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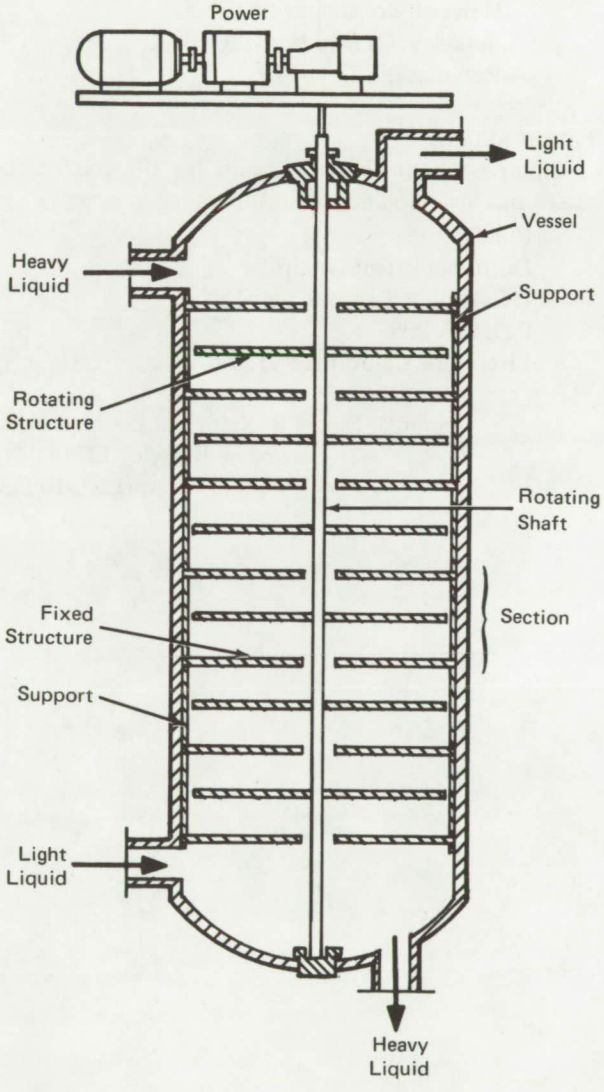
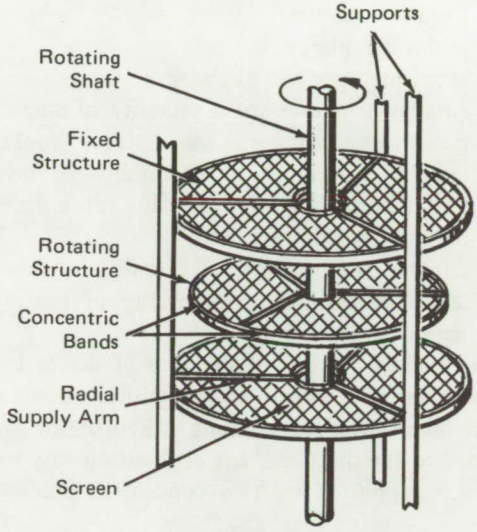
AEC-NASA TECH BRIEF

Lawrence Berkeley Laboratory

A Permeable Rotating-Wheel Solvent Extractor





Detailed Section
(3 Dimensional)

The problem:

Column-type solvent extractors such as the pulsed-plate, rotating-disc, and Oldshue-Rushton type have had limitations in that they either required excessive power inputs or could not handle systems with low density differences without forming stable emulsions.

The solution:

A permeable rotating-wheel solvent extraction device has been developed which uses low power and employs a gentler mixing action between the phases. Because of its gentler mixing, the device can handle systems with low density differences and low interfacial tensions without the formation of a stable emulsion.

How it's done:

The device, as shown in the figure, is an extraction column which uses several novel circular mixing structures. The device comprises a vertically mounted long cylindrical vessel with elliptical end closures. Heavy-liquid flow enters at the top of the vessel and exits through the bottom. The light-liquid flow enters the vessel from the bottom through a separate inlet and exits from the top. Immiscible liquids are used and the

(continued overleaf)

column is employed to transfer a substance soluble in both liquids from one liquid to the other. One phase is usually dispersed in the form of small droplets into the second phase.

A number of circular permeable structures are situated in the central portion of the vessel, as shown. Alternate structures are fastened to the shaft and rotate with it; the others are secured to the three vertical supports and remain stationary.

The types of circular permeable structures that are used in this column are:

(a) a single layer of wire-mesh screen per circular structure;
(b) a plurality of layers of wire-mesh screens per circular structure;
(c) perforated plates;
(d) corrugated perforated plates;
(e) circular structures of a plurality of single planar radially emanating thin wire rods (or "spokes");
(f) circular structures of a plurality of horizontal layers consisting of a plurality of radially emanating thin wire rods; and
(g) circular structures of a plurality of non-planar layers consisting of a plurality of radially emanating thin wire rods.

The unique feature of the present device is that it employs circular permeable structures of wire mesh screen, as shown. The rotating screen of the structure fastened to the shaft and that of the stationary structure are each supported by two concentric circular bands which are connected by three radial metal arms. It is possible to vary wire-mesh size on either screen to minimize longitudinal dispersion without increasing dispersed phase holdup or decreasing the throughput capacity. Each configuration can be of different and variable permeability, and the permeability can vary in the radial direction.

Note:

Requests for further information may be directed to:

Mr. Robert J. Morris
Technical Information Division
Lawrence Berkeley Laboratory
University of California
Berkeley, California 94720
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Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to:

Chief
California Patent Group
U.S. Atomic Energy Commission
P.O. Box 808
Livermore, California 94550

Source: Daniel R. Kahn and Louie A. Nady
Lawrence Berkeley Laboratory
(LRL-10033)