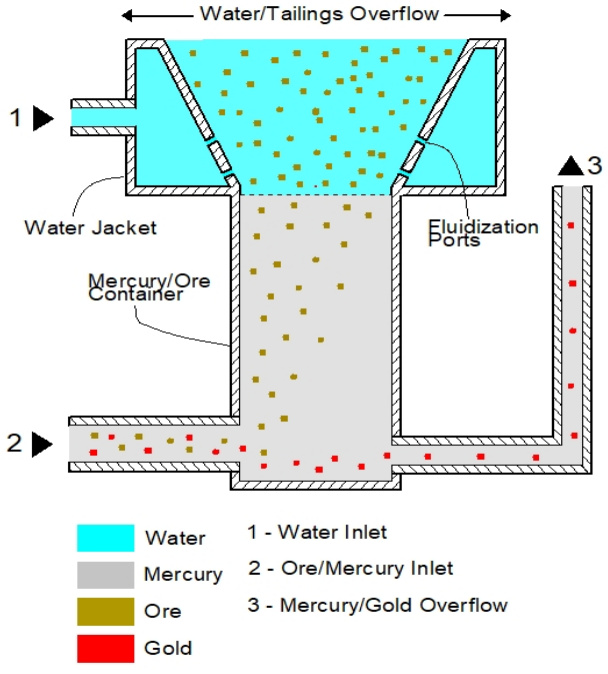
Centrifugal Mercurial Screen Separator

In 1982, I sent a design for a mineral recovery device to the Canadian Innovation Center at Waterloo University. The heart of this device is a flow through centrifuge using mercury as the operating fluid. Waterloo studied it for almost a year and sent me regular reports. The reports basically said it was the best thing since sliced bread until the final report which said it would cost approximately $80m to prototype. This estimate was done by a Texas engineer who had designed a plant to centrificially separate coal dust transported in an oil pipeline (I think he was thinking really big machines?) I spent the next 2 years and about $20,000 producing a total of 3 prototypes. The last one was able to contain the mercury at less than 20 ppm discharge with the tailings. This can be further reduced using a vacuum belt washer. At about this time I was introduced to a Mr. Frank Anthony, we made a deal and he tried on several occasions to buy the controlling interest in public corporations in order to build and promote the device. He was essentially a stock promoter and probably would not be able to operate nowadays. The first site would have been the Five Star Mine in Colorado. This large site has approximately $3b (1982) worth of fine gold in a shallow sand layer. They are using the flotation method with 5 drilled wells to supply the water. At the time the owner said it would take ~150 years to extract the whole site due to the water constraint. We calculated, at the time, that we could do it in ~15 years with ~$2m worth of processing equipment given the amount of water available. This project ended when the Canadian and US governments went to zero tolerance on mercury at which point I lost my baker. They have since eased off and allow up to 200 ppm for mining operations. The machine is small, rugged and portable. It can separate anything with a specific gravity greater than 13.5 with ~ 100% recovery rate. The last prototype built was a compromise in order to save money and reuse parts (basically a flat powered cyclone).

I believe the mercury discharge could be reduced to ppb in a purely centrifugal machine.

I've read that many small South American mining operations are discharging mercury at about a 1:1 ratio for every oz. of gold they recover.
In some foreign countries (Bolivia being the closest) the mercury contamination is acute.
In these areas they typically use crude mechanical means to produce a concentrated ore, it is not unusual to leave behind up to 2/3 of the gold in the form of fine gold. The concentrate is then mixed with mercury to dissolve the gold. In the crudest of these operations the mercury is boiled off typically on a shovel over a camp fire and the mercury vapor quickly condenses into the surrounding environment.
It is possible that a reworking of creek beds and tailing pile would yield enough mercury to pay for the operation on its own.
I believe that newly worked tailing would be safe for any form of human use.

Operating principal at 1 g.

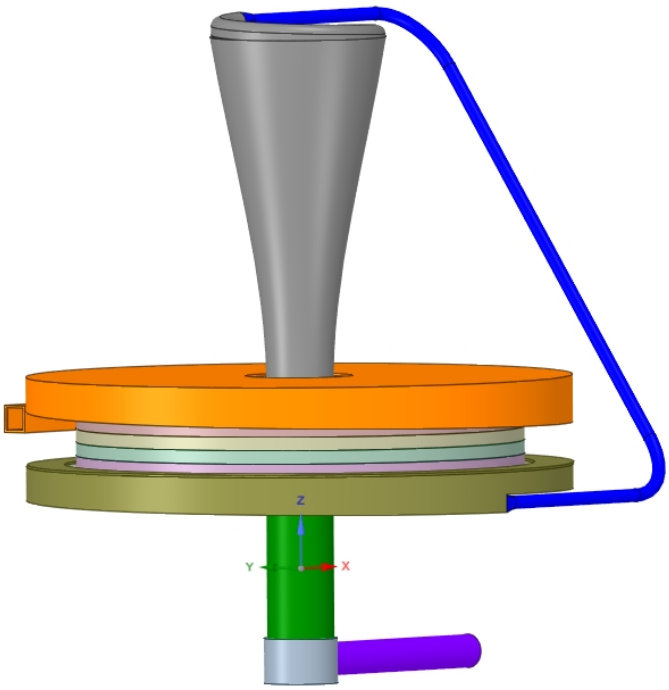


This machine could possibly be used for other heavy metals as well (platinum/uranium)?

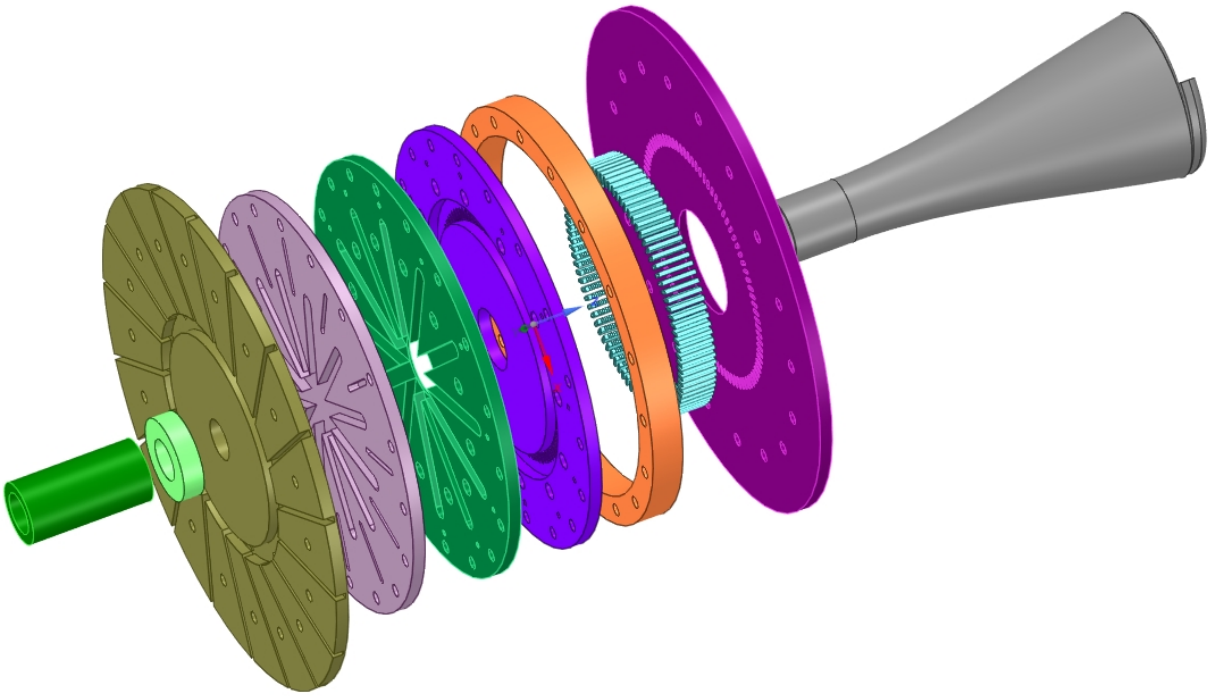
Unlike other processes the discharge water can be reused. A post process vacuum belt can reduce water loss to about 4%.

With the help of an engineer or two I believe a working machine capable of processing several tons of concentrate per hour can be built for not a lot of money? In operation I believe a series of smaller machines rather than one large one would be better.

I drew up this 40 cm. diameter centrifuge as a possible test base.



The axle (shown in green) needs to be supported and driven. My last prototype operated at about 300 rpm. This machine can operate at much higher speeds. The centrifuge itself can be mostly machined from plastic sheet material such as HDPE.
Stationary parts include the cyclonic feeder (shown in gray) this was originally fabricated in fiberglass as the rapidly swirling mercury protects it from abrasion. Ore is introduced through the top of the feeder with or without water, any water will overflow the top of the mixer and will not be drawn into the machine. A mercury return pipe (shown in blue) connects the mixer to the overflow mercury collector/ pump housing shown in bronze. A water/tailings discharge manifold is shown in orange. Water is introduced through the water feed pipe shown in purple. A rotating coupling is required between the water feed pipe and the hollow axle.



Dry Method Machine

- Dry method (current dry methods mechanical and electrostatic do not recover fine gold)
- Can recover nanoparticles down to a few nanometers in size
- Recovery rates near 100%
- The device only requires electricity to separate metals from ore concentrates
- Compact and easily transportable

I will upon request furnish the details and operating principals of this machine.