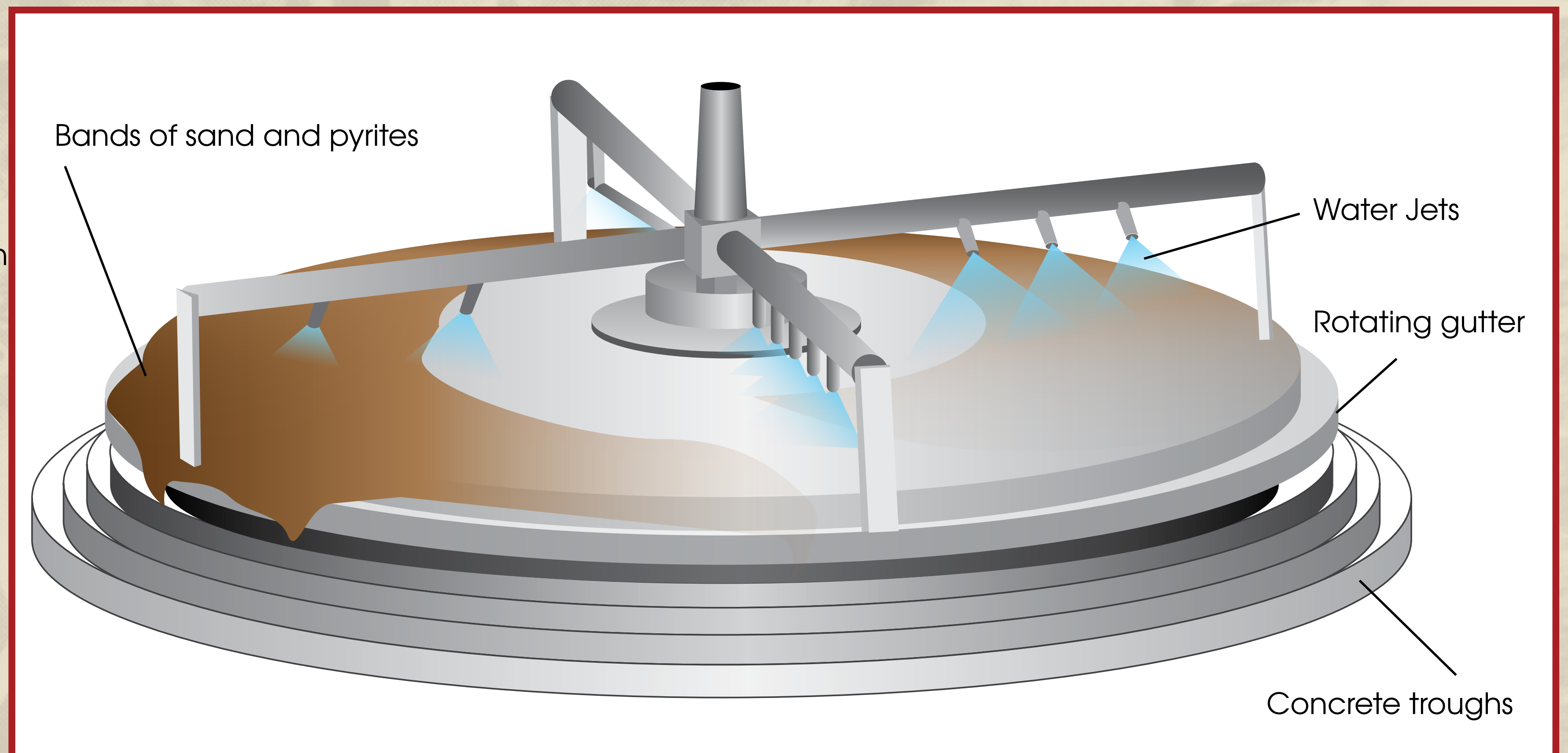


The Otago Pyrites Saving Co

This strange piece of equipment is a circular stationary buddle or concentrator.

It is all that is left of the Otago Pyrites Saving Co.'s treatment plant which once occupied this site. The company was formed in 1885 to separate gold bearing pyrites (Iron sulphate) from the waste (or tailings) of the Invincible Mine which is located high on the hillside above the buddle.

At first the Invincible Mine company did not know how much gold was still contained in the tailings after it passed through their stamper battery. Tests eventually showed that the pyrites in the tailings contained as much as 9.5 ounces of gold per ton of pyrites. The Invincible Mine agreed to sell their tailings to the Otago Pyrites Saving Co. for 15% of the gold recovered. The tailings were sent down from the mine in a 2200 foot long wooden chute and stored in a dam before being processed.



The buddle was the final step in a four part process that was designed to concentrate the pyrites by separating it from the sands in the tailings. In each step of the process the tailings were mixed with water and used the greater density or weight of the pyrites to separate it from the sands.

At the buddle the fine sands and pyrites were mixed with water and the resulting solution flowed out onto the sloping concrete surface (the table) from a rotating centre point. As the tailings flowed onto the table they were sprayed with water from jets on four rotating arms. This water spray separated the lighter-weight sand from the pyrites and then moved it off the table in a concentrated band. The pyrites were left behind and later came off the table in another separate band. At the edge of the

table was a rotating gutter that caught the sand and discarded it into a concrete trough under the table, to ultimately be discharged into the river. All the pyrites recovered during the concentration process was bagged up and sent to Victoria where the gold was extracted.

The Otago Pyrites Saving Co. only operated briefly. In 1886 the Invincible Mine Co installed seven berdans (rotating grinding pans) at the battery site. This increased their gold recovery and led to the Otago Pyrites Saving Co. closing down.

This concentrator is the most intact gold-saving buddle in New Zealand.

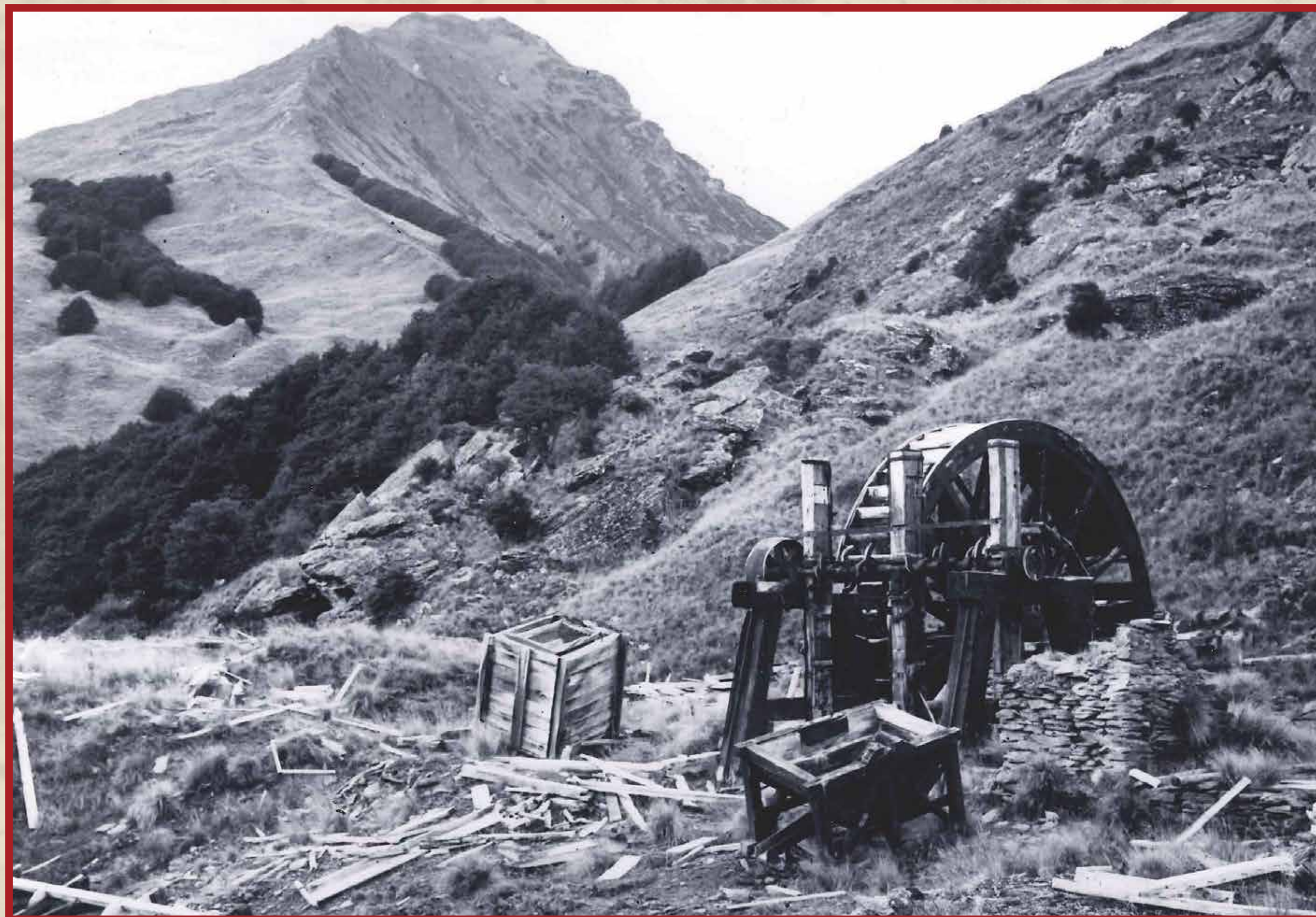
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The Power of Water

Obtaining gold from quartz mined at the invincible mine in the 1880s required large quantities of many things: time, money, perseverance and most importantly, water. One of the earliest steps taken by the first companies to establish a claim at Invincible was to apply for a water race giving 30 heads (849 litres/sec) of water. Water was the energy source needed to generate power for the ten-stamp battery which crushed the ore. It was carried from the Invincible Creek via a 213 metre water race, driving an 'overshot' wheel measuring 7.3 metres in diameter and 1.5 metres in width.

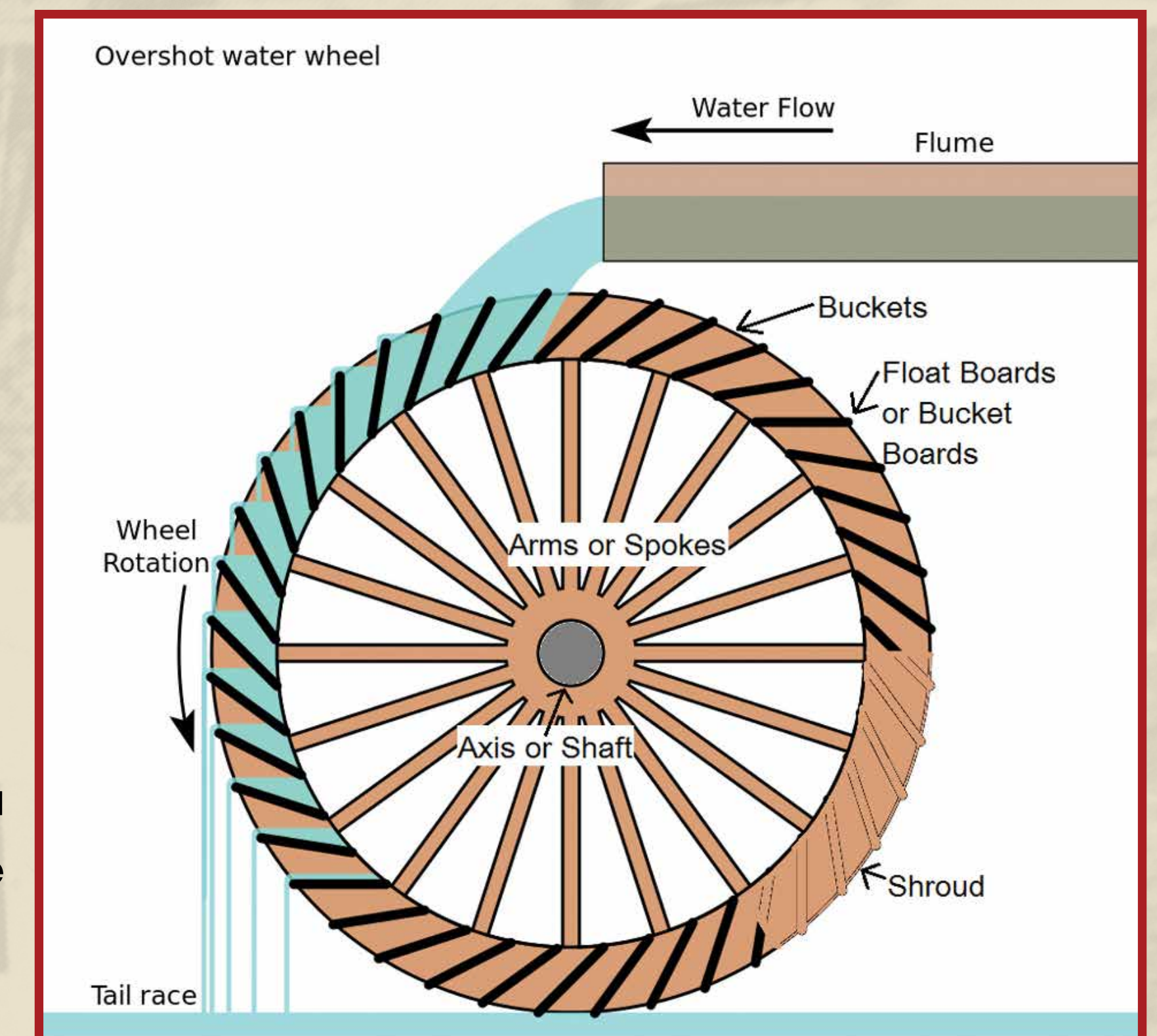


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An overshot waterwheel is a type where water is fed in from the top just past the wheel's highest point. Around the circumference of the wheel are partially enclosed buckets. As the buckets fill up, the weight of the water forces the wheel around. An overshot waterwheel is the most efficient of the basic types of waterwheel, utilising a higher percent of the available power.

The Invincible waterwheel had two cast iron hubs, each with a mounting plate of 1.2 metres in diameter. The hubs originally each carried fourteen beech spokes. The buckets were also made from timber and the whole structure was coated in pitch to waterproof it.

The stone-walled hole the wheel sits in is called the 'Wheel Pit'. Originally a large weatherboard building with an iron roof enclosed the machinery. It is believed the battery building was removed when the mine closed. The mechanical relics of the Invincible Mine have now spent over 100 years exposed to the weather.



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The Invincible Mine



Gold was first discovered in the Wakatipu region in 1862. Within a year miners were prospecting the many tributaries leading into Lake Wakatipu, though they had little success. However, in 1879 a gold bearing quartz reef was discovered on the Richardson Range from which significant quantities of gold was recovered.

The Invincible Prospecting Company was quickly formed and following a trial crushing of ore a decision to proceed was made. The Invincible Gold Mining Company was subsequently launched and by the end of November 1882 the first load was ready to be crushed in the newly erected battery. This first crushing resulted in 325 ounces of gold.

At the site of the mine there are parts of a large waterwheel which once drove the stamper battery. While only the framing and crank shaft of the battery remain, there is still a unique set of seven Berdans (revolving cast iron bowls containing heavy weights to grind the ore) still in place. This is the largest surviving array of berdans in New Zealand.

Magnificent views of Mt Earnslaw (2219m) and the Rees Valley are a feature of this site as is the walk from the valley floor. The track was built by miners in the early 1880s so that heavy machinery could be hauled up to the mine.

A circular 'Buddle' (a gold concentrator) is situated on the valley floor just a short distance further up the Rees Valley. It is a 7.9m convex concrete disc resembling a flying saucer!

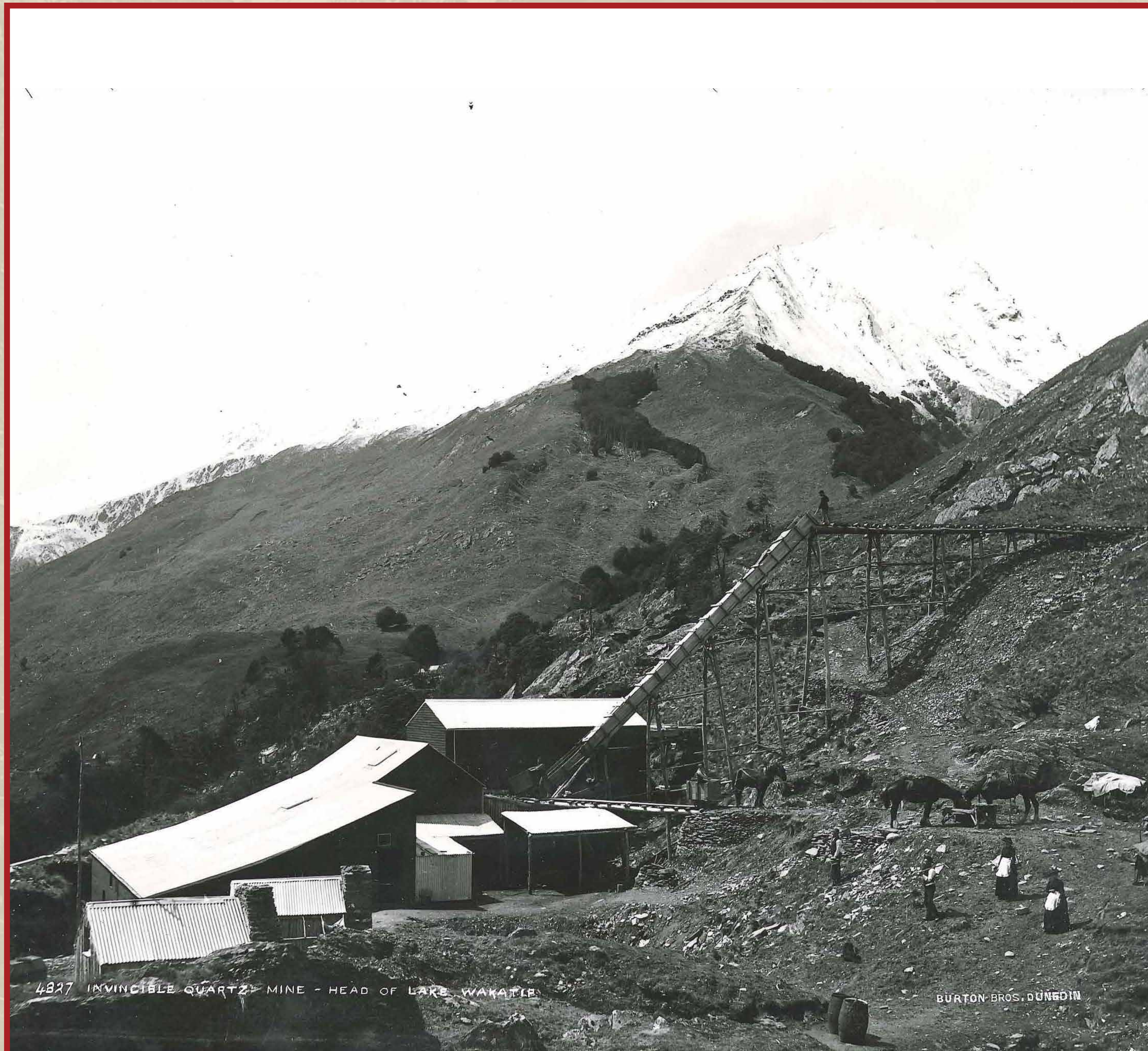
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The Invincible Mine Battery



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The battery worked round the clock and its crushing capacity amounted to 90 tonnes of quartz per week. There were 10 stamps in the battery, each weighing 350kg. Crushings passed down blanket tables and from these the concentrated sands were mixed with quicksilver (mercury) in a revolving octagonal iron barrel. The mercury formed an amalgam with the gold. The gold was then recovered by boiling the amalgam which caused the mercury to evaporate leaving the gold behind.

A reliable water supply was provided by a water race from the Invincible Creek almost a kilometre away. This water drove an overshot waterwheel to power machinery on the site. A large weatherboard building with an iron roof enclosed all the machinery and the waterwheel.

Quartz ore was extracted from several underground levels in the mountainside. Of these, only the lower "machine level" is still visible. It is in a partially-collapsed state and is situated 100 metres to the right of the battery.

Much of the quartz ore was mined at the face by hand, though blasting powder was an essential aid. Iron tram rails were laid from the workings to the battery and one man was able to push the laden trucks, each weighing a tonne, to a wooden chute supplying an ore hopper immediately behind the battery. This system eliminated costly double handling of the ore.

In 1886 the company began processing its own tailings by further crushing and amalgamation with mercury in Berdans. The seven Berdans are still here despite the failure of the mining venture just a few years later.

More information at



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The Pyrites Saving Berdans



The Invincible Mine, like other quartz mines in the Wakatipu, has a high proportion of gold-bearing pyrites, a yellow iron sulphide mineral which is also known as fools' gold. In the early days of mining operations much of the gold was lost in the tailings discarded from the battery because of the presence of pyrites in the ore. In 1884 Professor Black of Otago University's Mining School carried out an experimental crushing of tailings in a berdán (a slowly revolving cast-iron bowl containing heavy weights to finely grind the tailings). This experiment produced 9.5 ounces (295 grams) of gold to the ton of tailings, an extremely high yield.

As a result the Invincible Quartz Mining Company sold its tailings to a new company, the Otago Pyrites Saving Company. This company set up operations at the bottom of the hill, the tailings being transported down to them via a long wooden chute. The Saving Company used a buddle concentrator to separate any remaining gold from the pyrites. As part of the agreement, the Otago Pyrites Saving Company returned 15 percent of the gold to the invincible Quartz Mining Company. The remains of the pyrites works can be found near the start of the access track to this reserve.

The pyrites saving operation was a success, but in 1886 a new manager at the Invincible Mine investigated Professor Black's work on the tailings and decided to install a bank of seven berdans at the battery site, at a cost of £1,230. The berdans were built by Kincaid, McQueen and Co. of Dunedin. Within a year the berdans had increased the Invincible yield from 8 to 16 dwt (12 to 25 grams) per tonne and the Otago Pyrites Saving Company was forced to close. The following year the Invincible mine operation faltered and in August 1887 the mine manager declared that the gold-bearing quartz had run out.

Today, the array of berdans are unique in New Zealand. The odd berdán by itself can be found at various mining sites in Central Otago but nowhere else are there seven in a bank together.



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