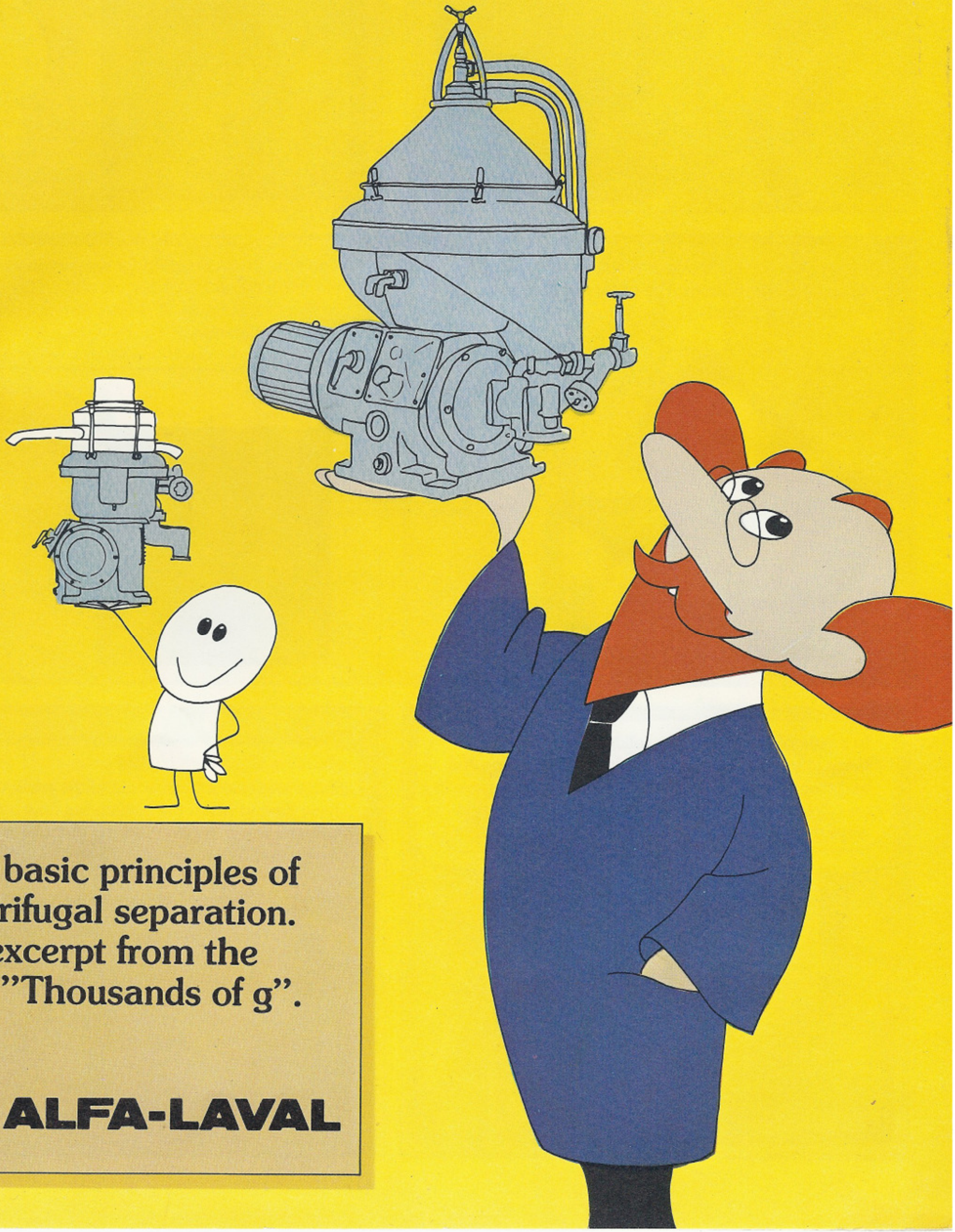
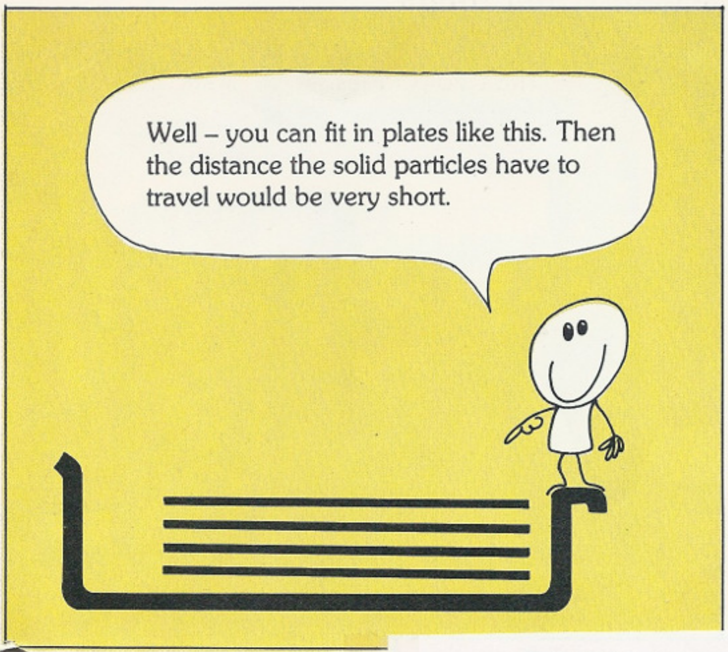
Thousands of g

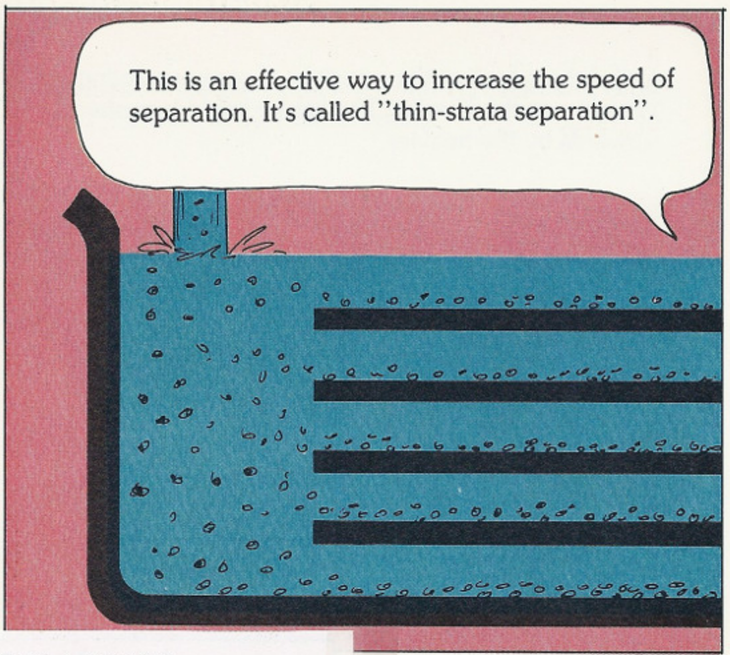


The basic principles of centrifugal separation. An excerpt from the film "Thousands of g".

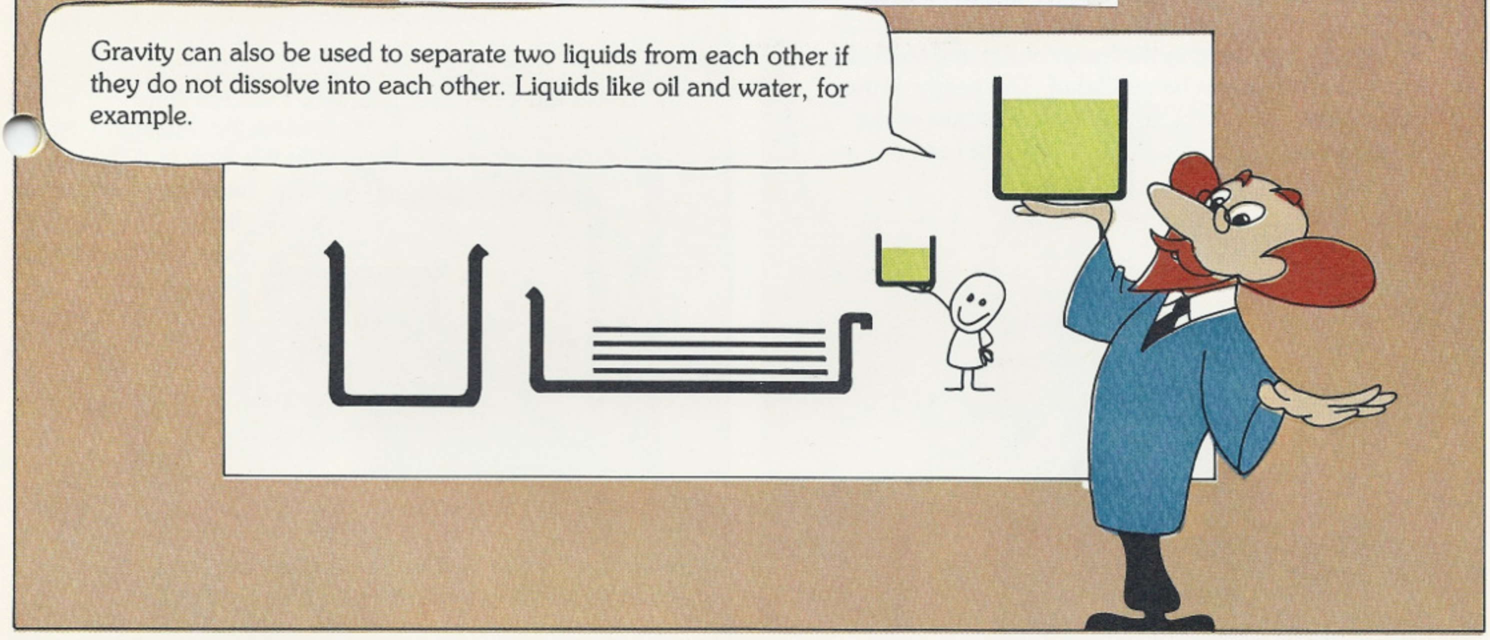
ALFA-LAVAL

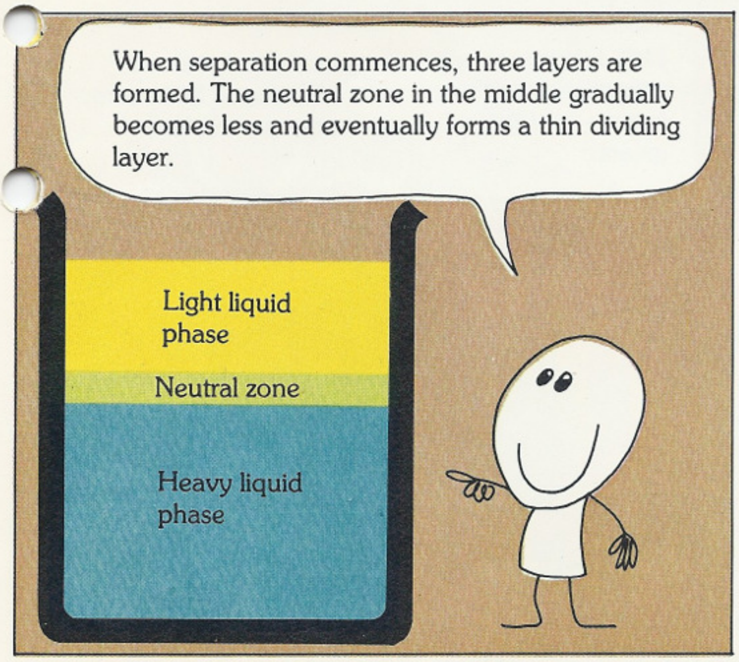
SEPARATING MIXTURES OF LIQUIDS AND SOLIDS.

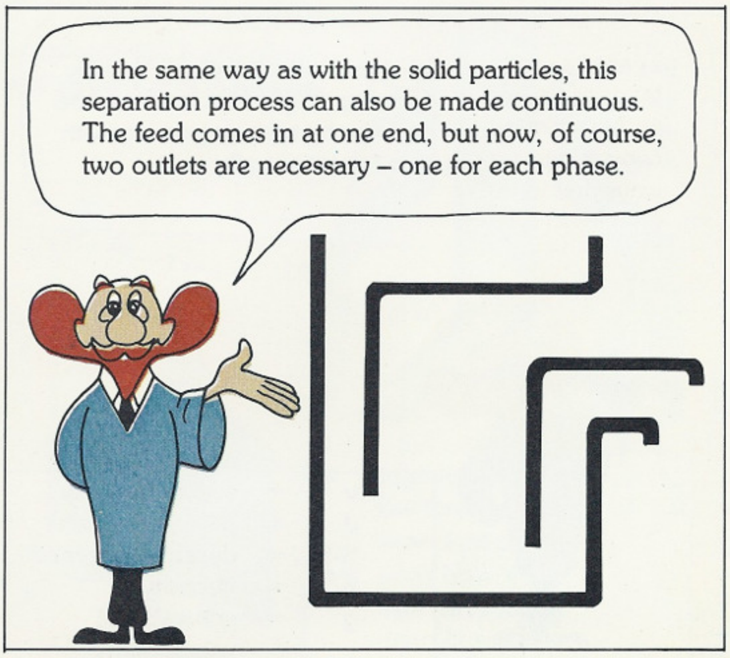


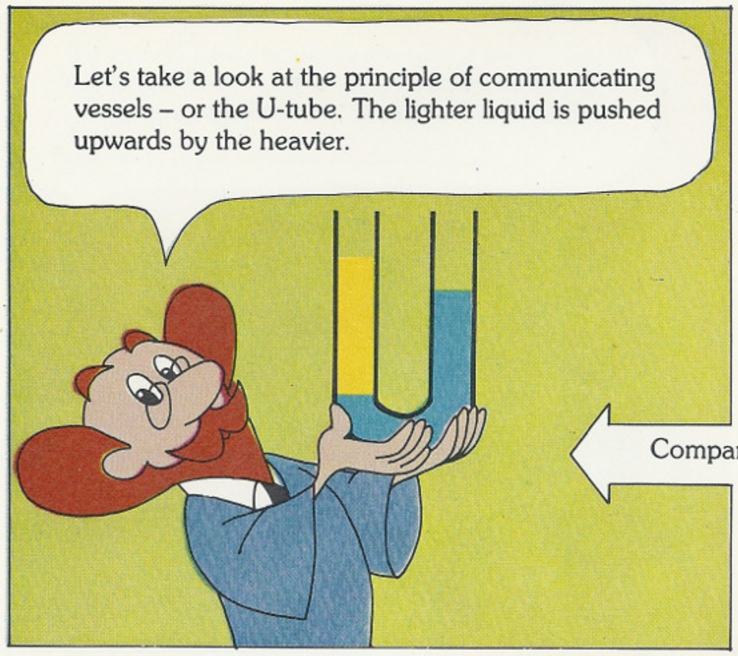


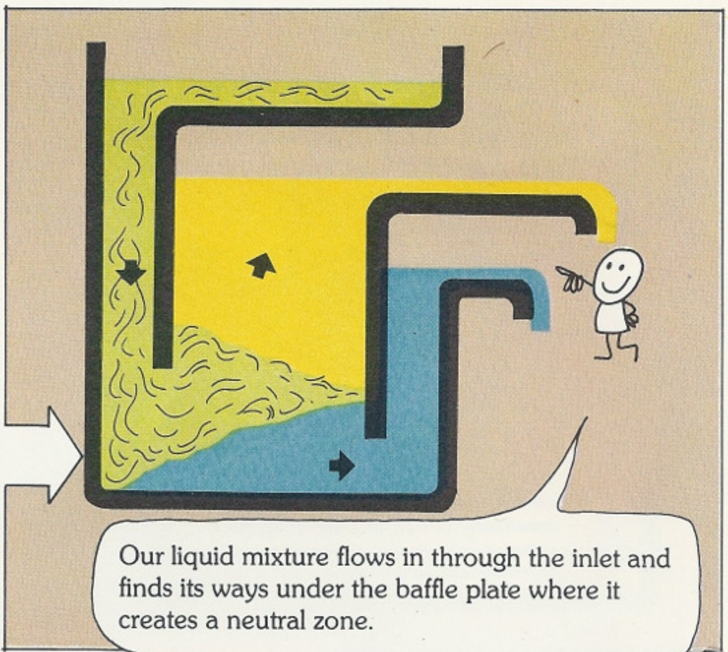
SEPARATION OF TWO LIQUIDS.

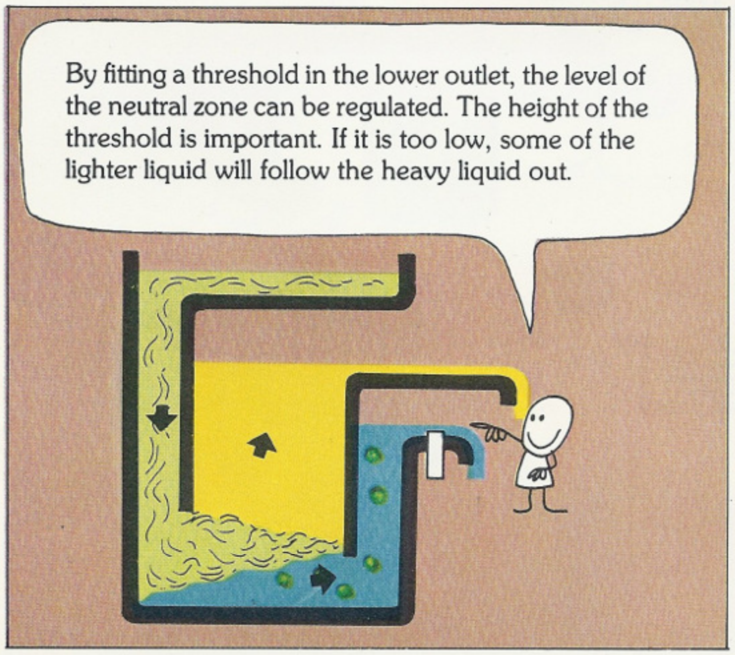


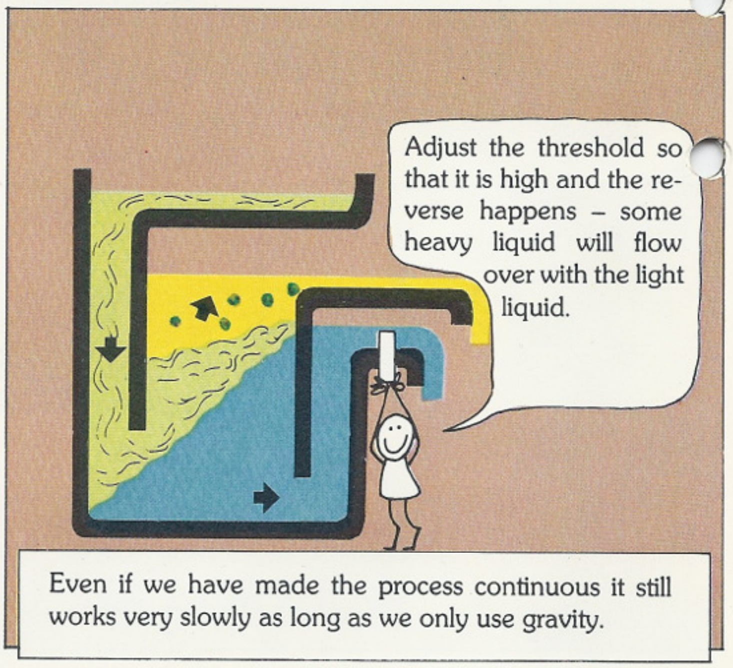


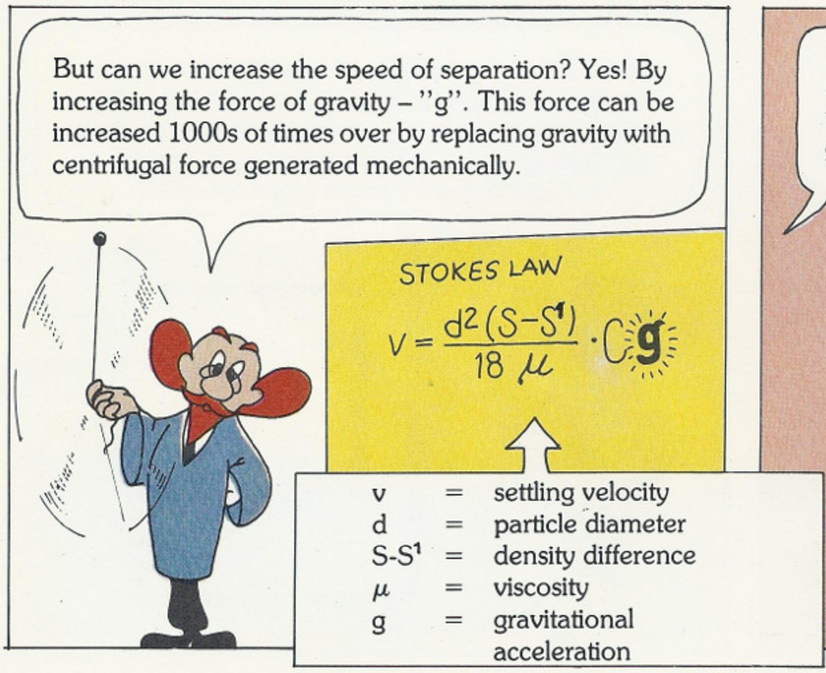


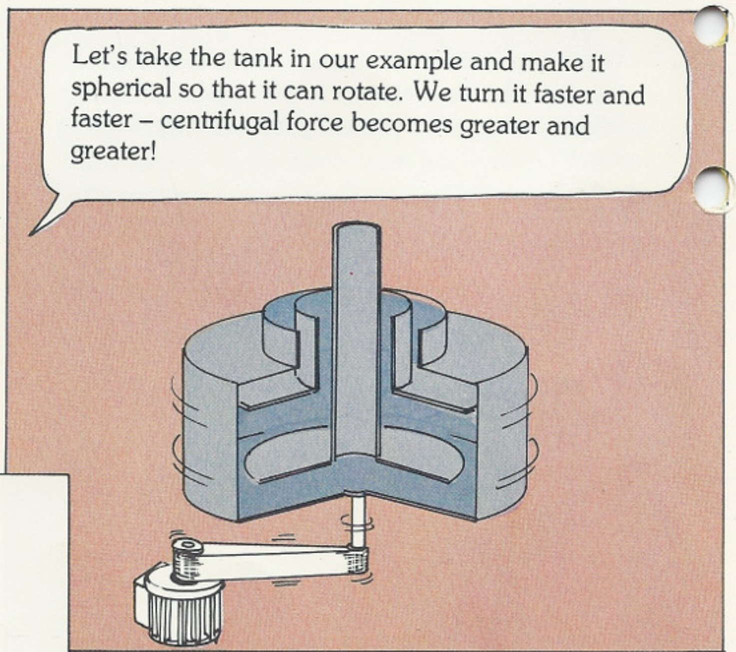

Let's take a look at the principle of communicating vessels – or the U-tube. The lighter liquid is pushed upwards by the heavier.
Compare

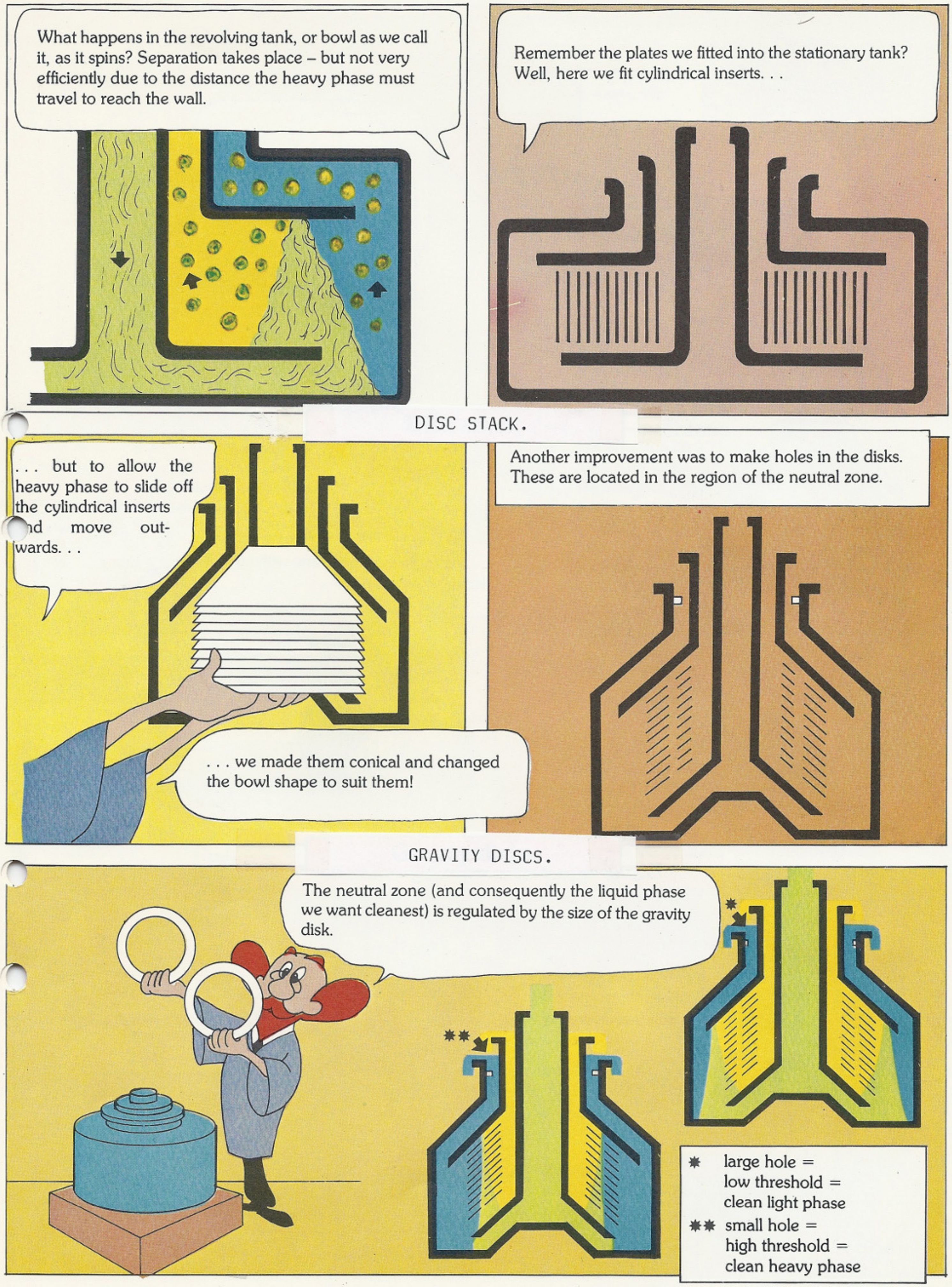

Our liquid mixture flows in through the inlet and finds its ways under the baffle plate where it creates a neutral zone.

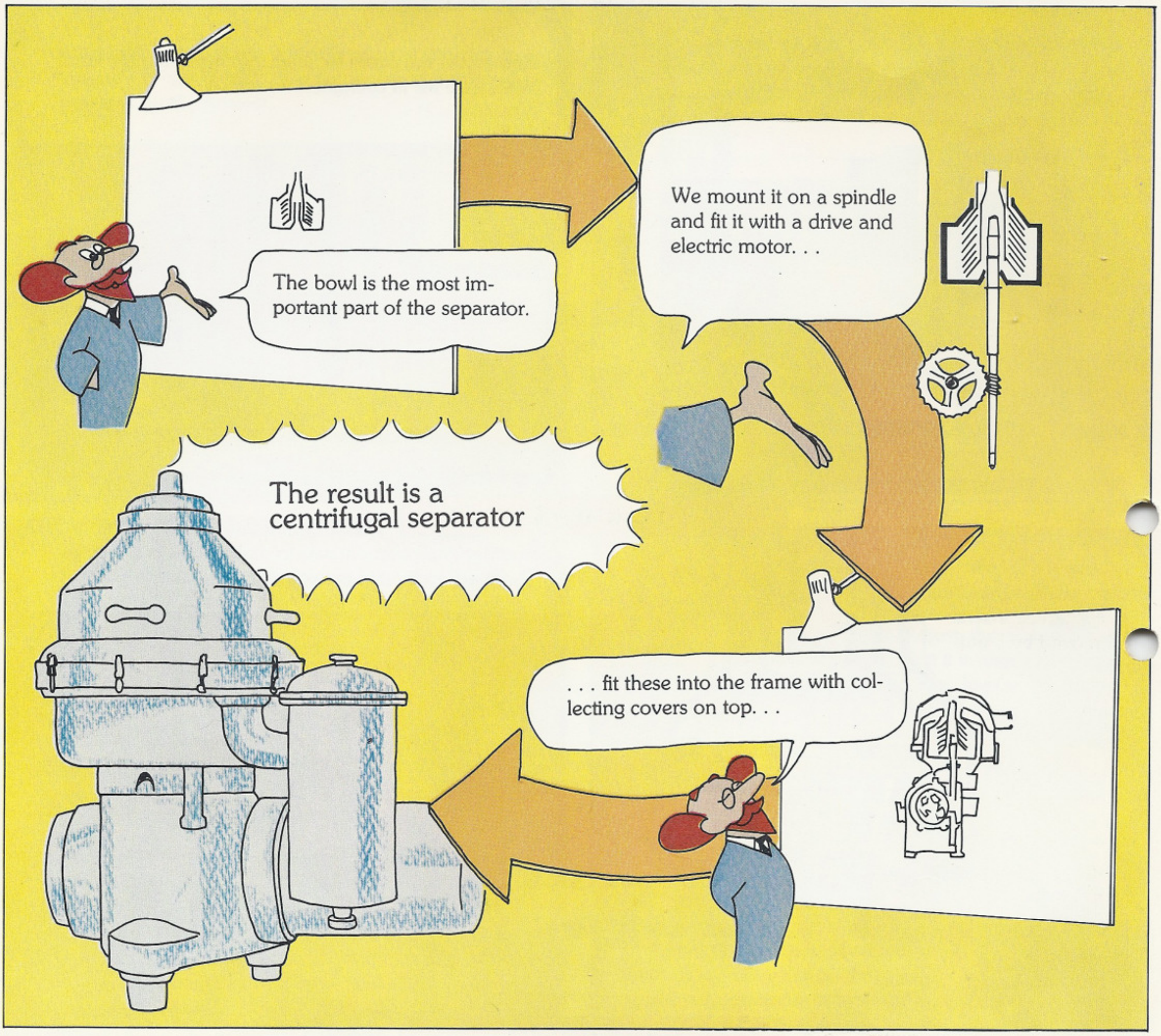

By fitting a threshold in the lower outlet, the level of the neutral zone can be regulated. The height of the threshold is important. If it is too low, some of the lighter liquid will follow the heavy liquid out.


Adjust the threshold so that it is high and the reverse happens – some heavy liquid will flow over with the light liquid.
Even if we have made the process continuous it still works very slowly as long as we only use gravity.

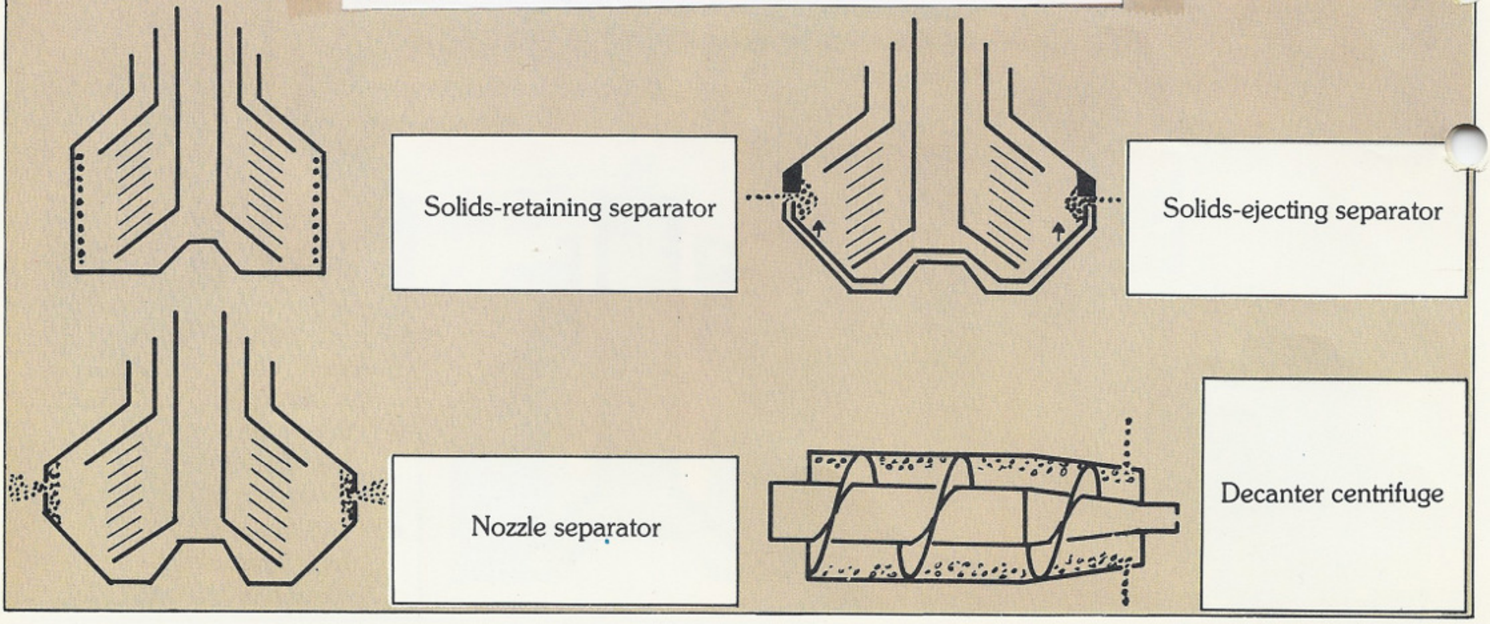

But can we increase the speed of separation? Yes! By increasing the force of gravity – "g". This force can be increased 1000s of times over by replacing gravity with centrifugal force generated mechanically.
STOKES LAW
$V = \frac{d^2(S-S^1)}{18\mu} \cdot C g$
v = settling velocity
d = particle diameter
$S-S^1$ = density difference
μ = viscosity
g = gravitational acceleration


Let's take the tank in our example and make it spherical so that it can rotate. We turn it faster and faster – centrifugal force becomes greater and greater!


What happens in the revolving tank, or bowl as we call it, as it spins? Separation takes place – but not very efficiently due to the distance the heavy phase must travel to reach the wall.
Remember the plates we fitted into the stationary tank? Well, here we fit cylindrical inserts. . .
DISC STACK.
. . . but to allow the heavy phase to slide off the cylindrical inserts nd move outwards. . .
. . . we made them conical and changed the bowl shape to suit them!
Another improvement was to make holes in the disks. These are located in the region of the neutral zone.
GRAVITY DISCS.
The neutral zone (and consequently the liquid phase we want cleanest) is regulated by the size of the gravity disk.
*
**
* large hole = low threshold = clean light phase
** small hole = high threshold = clean heavy phase

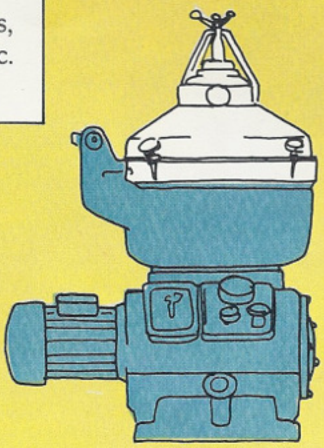


BASIC TYPES OF CENTRIFUGE BOWLS.



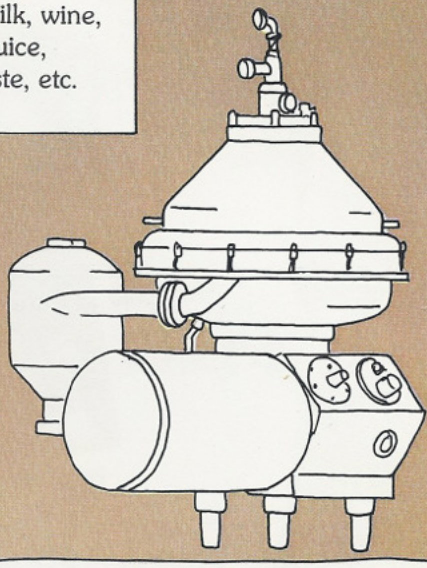
CENTRIFUGE APPLICATION.

Explosives, edible oils, soap, rubber latex, etc.



This is a **solids-retaining separator**. It's used for separating liquid mixtures that have only a low amount of solids in them – no more than 1%. This is because the machine must be stopped, the bowl dismantled and the solids removed by hand.

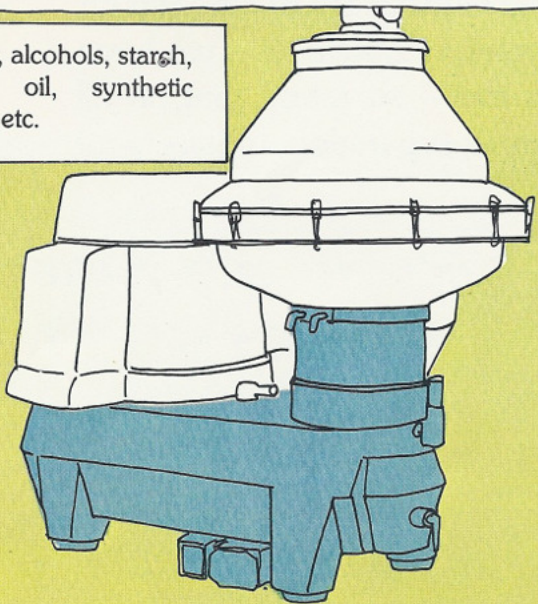
Fuel oils, milk, wine, beer, fruit-juice, nuclear waste, etc.



For liquids with a higher solids content (up to 10%) or when it's undesirable to stop the machine for emptying, a **solids-ejecting separator** is the one to use. The solids that collect in the bowl are shot-out by perodically uncovering slots in the periphery of the bowl for a fraction of a second.

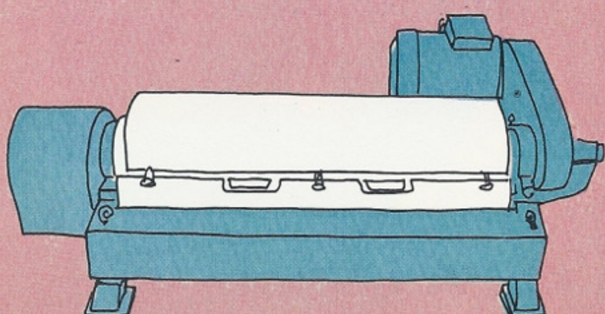
If a process liquid contains over 10% solids – a **nozzle separator** should be used. Here, the solids leave the bowl in a continuous stream.

Yeast, alcohols, starch, palm oil, synthetic fuels, etc.



For dewatering sludge containing up to 60% solids, a **decanter centrifuge** is used. This machine has a horizontal drum or rotor in which separation takes places in the same way as in the vertical separator. The decanter has no disk stack, however, the solids being removed continuously from the drum by a screw conveyor.

Fish processing, meat by-products, sewage dewatering, plastics, etc.



Our founder, Gustaf de Laval, invented the centrifugal separator for separating cream from milk 100 years ago. Today, our centrifuges are used in a great number of processes. Some of these are mentioned on page 7 and more in the collection of brochures above. But we have solved many other separation problems too – so many that, in all probability, we have already worked on a separation requirement similar to yours.

For more information, please contact:

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