United States Patent

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[54] **CENTRIFUGAL FLASH TANK**
5 Claims, 1 Drawing Fig.

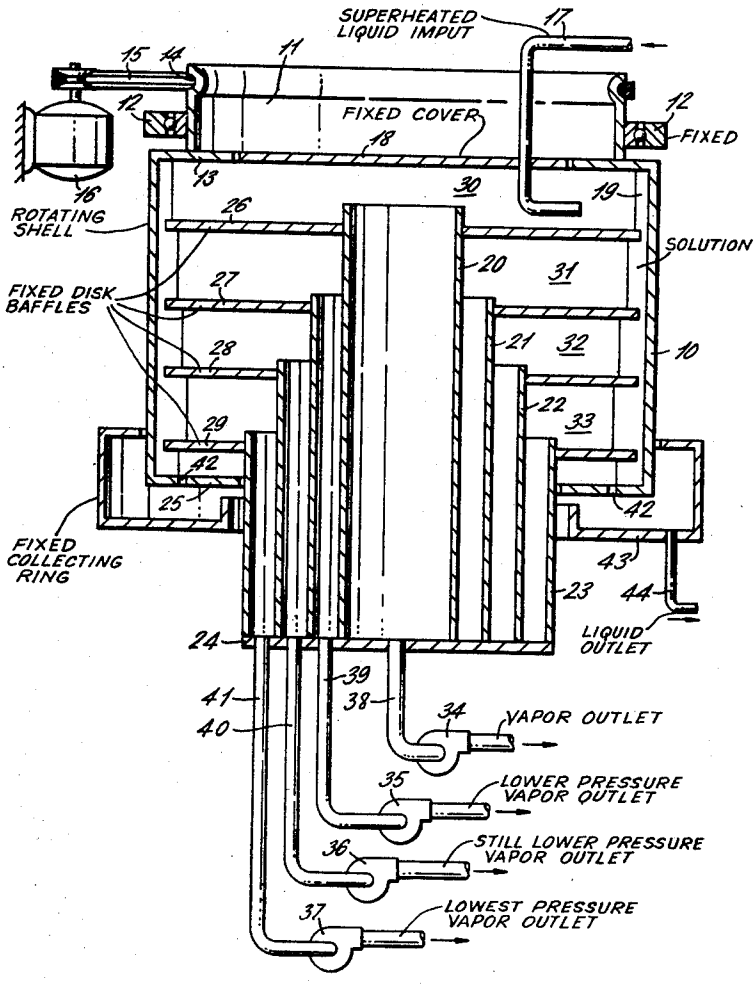
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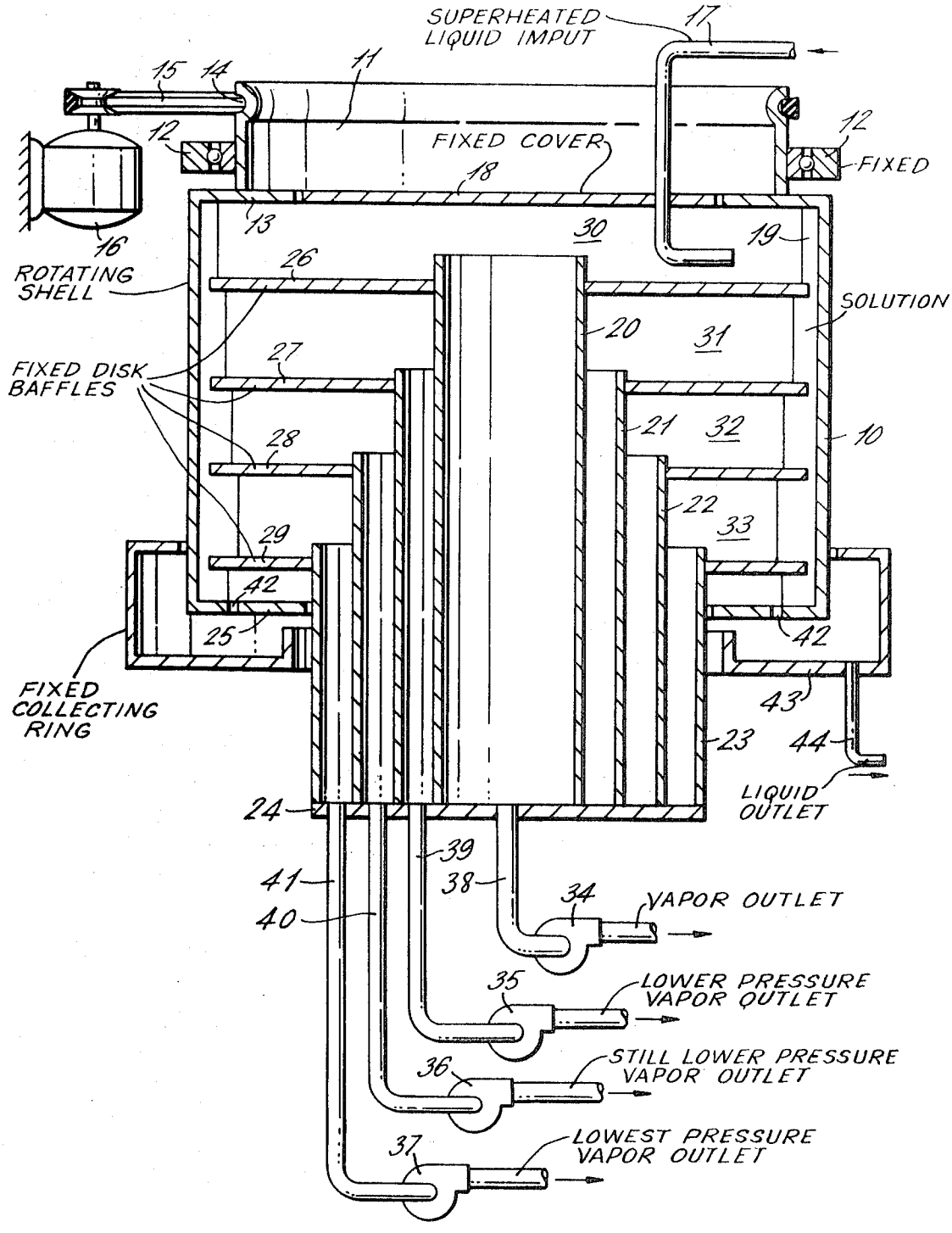
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ABSTRACT: A flash tank for a superheated liquid has a rotated cylindrical shell divided into longitudinal compartments by transverse stationary partitions which extend into liquid introduced into the shell, the compartments being successively evacuated to a greater extent to successively flash the liquid to a vapor as it flows from one compartment to another under centrifugal force.





INVENTOR

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CENTRIFUGAL FLASH TANK

BACKGROUND OF THE INVENTION

Certain liquid solutions, such as coffee extract as one example, are difficult to concentrate by boiling because they foam. This foaming causes entrainment of air or gas with resulting poor heat transfer to the liquid. Often the degree of foaming is a function of concentration within a given limited concentration range so that outside this range foaming is no longer a problem. The device of this invention flashes liquid from a solution with a minimum of foaming within such a range.

SUMMARY OF THE INVENTION

A flash tank for a superheated solution has a rotated cylindrical shell divided into longitudinal compartments by transverse, stationary disk-shaped partitions which extend into liquid introduced into and spun outward onto the inside of the shell, the compartments being evacuated to a progressively greater extend to successively flash portions of the liquid to a vapor as it flows from one compartment to another under centrifugal force. The high acceleration to which the solution is subjected in the apparatus of this invention breaks down foam at a higher rate than it forms.

BRIEF DESCRIPTION OF THE DRAWING

The FIGURE is a longitudinal section through the apparatus of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As may be seen in the drawing, a cylindrical shell **10** is rotatably mounted by an upper collar **11** which is pressed into a ball bearing **12**. Collar **11** is welded to the upper end wall **13** of shell **10**. Collar **11** has a V-belt groove **14** formed in it. By means of a V-belt **15**, motor **16** rotates shell **10**.

Inlet feedpipe **17** extends through the stationary cover **18** to inject a solution **19** in shell **10**. Centrifugal force draws the solution **19** against the inner side of the spinning shell **10**. Concentric pipes **20, 21, 22** and **23** extend upward from a common base and closure **24** through the central opening of bottom wall **25** of shell **10**. The ends of the pipes **20, 21, 22** and **23** support and space apart, respectively, the disk-shaped partitions **26, 27, 28** and **29** which have edges extending into the solution **19** and they form the compartments **30, 31, 32** and **33**. By means of exhaust blowers **34, 35, 36** and **37** and ducts **38, 39, 40** and **41**, the pressures in compartments **30, 31, 32** and **33** are reduced to a progressively greater extent in each successive compartment.

If the solution **19** introduced into compartment **30** is superheated for the pressure therein, some liquid will flash into vapor. The remaining liquid will pass around partition **26** to compartment **31** to again flash partially into vapor. This continues through compartments **32** and **33** to further concentrate the solution. The high acceleration or centrifugal force exerted on the solution by the spinning shell **10** breaks down foam as it forms. Such acceleration may be from 10 to several hundred gravities.

Concentrated solution, concentrated past the foaming range, flows through the apertures **42** in end wall **25** to fly into the collecting ring **43** and leave the apparatus through drainpipe **44** as a concentrated foamless product. It is to be noted that pipes **20, 21, 22** and **23** need not be concentric and that the partition disks **26, 27, 28** and **29** may be rotatively mounted with suitable seals. As many compartments as desired for a given concentration may be provided.

While this invention has been shown and described in the best form known, it will nevertheless be understood that this is purely exemplary and that modifications may be made without departing from the spirit and scope of the invention.

What I claim is:

1. A centrifugal flash tank for a superheated liquid comprising, in combination, a cylindrical rotating shell, means introducing a liquid into said shell, transverse stationary, axially displaced, perforate disk-shaped baffles in said shell having their outer peripheral edges extending into the centrifuged liquid in said shell, said disk-shaped baffles forming successive axially contiguous flash evaporation chambers in said shell, vapor exhaust pipes sealingly extending through said baffles, the open ends of said pipes terminating in respective ones of said chambers, and exhaust means connected to said pipes progressively reducing pressure in said successive flash evaporation chambers, and at least one bore in the lower end of the shell for discharging concentrated solutions.

2. The combination according to claim **1** wherein said pipes are concentrically disposed and extend longitudinally through one end of said shell, the centermost pipe extending to the chamber most remote from the end of said shell entered by said concentric pipes and the outer pipes extending successively to respective chambers.

3. The combination according to claim **1** wherein said liquid is introduced into the remote end of said shell, said shell having at that end a first inturned annular end wall retaining said liquid introduced into said shell.

4. The combination according to claim **3** wherein said at least one bore is contained in a second inturned annular end wall through which the concentrated liquid may flow from said shell.

5. The combination according to claim **4** with the addition of a stationary annular collecting ring disposed about said cylindrical shell and said second annular end wall collecting liquid flowing through the aperture in said second end wall.