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2,766,193

APPARATUS FOR DISTILLING OR EVAPORATING LIQUIDS

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FIG. 1

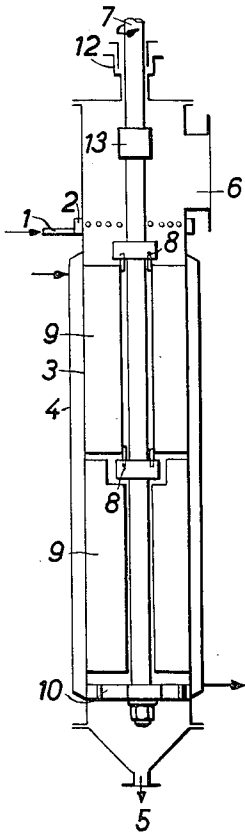


FIG. 2

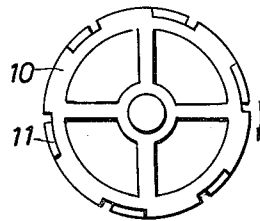


FIG. 3

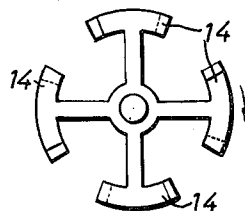


FIG. 4

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APPARATUS FOR DISTILLING OR EVAPORATING LIQUIDS

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Claims priority, application Germany April 7, 1952

4 Claims. (Cl. 202—236)

The present invention relates to apparatus for distilling or evaporating liquids in which a thin layer of liquid flows down the inside wall of a container, which is preferably heated from outside, and is distributed on the inside surface of the container by wipers, brushes or the like mounted on a rotating shaft.

The length of such an evaporator is preferably many times that of the diameter. As a long shaft arranged in an overhung position must be of great diameter, the stuffing box on the driving side of the apparatus becomes large and the construction expensive. The arrangement of a step bearing fitted in the bottom of the apparatus likewise involves difficulties since the step bearing is arranged in a chamber which has a high temperature and in most cases it is not desired that lubricating oil or grease should come into the non-distilled product which discharges at the bottom. The passage of the shaft through a stuffing box and an external bearing offers difficulties since the stuffing box and the shaft must be cold since otherwise condensation of the vapours and, accordingly, dilution of the residues occurs.

The present invention provides a means of overcoming the aforesaid difficulties in a simple manner by providing the rotating shaft of the evaporator with at least one bearing surface gliding on the inside surface of the container and having passages for the material flowing down the inside surfaces of the container. The bearing surface is lubricated by the material flowing down. The passages provided on the bearing surface of the shaft are preferably designed so as to form oblique lubricating grooves to insure a smooth conveyance especially as far as viscous materials are concerned.

In the accompanying diagrammatic drawings which illustrate the invention:

Fig. 1 is a vertical section of a distilling or evaporating apparatus, and

Figs. 2, 3 and 4 are details of alternative travelling wheels forming part of the apparatus.

The apparatus illustrated comprises a feed pipe 1 for the liquid to be evaporated, a liquid distributor 2, an evaporator vessel 3, a heating jacket 4 of the evaporator, an outlet 5 for the non-evaporated residue, an outlet 6 for the vapour, which outlet is connected with a vacuum chamber (not shown in the drawing). A hinged and

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pivoted shaft 7 is provided with movable wipers and brushes 9 which brush the inside surface of the vessel 3 and distribute the liquid film. At one end of the shaft 7, there is arranged a bearing surface shaped as a travelling wheel 10 which glides on the inside surface of the vessel and insures a centering of the shaft.

As shown in Figs. 2 and 3, the travelling wheel 10 can be provided with peripheric, oblique lubricating grooves 11.

The travelling wheel may also be designed so as to leave only single segments 14 in wider spaces, as shown in Fig. 4. The bearing surface need not be provided at the lower end of the shaft, but may be arranged in containers having a number of rows, between these rows. This construction has the advantage that, in the event of very viscous residues flowing down, the travelling wheel can be provided at the position at which the concentration of the material to be evaporated is not so high and therefore the material is prevented from getting blocked and sticking. The shaft may either be machined of one piece or, preferably, can be separated below a stuffing box 12 and connected through a coupling (Fig. 1) which provides so much play that the shaft does not weigh on one side of the travelling wheel 10. The coupling can be shaped like a bayonet so as to allow of removing the shaft provided with the wipers and travelling wheels at the bottom after detaching the bottom.

I claim:

1. In an apparatus for the distillation and evaporation of liquids having an inner distillation surface of circular cross section and wiping means mounted on a rotatable, axially positioned central shaft for spreading a thin film of the liquid to be treated over the inner distillation surface, the improvement which comprises a bearing connected to said shaft having an outer bearing surface extending in a plane substantially parallel to the plane of the adjacent portion of the inner distillation surface and in bearing contact therewith, said bearing surface defining interruptions extending throughout the axial width thereof to define passages for the passage of liquid therethrough.

2. Improvement according to claim 1, in which said bearing is a wheel shaped bearing having a cylindrical outer bearing surface.

3. Improvement according to claim 2, in which the interruptions in said bearing surface are oblique lubricating passages.

4. Improvement according to claim 1, in which said bearing is a segmented wheel with the segmented portions thereof having an outer bearing surface in bearing contact with the inner distillation surface.

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