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J. U. LLOYD.

CONCENTRATOR FOR SOLUTIONS.

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Fig. 1.

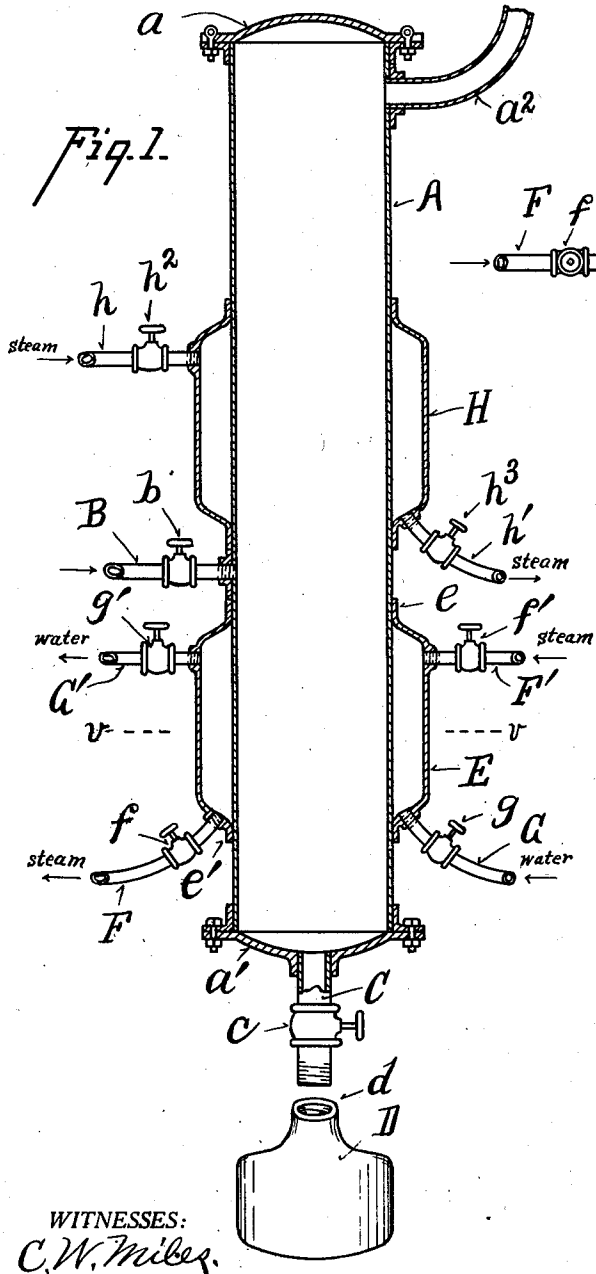
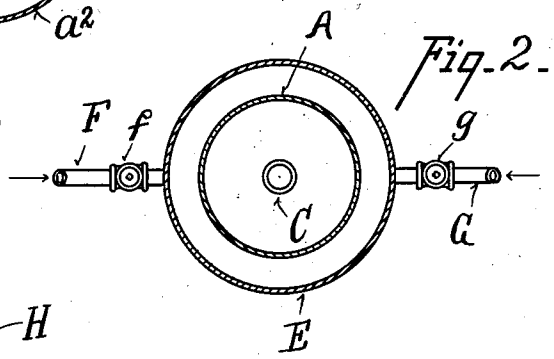


Fig. 2.



WITNESSES:

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CONCENTRATOR FOR SOLUTIONS.

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To all whom it may concern:

Be it known that I, JOHN URI LLOYD, a citizen of the United States of America, and resident of Norwood, county of Hamilton, State of Ohio, have invented certain new and useful Improvements in Concentrators for Solutions, of which the following is a specification.

My invention relates to an apparatus by means of which a liquid may be heated at its surface, while the body of the liquid is kept comparatively cool. Its object is to provide an apparatus of this character which may be cleaned readily, and which is supplied with a convenient means of adapting it for use with varying quantities of the solutions to be treated. This object is attained by the means described in the specification and illustrated in the accompanying drawing, in which,

Figure 1 is a vertical sectional view of the concentrating tank, its heating and cooling jackets and in elevation of the top of the receiving vessel, the lower part of the latter being broken away to economize space. Fig. 2 is a horizontal sectional view taken upon line *v*—*v* of Fig. 1.

Concentrating tank, A, has its interior free from obstructions of any character. It is made preferably of a cylinder closed at its upper and lower ends by caps, *a*, *a'*. Near its upper end is a vapor pipe, a^2, which leads to a condenser (not shown). Into the side of the tank, A, an admission pipe, B, leads, whose opening is controlled by a cock, *b*.

Cap, *a'*, has a central port, into which a discharge pipe, C, is secured. Pipe, C, has a cock, *c*, and its lower end is screw-threaded to receive the interiorly screw-threaded necks of receiving vessels, D, which may be made of varying sizes, but having the same sized neck, *d*, for engaging the screw-threaded end of pipe, C. Near the bottom of the tank, A, is an external jacket, E, whose upper and lower ends, *e*, *e'*, snugly contact and are secured to the external wall of the tank, A. Into the bottom of the jacket, E, a steam pipe, F, leads, in which is located a regulating cock, *f*, and from the top of said jacket leads a steam pipe, F', controlled by a cock, *f'*. Into the bottom of the jacket, E, a water pipe, G, enters and from its top extends a water pipe, G', said pipes being controlled by cocks, *g* and *g'*, respectively. Above the jacket, E, a jacket, H, is secured upon the external walls of the tank, A. A steam pipe, *h*, enters the top of jacket, H, and a steam pipe, *h'*, leads from its bottom, the said steam pipes being controlled by cocks, h^2, h^3.

The operation of the device is as follows: Suppose a solution, which it is desired to concentrate to make for instance, an abstract or extract, has been admitted to tank, A, through pipe, B, to a level reaching above the level at which the bottom of the jacket, H, is secured to the tank, A. The cocks, *g'* and *g*, in the water pipes, G and G', are opened and cool water flows into the jacket through the pipe, G, and out through the pipe, G', keeping up a constant circulation of cool water in said jacket. The cocks in the steam pipes, F, and F', are closed. Cocks, h^2, h^3, are opened and steam enters the jacket, H, through steam pipe, *h*, and leaves the same by the steam pipe, *h'*, thus keeping up a constant supply of steam to the jacket, H, simultaneously with the admission of cold water to the jacket, E. The result is that the solution in the tank, A, is heated at its surface, while the body of the solution occupying the tank below the level of the jacket, H, is kept cool. Evaporation takes place from the surface and the vapors pass out through the pipe, a^2, to the condenser. As the liquid in the tank, A, falls, fresh quantities of solution to be treated may be admitted through the pipe, B. When the solution has been concentrated to the degree desired, cock, *c*, is opened and the concentrated solution is received into the vessel, D.

If it be desired to treat a larger quantity of solution at one time, a vessel, D, of whatever size desired may be secured to the pipe, C, the cock, *c*, may be kept open, while the heating operation is being carried on, and as the vapor continues to pass off through the pipe, a^2, fresh supplies of unconcentrated solution may be admitted to the pipe, B. Thus, by utilizing different sized vessels, D, batches of material, differing in quantity, may be treated.

Should it be desired to concentrate a certain batch of material more, after it has fallen below the level of the jacket, H, this may be accomplished by closing the water pipes G, and G', and opening the steam pipes, F and F', for the admission of steam to the jacket, E.

When it is desired to clean the tank, A,

the caps, a, and a', are removed, and then the unencumbered interior walls of the tank are very readily cleansed.

Jackets, E and H', are of a construction such that they do not become clogged as do the coils of pipes.

What I claim is:

1. An apparatus of the character described consisting of a concentrating tank having its interior unencumbered, a jacket surrounding the tank near its bottom, a second jacket surrounding the tank above the first jacket and a means of admitting a cooling medium to the first jacket and a heating medium to the second jacket, simultaneously.

2. In a concentrator for solutions the combination of a concentrating tank, a chamber for receiving a cooling medium located near the bottom of the tank, a chamber for receiving a heating medium located above the cooling chamber, means for admitting a cooling medium to the first chamber simultaneously with a heating medium to the second chamber whereby the surface of a solution in the concentrating tank is heated while the body is kept cool, an exit pipe in the bottom of the concentrating tank, and a receiver removably connected with the exit pipe, substantially as described.

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Witnesses:
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