



AWRI

Equipment evolution: Pressing (continuous)

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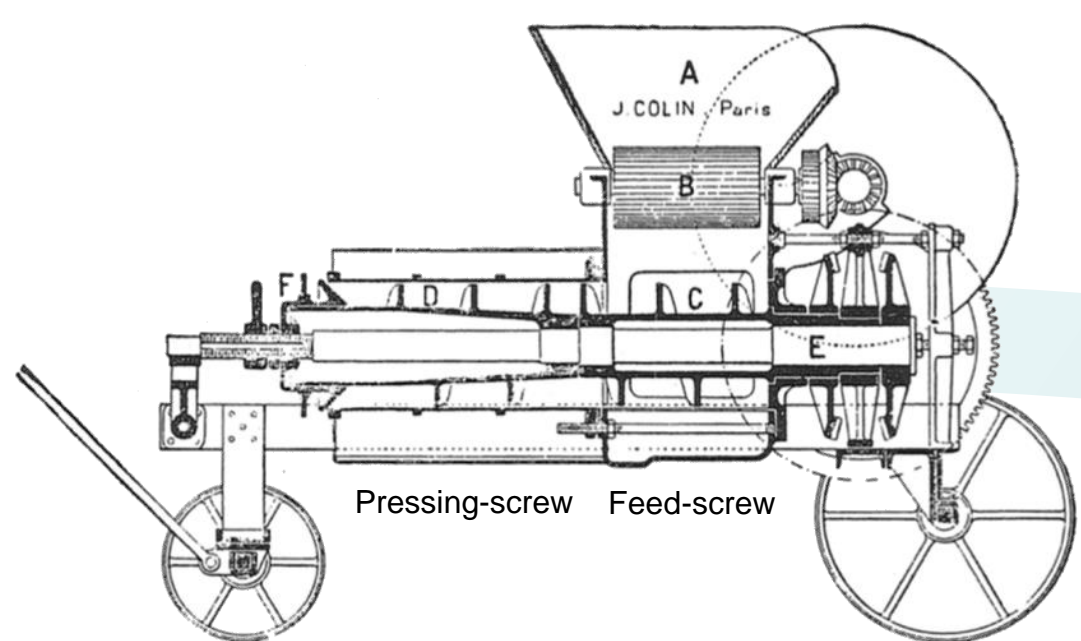
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Drive for productivity - but without too many solids or phenolics...

While there were major advances in batch pressing technology in the late 1800s, pressing was still a very slow process. This fostered interest in continuous presses. Many continuous press designs were launched in France in the 1890s. The Archimedean screw press quickly came to dominate this category.

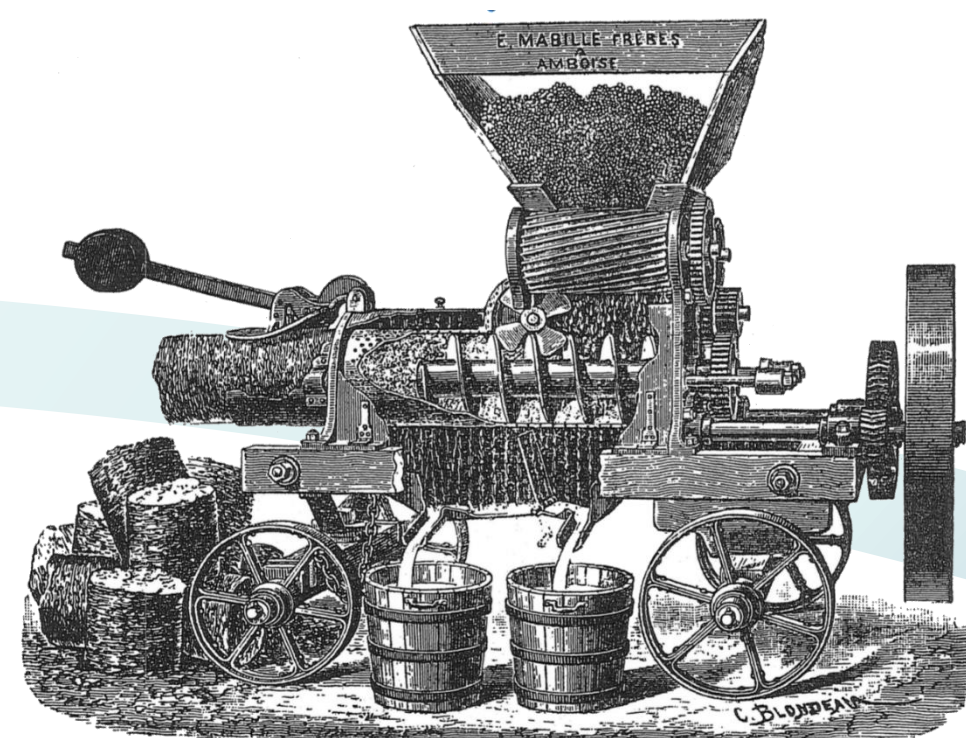


Model T Ford assembly line



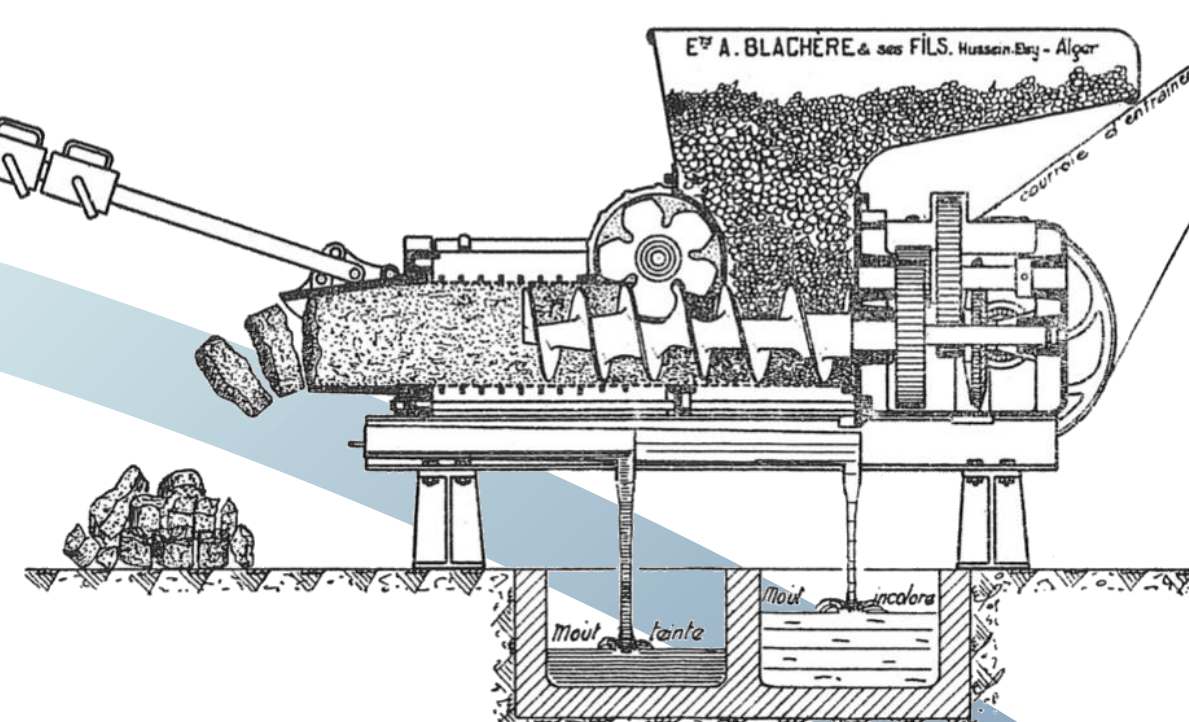
Counter-rotating feed screw

Some designs featured a counter-rotating screw to feed material into the pressing chamber without backflow. Other designs featured side-by-side screws for this purpose.



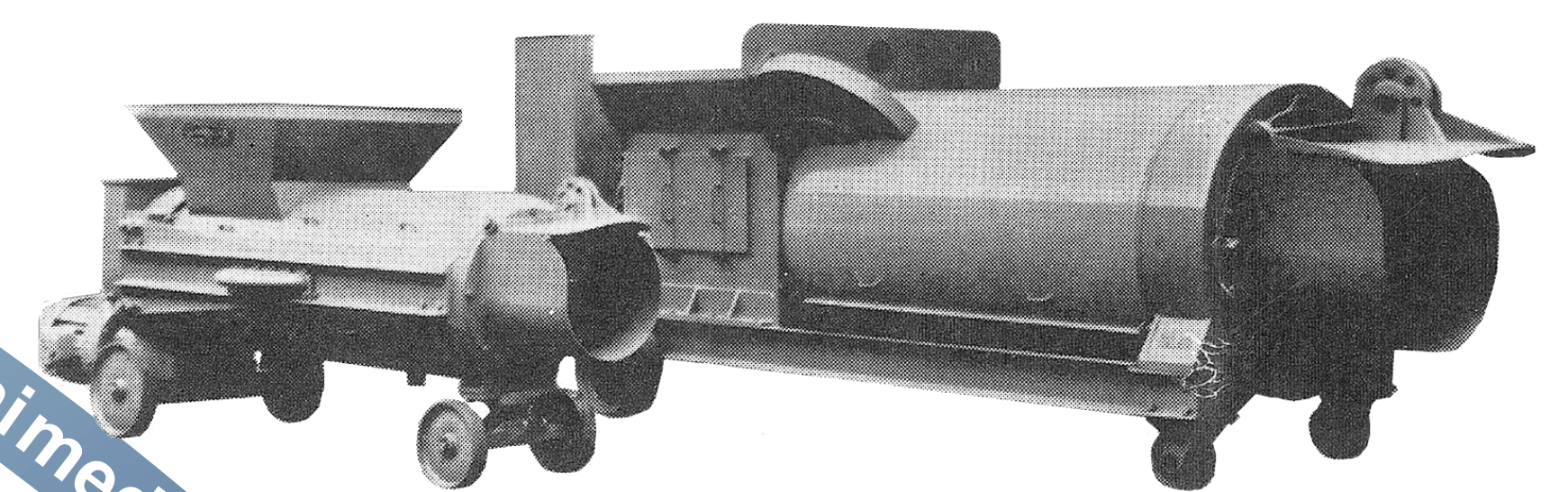
Feeding clover wheel

Clover wheels were another method of feeding material into the pressing chamber. This mechanism was widely used from the 1890s to the 1970s.



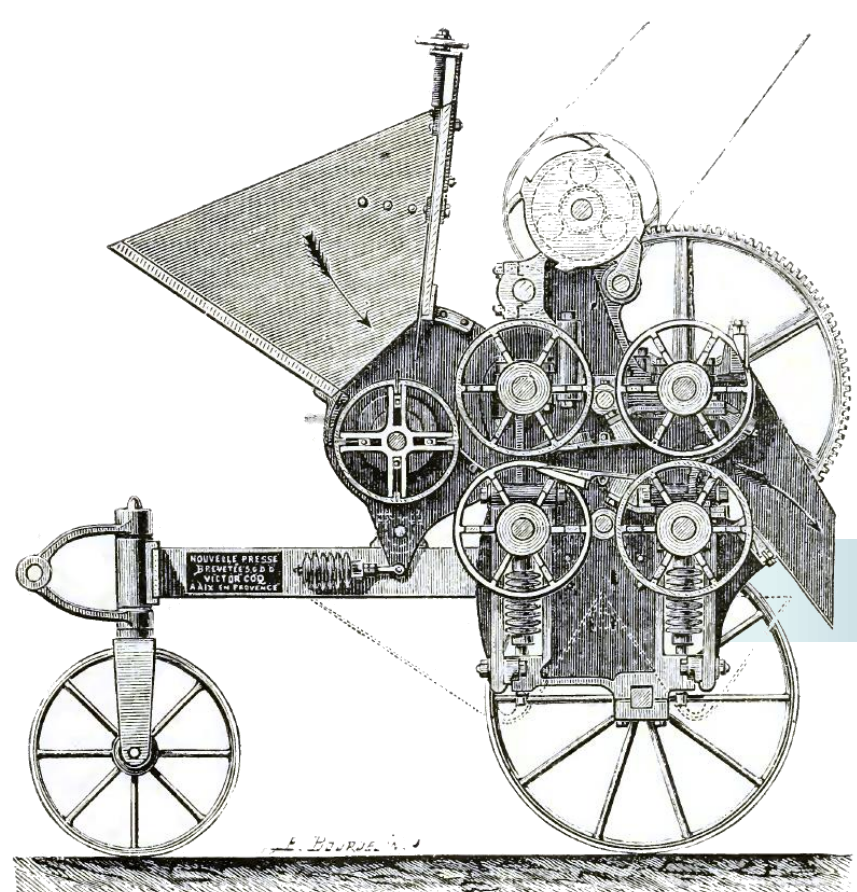
Prior draining

Early designs often featured in-built crusher rollers, making them an all-in-one juice expression solution. However, prior crushing and draining allows the press to more efficiently grip and press the cake (the press shown has no crusher rollers).



Larger diameter with slower RPM

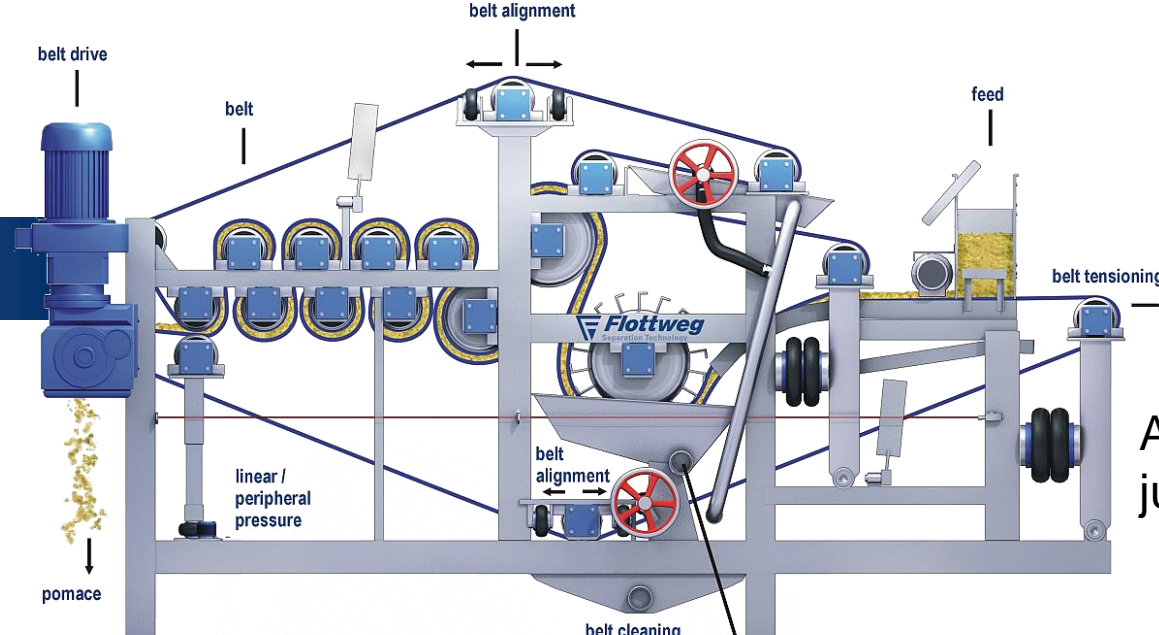
Juice solids levels are often high with Archimedean screw presses. The use of larger diameters and slower speeds reduced this somewhat.



Rollers

Several roller presses were launched in the 1890s. They were apparently soon abandoned. They likely produced low yields with high solids.

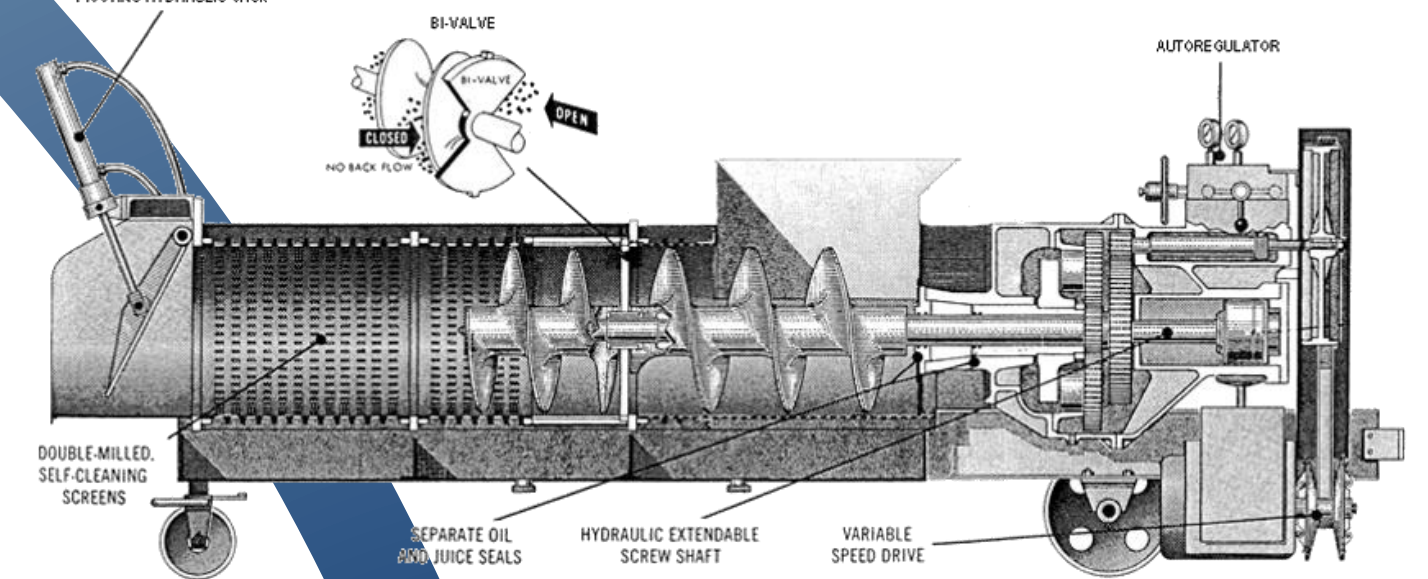
Rollers and belts



Belt

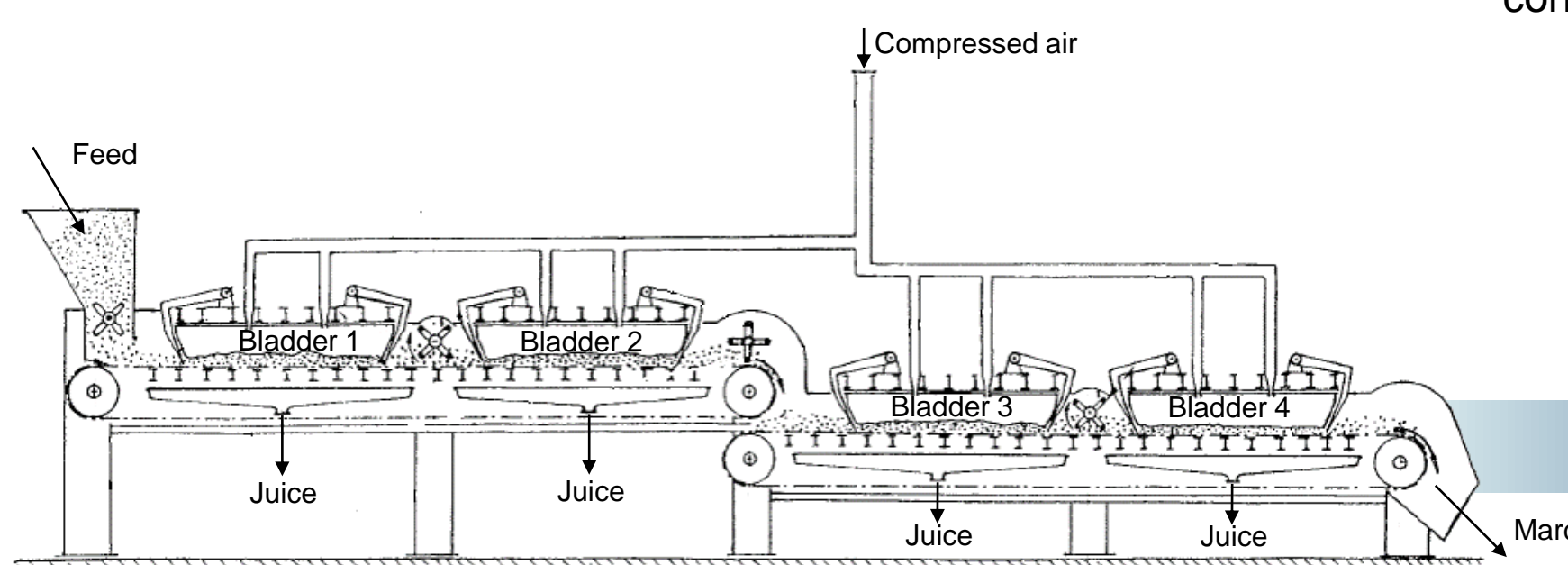
Belt presses have intermittently been trialed in the wine industry but give juice with high solids content and can be difficult to clean.

A modern apple juice belt press



Bi-valve feeding plate

This alternative to the clover wheel invented in c. 1970 better prevented backflow. Presses with this design also used less power since there had been a lot of friction between the clover and screw.



Bladders on conveyors

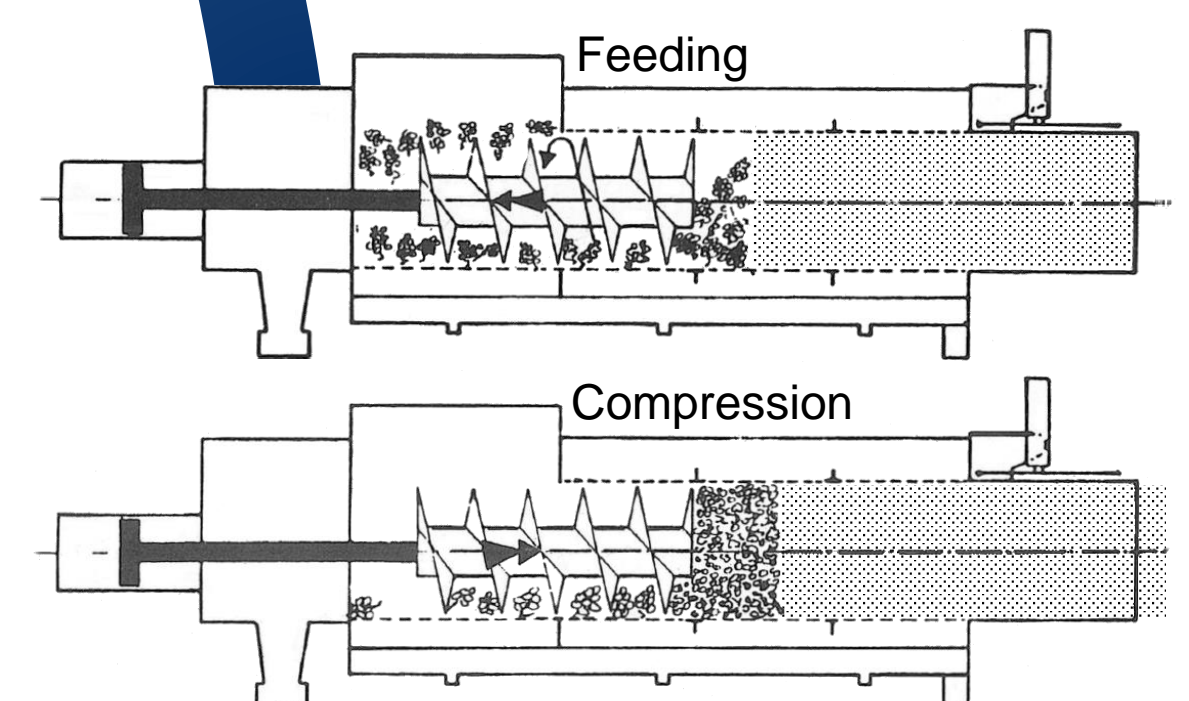
After prior draining, material is pressed by bladders at four stations. Material is moved intermittently between stations by a mesh belt. One of these South African Mackenzie presses was installed at Orlando winery in 1965.

Pneumatic



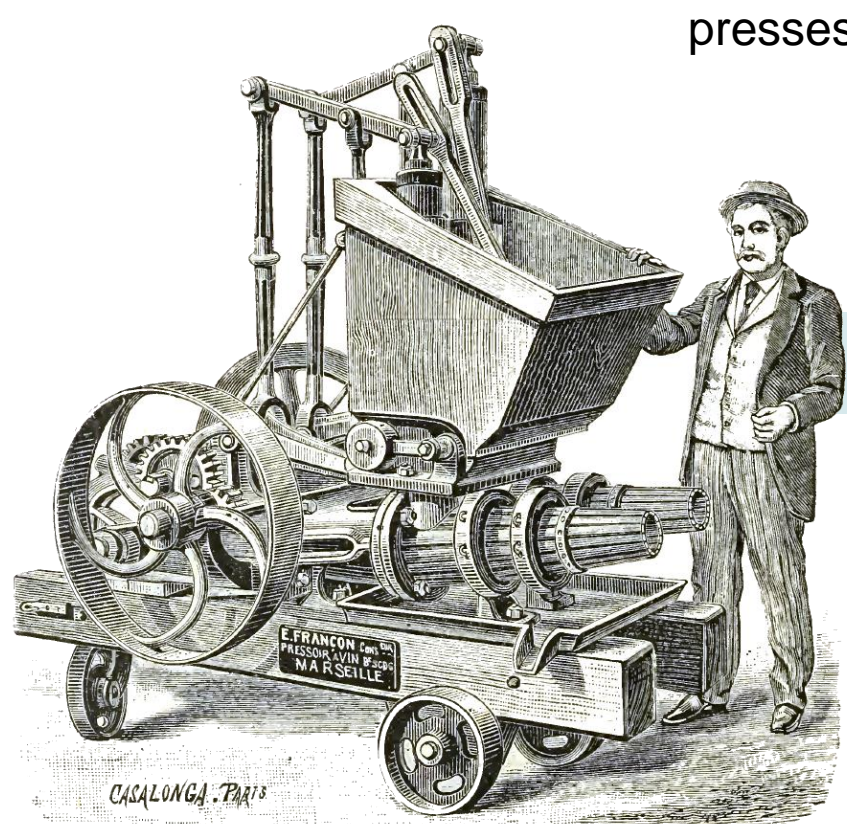
Membranes in a tank

A newer variation on the continuous pneumatic press was launched in the 1990s by Siprem. It consists of a partitioned tank with pressing by a membrane in each section. Tank rotation facilitates crumbling and conveyance to the next section.



Impulse action

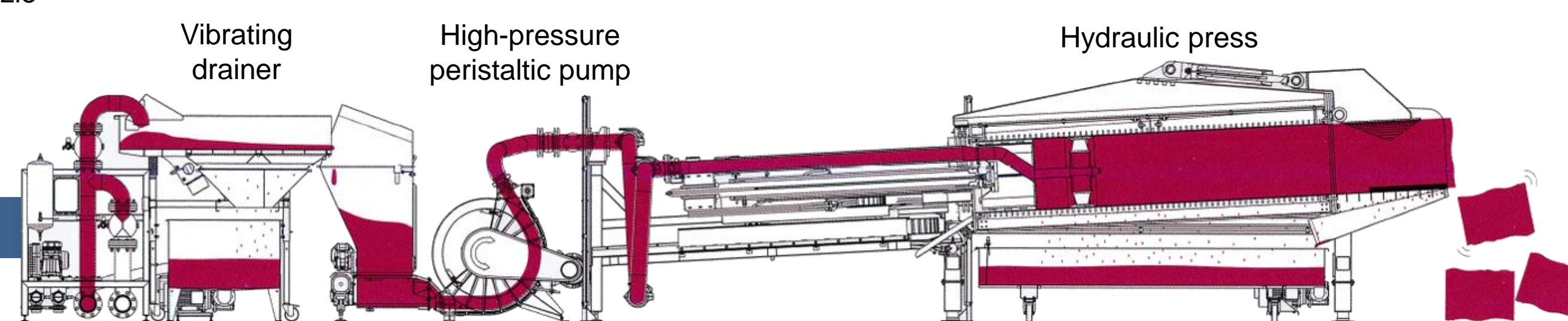
The screw rotates to feed, but is moved forward without rotating to press. This invention partially mimics a batch press. c. late 1970s.



Piston press

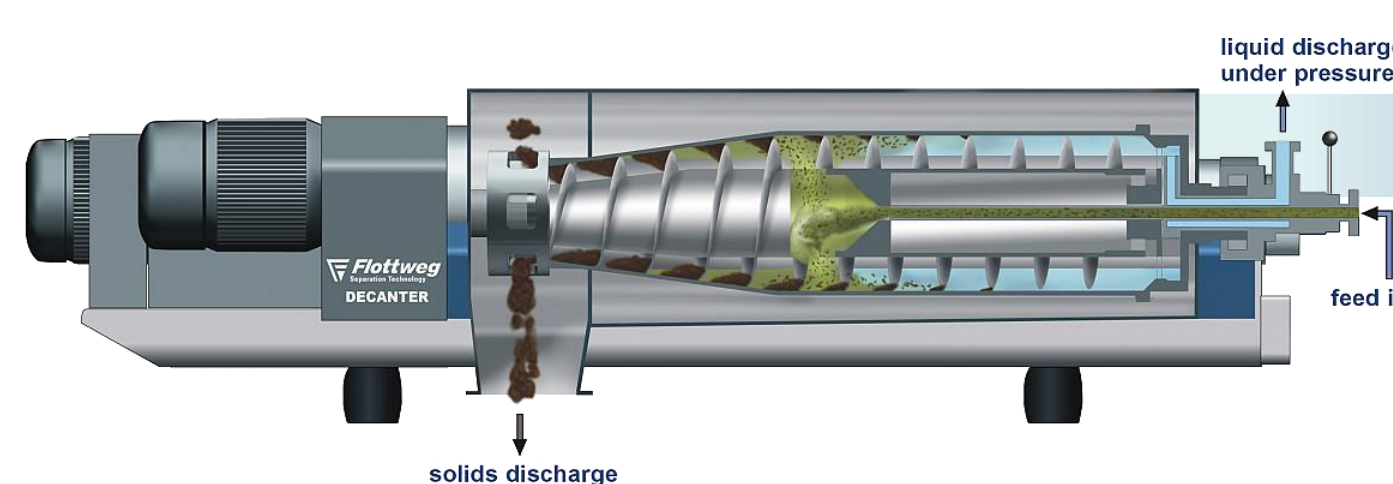
In this piston press design from the 1890s, material is fed from a hopper and into two horizontal bar cylinders in which pistons compress and transport the material towards the conical end.

Pistons & pumps



Peristaltic pump and hydraulic press

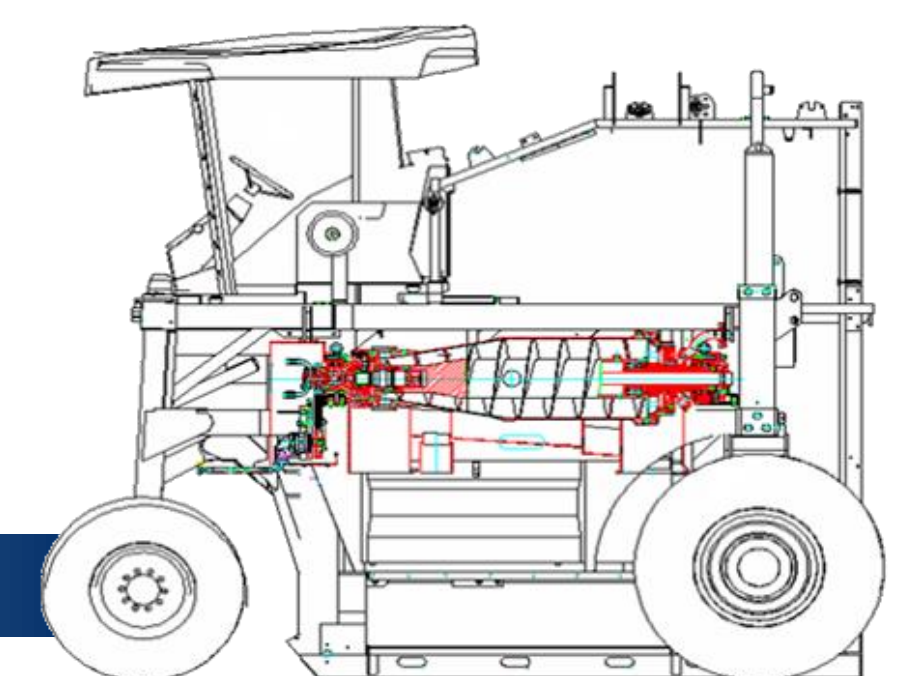
In 2015 Diemme released a new press for fermented pomace. It uses the combined action of a peristaltic pump and a hydraulic press. There is no screw or crumbling and is claimed to give lower solids than a batch membrane press. However, the lack of crumbling means that yields would be insufficient with fresh grapes.



Decanter centrifuges

Winery

Undrained mash is feed into a fast-rotating chamber. Grape parts are projected into the wall and juiced. Solids are transported towards the exit by a scroll rotating at a slightly faster speed than the chamber. There have been a number of studies of this technology in the wine industry over the last 20 years and some limited adoption.



Harvester-mounted

The small footprint of a decanter led to trials mounting one on a machine-harvester to juice white grapes directly in the vineyard. This is not yet commercially available.



- Continuous screw presses were widely used in large-scale wine production. Use declined after the introduction of large capacity axial filling batch pneumatic membrane presses that gave lower juice solids levels.
- However, large axial filling batch membrane presses still have a relatively low throughput and can be a bottleneck, particularly in white wine production.
- New high throughput continuous technologies will continue to be evaluated but they will likely only ever be widely adopted if they can provide multiple juice fractions with low solids and phenolics, while having a much smaller footprint than a membrane press.

Sources include: Fabre (1946), Ferrouillat (1894), Roos (1900), and many equipment suppliers.

Disclaimer: Simplified summary only. There are variations with country, region, scale, wine style and between equipment brands. Equipment often co-exists and independent data on relative performance is often limited. Information should not be considered as an endorsement or dis-endorsement of any product or brand by the AWRI.

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