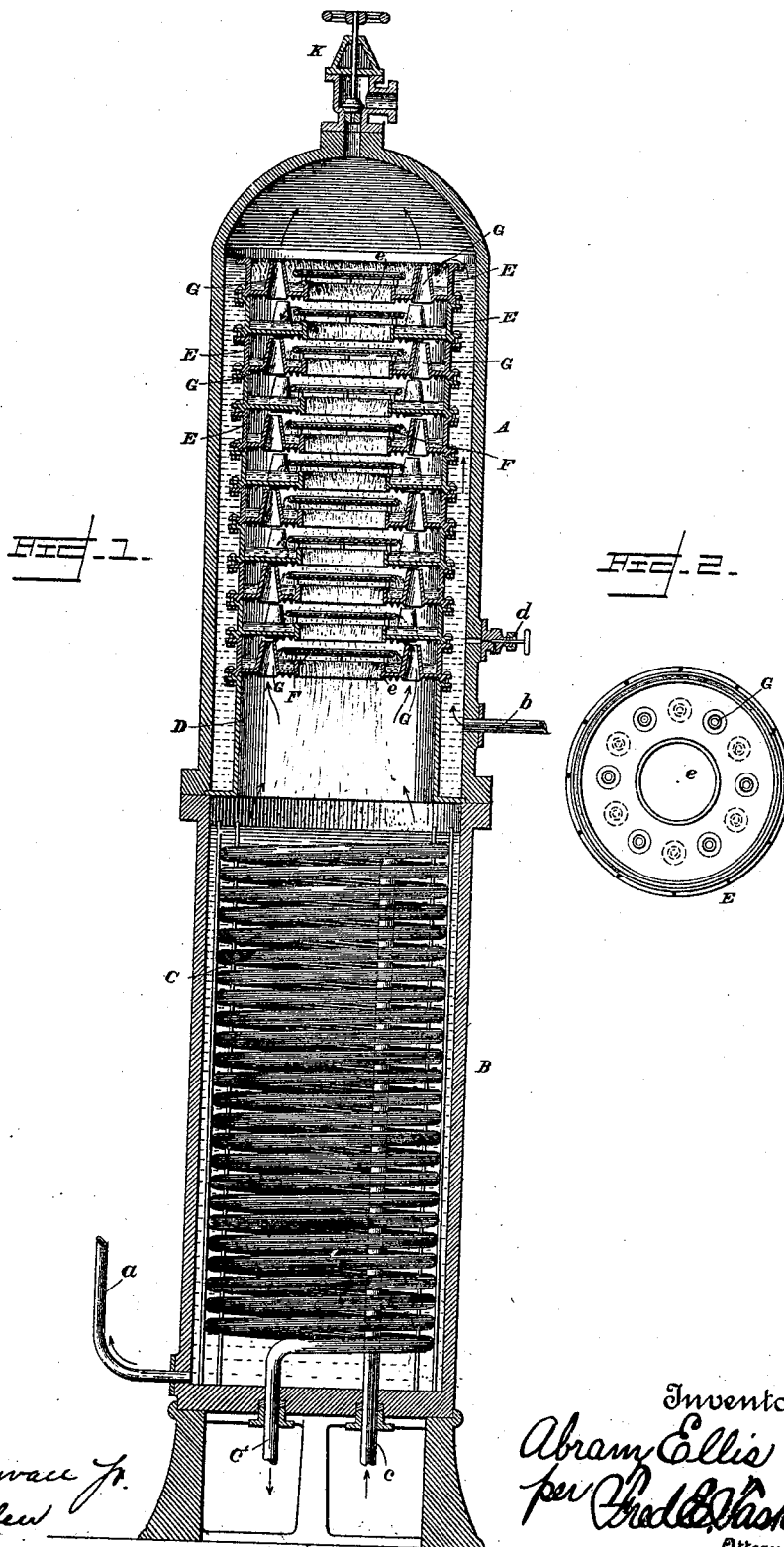


(No Model.)

A. ELLIS.
AMMONIA STILL.

No. 516,154.

Patented Mar. 6, 1894.



Witnesses
Edw. L. Swace Jr.
Wm. L. Boyden

Inventor
Abram Ellis
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Attorney

UNITED STATES PATENT OFFICE.

ABRAM ELLIS, OF COLUMBUS, GEORGIA, ASSIGNOR OF ONE-HALF TO WILLIAM R. BROWN, OF SAME PLACE.

AMMONIA-STILL.

SPECIFICATION forming part of Letters Patent No. 516,154, dated March 6, 1894.

Application filed June 11, 1892. Serial No. 436,377. (No model.)

To all whom it may concern:

Be it known that I, ABRAM ELLIS, a citizen of the United States, residing at Columbus, in the county of Muscogee and State of Georgia, have invented certain new and useful Improvements in Ammonia-Stills; 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.

This invention relates to an improvement in rectifying apparatus for use in absorption ice machines, the object being to provide an improved arrangement of pans whereby superior results may be accomplished in a better and simpler way than heretofore, and the invention consists in the construction, arrangement and combination of the several parts, substantially as will be hereinafter described and claimed.

In the annexed drawings illustrating my invention: Figure 1 is a vertical section of an ammonia still belonging to an absorption ice machine, and showing my improved rectifying apparatus arranged therewith. Fig. 2 is a top plan view of the rectifying pans.

Like letters denote like parts.

The ammonia still represented in the drawings may be of any size and shape, and it comprises the upper part A, containing the rectifying pans and the lower part B containing the pipe coil C, arranged therein, said coil having the inlet end *c* and the outlet end *c'*, and containing steam which is supplied thereto for the purpose of boiling the ammonia liquid in the still so as to separate the ammoniacal gas. The lower section B of the boiler, is provided near its lower end with an outer pipe *a*, through which the poor liquor is taken off. The upper section A is entered at a suitable point near its lower end by a pipe *b* through which the ammonia liquid is introduced into the boiler, said pipe being the feed pipe. The upper section is also provided in its side with a try cock *d* and at its top with a gas outlet valve K. The rectifying pans E are superposed upon each other in a vertical series, being supported in such a manner as to leave an annular space between their sides and the wall of the boiler section A, into which space the ammonia liquid enters from the

feed pipe *b*, filling the space and rising therein until it flows over the edge of the topmost pan, filling said pan and then passing down through the several pans of the series until it reaches and enters and partly fills the lower boiler section B where the heating coil is located. The pans E E are of a general circular or cylindrical form, and of a moderate depth. They are each provided with a central circular flanged opening *e*. Above this opening *e* and with a slight space between it and the edge of the vertical flange which is located at the periphery of opening *e* is located a flat small shallow pan F, which is supported by short projections or arms on pan E. Further, each pan E is provided with vertical conical nozzles G, formed therein, smaller at the top and larger at the bottom and designed for the purpose of affording channels through which the gas set free by the boiling of the ammonia, may pass upward through the rectifying apparatus to the top of the boiler. The tops of the nozzles are somewhat higher than the flanges or walls at the central circular opening *e*. Each pan has several nozzles, but the pans are preferably so arranged that the nozzles of adjacent pans will not be directly under each other, but will be out of line, substantially as indicated in Fig. 2, such arrangement being for the purpose of obliging the upwardly traveling gas to pursue an irregular or zigzag course, thereby sufficiently obstructing the gas to cause a condensation of any vapors that may be left therein, which will at once fall into the pans and go back again to the bottom of the boiler. The several pans E are bolted together or otherwise firmly secured to each other in a vertical series. They are made of iron, steel, or other metal and are joined together preferably with a tongue and groove joint, being red-leaded to form a continuous pan structure. The whole series of pans is supported on a cylindrical base D having a flanged lower edge, which is secured to the side walls of the boiler.

The operation is as follows: The ammonia liquid in the upper section A, fills first, the topmost pan E, entering same in the direction shown by the arrow and when the pan has been filled to the top of its central flange at opening *e*, it will run over said flange and fall

upon the flat pan F beneath it, whence it will fall into the second pan E, until it likewise is filled to the top of its central flange, when the ammonia will escape from the second pan to the plate F beneath it, and so the operation will go on as the ammonia falls from pan to pan, until finally it reaches the boiler section B and comes in contact with the heating coil C, which heats the ammonia liquor, causes it to boil, and separates the ammoniacal gas from the poor liquor. The gas thus freed rises, passing first through the nozzles G of the bottom pans E, and when it emerges from these nozzles it strikes against the cold bottom surface of the next pan E, since the nozzles of all the pans are not directly in line, but by thus striking the pan bottom, the gas is spread and soon finds its way into the nozzles G of the next pan, and so the gas goes upward through all the pans until it reaches the top of the boiler, and may be drawn off through valve K. It will be observed that the pans E hold, say about two inches of somewhat colder liquor which surrounds the gas nozzles and causes the water or vapor contained in the gas ascending through said nozzles, to become condensed and run down the inclined sides of the nozzles and drip from a rim or small flange formed on their lower edges as shown, which drippings enter the next pan below and mix with the liquor flowing through said pan. The tops of the nozzles being higher than the central rims of the large pans, cannot possibly be flooded by the liquor and therefore the rising gas cannot be interfered with. The large

pans have numerous points on their under surface as shown to attract the water of condensation and allow it to drip off to the pan below without mingling with the ascending gas.

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

In an ammonia still, a series of superposed pans E, each of which is provided with a central circular flanged opening *e* and on its under side with numerous points or projections to attract the water of condensation and allow it to drop off said points to the pan below without mingling with the ascending gas, the shallow pans F of larger diameter and located above the openings *e* and supported by short arms or projections on the pans E, the series of nozzles G located in the pans E, of smaller diameter at the top than at the bottom, the top or upper portions of said nozzles extending a short distance above the plane of the flanges or walls of the central openings *e*, the bottom portions of said nozzles projecting below the bottom of the pans E, the series of nozzles of one pan being out of line with the adjacent pan, and the cylindrical base D for supporting said pans, substantially as described.

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

ABRAM ELLIS.

Witnesses:

T. L. TATE,
H. I. STRUPPA.