What Are They?

Harz jigs like these were used at mines to separate ore from unwanted material using a sieve and pulses of water from a wooden plunger.

At Snailbeach they would have been used to separate lead ore (galena) from minerals, such as quartz and baryte.

How it Worked - Harz Jigs

As the bed of heavy material builds up on the sieve, it blocks the slot into the Gate, preventing the lighter material from entering.

As jiggling continues the layers of material outside the gate build up and their combined weight forces the level of the heavier material to rise inside the gate. This can then be tapped off down a small moveable chute inside the gate.

Relative Densities

The relative density (specific gravity) of the minerals that were being processed at Snailbeach are:

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Relative Density [kg per cubic metre]</th>
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</thead>
<tbody>
<tr>
<td>Galena (lead ore)</td>
<td>7.5 or more</td>
</tr>
<tr>
<td>Baryte</td>
<td>4.5</td>
</tr>
<tr>
<td>Sphalerite (zinc ore)</td>
<td>4.0</td>
</tr>
<tr>
<td>Quartz</td>
<td>2.65</td>
</tr>
<tr>
<td>Lead (refined)</td>
<td>11.3</td>
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Technical Facts

This three-sieve jig is an example of a “fixed sieve jig” or “plunger jig” - a gravity concentration device which works by a combination of hindered settling, differential acceleration and consolidation trickling.

For good material separation a steady feed of water (into the plunger side of the jig) is required. About 2 to 5 tonnes of water is needed per cell per tonne of material treated. The exact amount depending on how much water entered the jigs with the feed – coarser material was generally fed in fairly dry.

The size of the sieve mesh controls the size of material that can be separated. The material can range from 40mm (coarse) to 1mm (fine) in diameter. If the sieve holes are too small, then the sieve can become clogged by the finer material.

In an ideal operation the depth of the bed on the sieve is about 5 to 8 cm. If it is too deep and too heavy, then it does not get agitated enough, resulting in poor separation. If it is too thin, then there is a danger of it being agitated too much and valuable material being lost over the tail board.

The plunger speed is typically 120 strokes per minute for coarse material, to over 200 strokes per minute for very fine material. For efficient separation, the plungers need to be the same size as the sieve.

As the plunger is pushed down, it created a pulse of water in the sieve side of the cell, lifting the material in the bed. Then as it rises it creates a suction effect under the sieve helping to draw the finer material through the sieve into the hutch.
The jigs have a wire mesh sieve, supported by a strong grate in one side, and a loose fitting rectangular wooden plunger in a compartment on the other side.

In Operation

A mixture of crushed ore and rock would be fed steadily onto the first sieve and is agitated by the pulses of water and suction effect caused by the rise and fall of the plunger.

The heavier particles form a bed on top of the sieve, with layers of the other lighter materials separating out on top.

The pulses of water agitate the bed helping to separate the minerals.

The Snailbeach jigs are divided into 3 cells, with the sieve of each cell slightly lower than the previous one.

Smaller particles of the heaviest material drop through the sieve into the tapered “hutch” where they can be flushed out into a discharge pipe for collection.

The tail board at the end of the sieve (about 10cm high) is designed to discharge the lighter layers onto the next sieve or at the very end, down a discharge chute.