Title : Different Types of Filtration Equipment (SFO:2180508)

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Name of Faculty: Mr. Sunil M Badgujar

Lecture No : 01: 9.30am to 10.30 am

Source of information :

1. Unit Operations of Chemical Engineering, McCabe, Smith, Harriott (Pg. No.1007-1017 Section V)

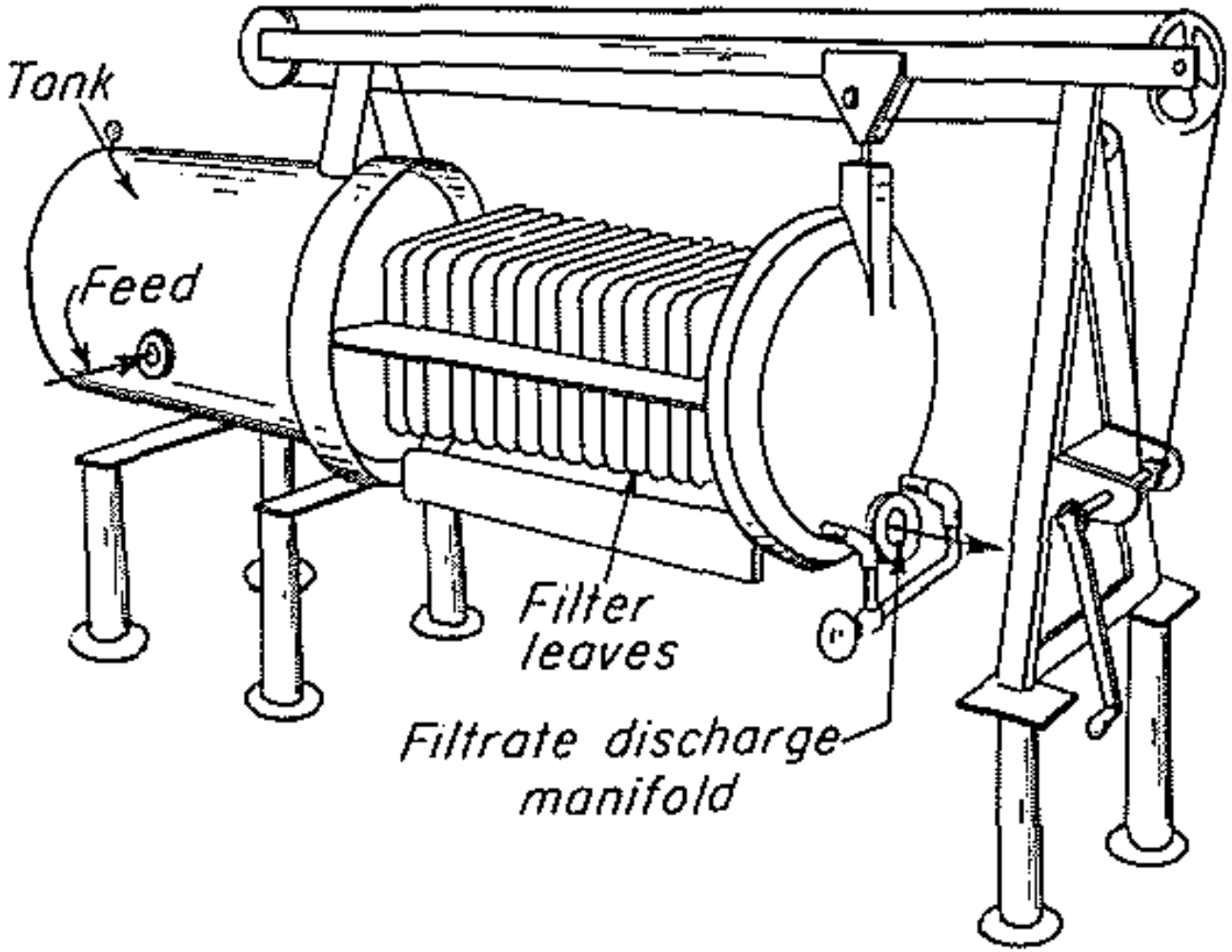
2. Coulson Richardson's Chemical Engineering Vol.6 Chemical Engineering Design 4th Edition

SHELL AND LEAF FILTER:

Description:

In these horizontal pressure leaf filter Jacketting and cloth enveloped filters are optional. There are 2 hydraulic cylinders to open and close the special bayonet wedge lock closure, which is provided at the lid. The retractable filtered shell is mounted on four external wheels and all nozzle connections are mounted on fixed head of filter vessel. Appropriate inter-locking (preventing opening under pressure) is also a key feature of this type of horizontal pressure leaf filter.

Vertical Pressure Leaf Filter



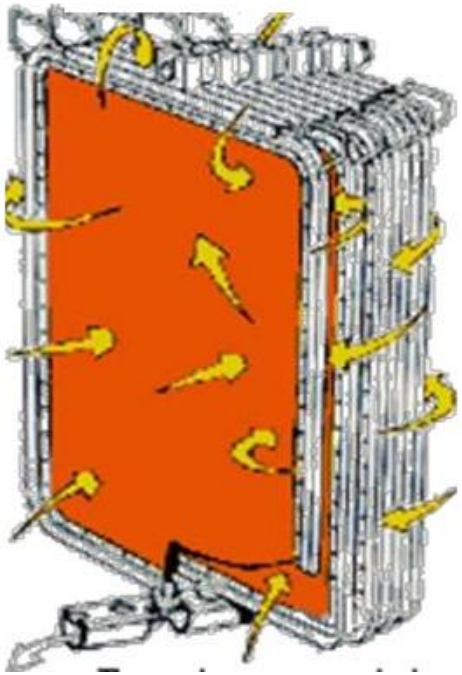
- This filter is used under higher pressure and batter washing of the cake is needed.
- These filters provide large surface area by using varieties of filter leaves.
- In the horizontal tank design shown in fig. a set of vertical leaves is held on a retractable rack.
- The slurry to be filtered fills the space around the leaf and is forced to flow through the leaf by applying pressure on the slurry or vacuum within the leaf.
- The filter cake builds upon the outside of leaf.
- Filtrate passes from within the leaf to the filtrate discharge system.
- This is widely used for filtrations involving filter aids.

Advantages:

Horizontal Leaf Filter is also a multi utility device that has the following advantages: -

» Nil spillage, as a result of close and compact operation.
» No use of filtered cloth reduces operational expenses.
» High productivity due to high rate of filtration.
» Cheap and economical operational costs.
» Highly user friendly.

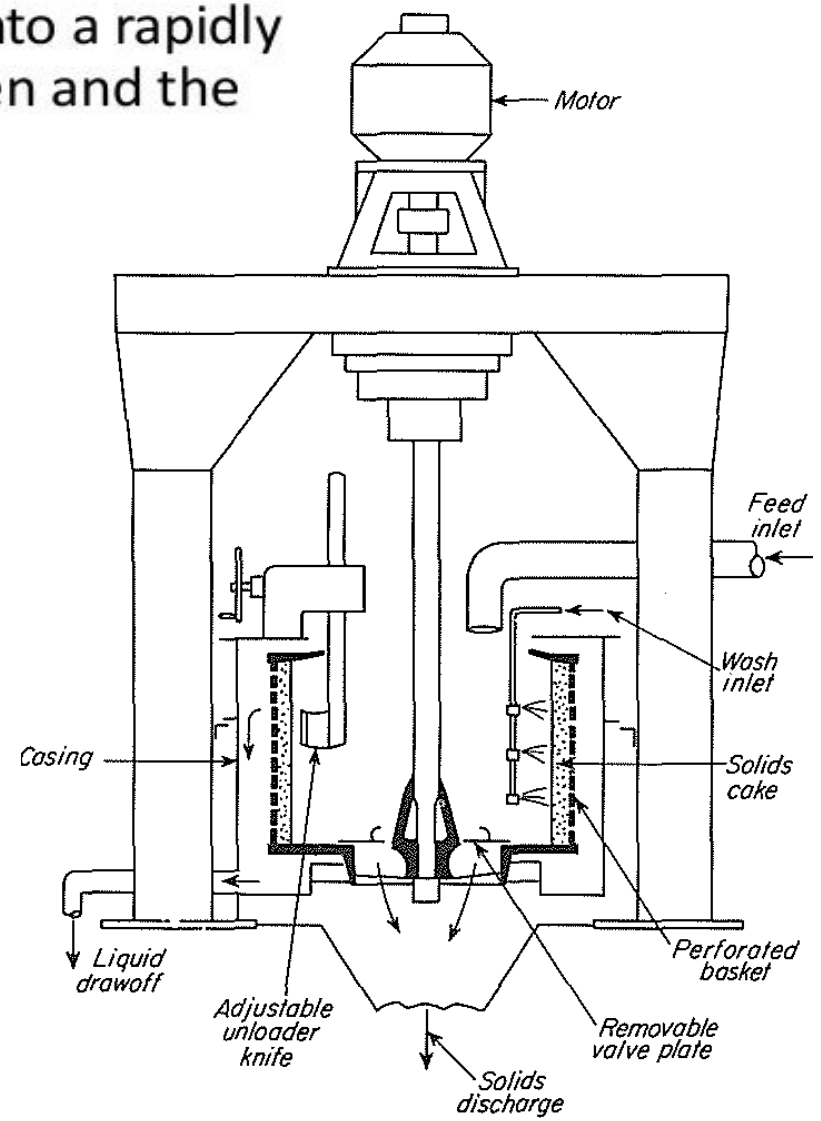
Internal Structure



CENTRIFUGAL FILTRATION

The removal of a liquid from a slurry by introducing the slurry into a rapidly rotating basket, where the solids are retained on a porous screen and the liquid is forced out of the cake by the centrifugal action.

A highly accelerated form of sedimentation, centrifugation is a process used to separate or concentrate materials suspended in a liquid medium. Centrifugation uses gravity and centrifugal force to separate particles heavier than the liquid medium. Centrifuges spin the material at high rotation speeds and separate the particulate from the liquid. Centrifugal force can reach many thousand times that of gravity, quickly separating the liquid/solid material, sometimes even to the nano-particle level.



CENTRIFUGAL FILTRATION SELECTION CRITERIA

- The properties of the fluid, particularly its viscosity, density and corrosive properties.
- The nature of the solid—its particle size and shape, size distribution, and packing characteristics.
- The concentration of solids in suspension.
- The quantity of material to be handled, and its value.
- Whether the valuable product is the solid, the fluid, or both.
- Whether it is necessary to wash the filtered solids.
- Whether very slight contamination caused by contact of the suspension or filtrate with the various components of the equipment is detrimental to the product.
- Whether the feed liquor may be heated.
- Whether any form of pre treatment might be helpful.

Que 1: Draw diagram and describe shell and leaf filters.

Que 2: Describe the centrifugal force equipment for separation.

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