

Brass Among The Gold

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Ludwig Oertling was born near Hamburg in 1818, and the family moved to Berlin while he was very young. The eldest son, Johann, was an instrument maker, and Ludwig was his apprentice. About 1840, Ludwig immigrated to London and after he was established, found employment with George Hogarth Makins (1815-1892),¹ who made Makins' balances. Makins became scientific advisor to the London instrument maker Robert Bate (1782-1847), and as well as running his own business as an assayer he was recorded in 1863 as being assayer to the Bank of England. Ludwig eventually decided to branch out on his own, specializing in balances. He was employing five men by 1851, 12 by 1862, and over the next century **his** design of assay balance became the prototype for all those sold by Oertling for high quality work. He had a partnership with E.W. Ladd in the mid-1860s, and this firm produced huge bullion balances, many of which survived and can still be seen in banks and museums, including one beautiful specimen that is currently on display at the main ANZ bank in Melbourne. It dates from the 1860's, has a 38inch (96.5cm) beam, probably carried 1000oz (of gold) on each side, and turned on 0.5grain (one grain is equal to 65mg).

Ludwig died in 1893, and his son Henry ran the company until his death in 1921. Henry's son, a pilot in the British Royal Airforce, was shot down in 1918, and presumably because there was no one left in the family to run the firm, the business was sold out in 1924 to W & T Avery Ltd. In 1928 the Avery Company bought out De Grave and Son and moved the Oertling business into that factory.²

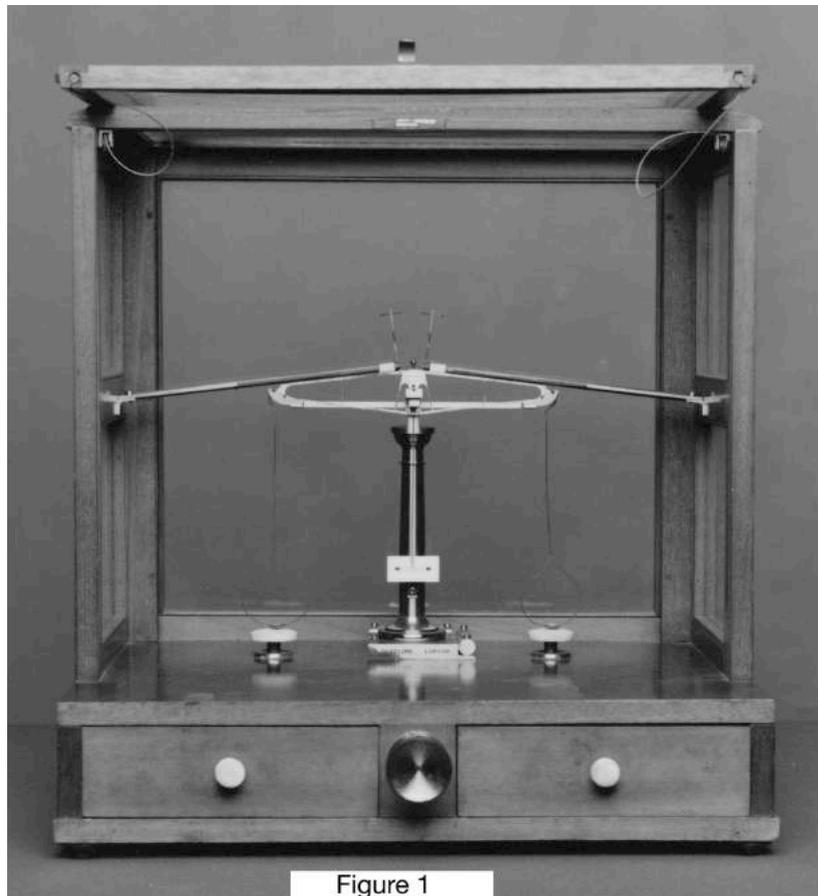
Oertling balances were exported to European countries and to all the colonies - Australia, New Zealand, Canada, South Africa, and India. Before its own companies got going, Oertling was also very influential on balance design in the USA. Gold rushes were a stimulus for assaying there, just as they were in Australia. The number of documented surviving Oertlings overseas, as well as in UK, is now well over 500.

From my point of view, one of the most exciting consequences of the nineteenth century gold rushes in Australia was the need for assay balances. Mike (my husband),

and I have spent about 14 months altogether on several trips exploring Australia, concentrating on old mining areas, and we have found Oertling balances in all States and Territories (we've also heard of 26 more from a recent email appeal via Museums Australia, and are still compiling details of those).

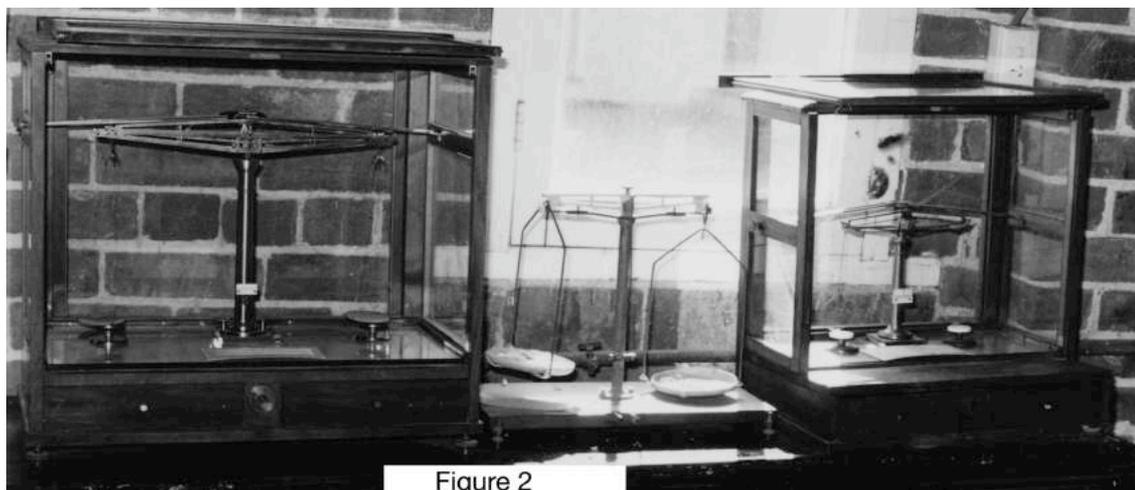
In the mining areas, access to a fast and accurate assay service was vital, as the miners wanted to know the value of their gold quickly. So did the Mints, and accurate balances, both assay and analytical, were also used in industry, and in government and educational institutions. Most of those, it has been found, have been associated with old mining towns, and in some places there are still ruins of the assay labs, with furnace chimneys, stone balance benches, and sometimes remains of assay equipment. Of course, balances didn't just come from the London based firm of Oertling, but also from Becker (Belgium/France), Baird and Tatlock (UK), Bosch (Germany), and Sartorius of Sweden, among others. There is, for example, a beautiful little assay Sartorius in very good condition in the Tennant Creek Mining History Museum.

Fig. 1: *Model 9, 1896, Oertling balance, Monash University.*



The pride of the Monash Science Faculty Instrument Collection, of which the author is Curator, is an 1896 model 9 Oertling (Fig. 1). This model was a routine assay balance, and they make up over one-third of our finds so far. Unfortunately they are not always in good condition – a very sad find at Tennant Creek was an 1899 model 9 in a pile of junk on the floor of a storage shed, and too far gone to salvage. The pans were gone and the case broken, but we were able to read the serial number, which can usually be found on the back of the pillar or the beam, and the balance then be identified from the UK data base. Tennant Creek of the 1930s was the scene of Australia’s last gold rush, and there is still some commercial prospecting. The gold here occurs in very hard dense black ironstone (magnetite is oxidised to haematite on the surface), with in addition, commercial amounts of copper and bismuth. The Battery Hill tour is well worth doing: a local firm donates low-grade ironstone to be crushed in the original 1942, 10-head government stamp battery. This is incredibly noisy, and earmuffs are provided, but the sample produces enough gold to form a fine gold/mercury sludge on the copper/mercury amalgam plate. The old mercury retorts are still on display, and in very good condition (just after the Second World War, the local field of Noble’s Knob was reported to be the richest in Australia).

Fig 2: Model 5 and Model 9, 1854-1860, Oertling balances, Charters Towers.



In other places, including Charters Towers and Kalgoorlie, we found balances in poor condition. At Charters Towers, where gold was discovered in 1871, there were three balances in the old Stock Exchange Museum. Two of these were Oertlings, unfortunately displayed in front of a window on a western wall, in full sunlight (Fig. 2).

The one on the left, a very early model 5, 1854-1860, is particularly interesting, as the chains are made of platinum and the copper pans are platinum coated on the top surface. This was an expensive instrument even then, at 18 guineas. The right hand balance is another model 9 from the 1870's.

In 1995, at the Hannan North Tourist Mine in Kalgoorlie, we discovered two more Oertlings, one in only fair condition, but when we went looking for them again in 2002 to collect more detail, they had been moved and were eventually discovered in a store shed in much worse condition. However, the guide assured us that they would be cleaned up and made part of the Mining Hall of Fame complex, which has now incorporated the Hannan North display. What they do have in the new reception area is this dazzling 1938 model 65 (Fig. 3), one of only 45 made between 1935 and 1940, and the only survivor known.

Fig. 3: *Model 65, 1938, Oertling balance, Kalgoorlie.*

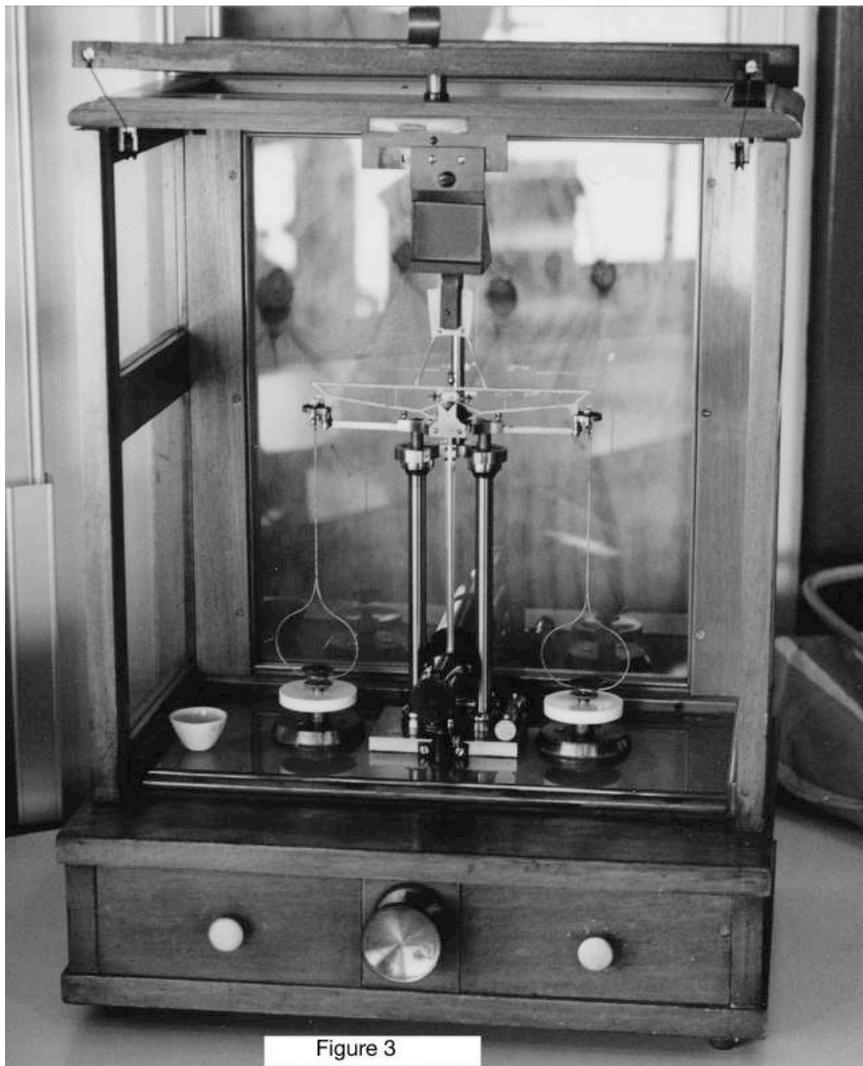


Figure 3

In the Northern Territory, the first mining rush was at Ruby Gap (East MacDonnell Ranges) in 1886, although the rubies turned out to be garnets. However, just 50km north, in the Harts Range, there are rubies, and more garnets - in fact the creek beds glint pink in the sun – and it is relatively easy to dig up large, well faceted specimens. In 1887, gold was found 45km to the west of Ruby Gap, at Paddy’s Creek Rockhole, and this became the Arltunga Field – there is still fossicking there today. It is extremely isolated, and back then the nearest railhead was Oodnadatta, 600km away. Prospectors walked from there, often pushing barrows, and in the peak year of 1903, 500 people arrived. We explored some of the Arltunga area from our camp at Ross River, and while we didn’t find any balances, the information centre there is excellent, providing lots of other exhibits, a film, and walking guides for the area. Many of the original walls and foundations survive at Arltunga, and some buildings have been reconstructed, including the manager’s house. The first gold finds were alluvial, and as there was little water, dry blowing or shaking was used for separation. Then reef gold was discovered in the mid 1890’s, wells were sunk, and a Government Battery built next to the second best well in the area, which produced about 8,000 litres a day. The first assay office was built next to the Battery, but the miners complained, with reason, that the ground shook when the Battery was working, so correct weighing was impossible and led to incorrect payments. Thus, in 1905 the second assay office was constructed some distance away, and the chimney and stone bench still remain (Fig. 4). Arltunga was significant in that people who stayed on in the area moved into other occupations and helped develop the Centre - there were also about 100 miners working there during the Depression.

Unfortunately, on a trip to the Comet Mine, Marble Bar, we discovered lots of fascinating local history and minerals but no balances. There is still some gold, also copper, white asbestos, jaspers of all colours (not just at ‘The Bar’), tantalite, and many relics of tin mining. Exploring the extensive remains of the tin sites makes a fascinating day trip from Marble Bar, and cassiterite nodules can be picked up in lots of places in the bed and on the banks of the Shaw River. We didn’t make it to the emerald deposits down near Hillside Station, south of Marble Bar, but did manage to navigate to another near Cue, in WA.

In fact, one of the most exciting parts of the 2002 trip was exploring the mining country east of Geraldton to Mt Magnet and Cue. There is gold mining now in a huge

open cut at Mt Magnet, near Poverty Flat, where it was said that in 1891 ‘nuggets were dug up like potatoes’ - 7.75kg in one day! But here I was more interested in the Orbicular Granite at local Boogardie Station. We spent a fascinating day there as this unusual granite occurs in only four places in the world, one of which is now under water. The stockmen used to call it ‘pretty rock’, and the outcrop was an easily identified meeting place.

Cue, where gold was discovered in 1892, is another tiny town where we found no balances, but many beautifully preserved buildings, and the remains of the assay office next to the old State Battery which burnt down in the 1970’s. There are also remains of old machinery and bulldozed rubbish all over the site, including cupels, the small vessels in which weighed buttons of Au were melted in the furnace before assay. Close by, Cue had a sister town, Day Dawn, where the Great Fingal Company mined reef gold. The classified Mine Office is still there, but is presently threatened by the Golden Crown open cut, which began operation in 1986. This office contained a gold vault and a smelting room, so there probably were balances, though there is no sign of any today.

From Cue we did a day trip to the emerald mines at Poona. This is real back of beyond country, and the three men working out there were pleased to have company. They were picking over ore on an endless belt sprayed by a small water jet. We were invited to help at the far end, and were able to keep some of the specimens, and others we found later in the tailings – this was a real thrill. After a friendly lunch, the cutter showed us some of his work, which was another unexpected treat. Rubies and gold were also mined close by, and probably will be again when the economics make it feasible. On the way back to Geraldton, we had lunch at Jokers Tunnel near Yalgoo: bored through a small hill, the mine lasted only from 1894 to 1898, but had a 20-head stamp battery and a pub, both of which were moved to another field.

However, the historical and Oertling highlight of the 2002 trip proved to be at the end of our tour, at the Perth Mint. This was opened in 1899 as a Branch of the Royal Mint, London, to refine gold from WA and turn it into British sovereigns and half sovereigns of legal tender. The Perth Mint ceased minting circulating currency in 1984, and now produces commemorative coins and medals for a worldwide market.

The building is in very good condition, and includes the original Melting House, which operated from 1899-1990, when a new refinery opened close to the airport. There were several beautifully preserved Oertling balances on display, including a model 14 (Fig. 5). By checking the pencil markings on the drawers and inside the drawer cavities

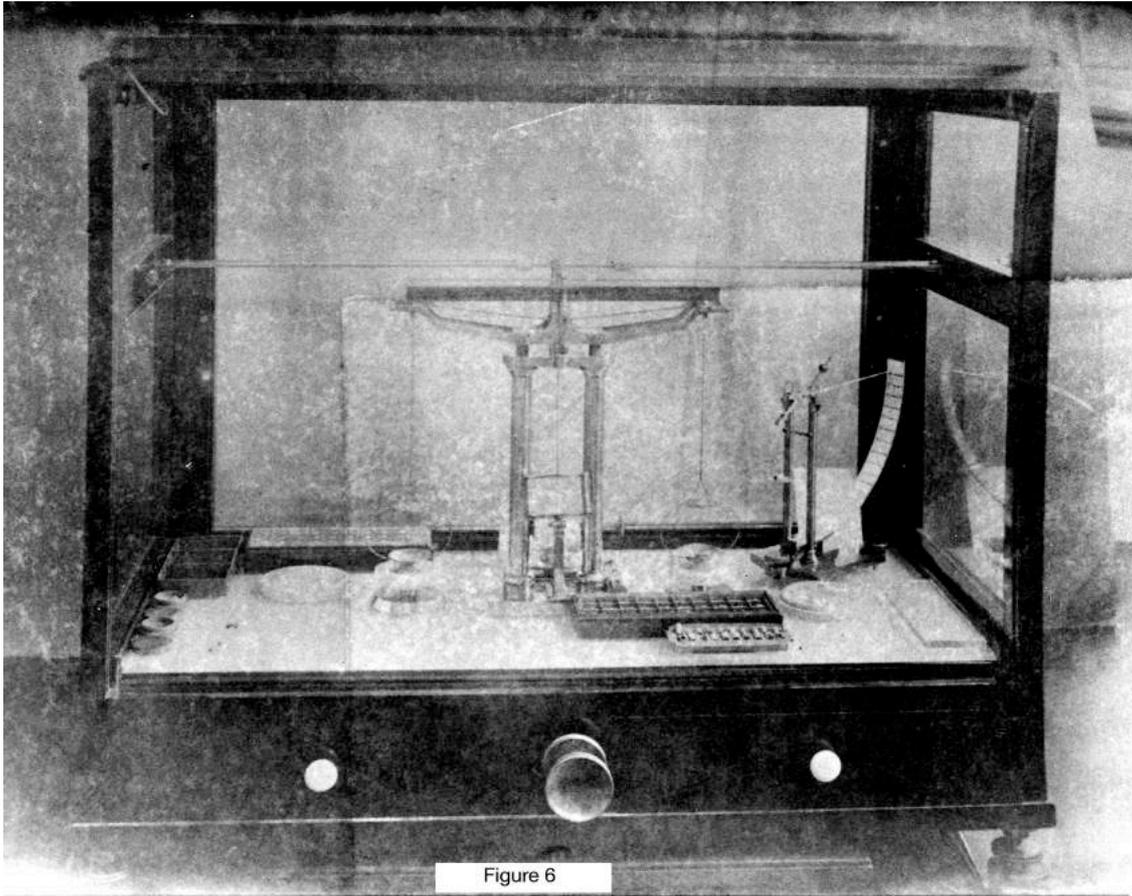
and door runnels, it is often possible to find details in the UK database of the dates of manufacture and repair, and even the names of the workmen involved. In fact this balance was one of two model 14's made by Mr Lange on '4.8.1900', and he was paid £9.0.0 for the pair.

Fig. 5: *Model 14, 1900, Oertling balance, Perth Mint.*



Just as happened at Arltunga, the original assay laboratory at the Perth Mint had to be moved, but in this case because of traffic vibration, as the lab had not been built on a proper foundation: 'the vibrations were transmitted through the sandy soil, and the only solution was to work on fine weighing at night'.³ A new assay laboratory was built, with separate foundations, and although it was not finished in time for the official opening, it was the venue 'for a banquet which was a tribute to the Victorian digestive system in its richness and variety'.⁴

Fig. 6: *Model 12, Oertling balance and lever type, 1896 Law balance.*



The Mint also holds extensive archives, including previously unknown Oertling correspondence, some of which the author was able to read. Among the old photos was a most exciting find (Fig. 6). In the case with the Oertling balance (probably an early model 12) was a small lever type balance, the prototype of which was invented in 1896 by Robert Law, assayer at the Melbourne Mint. I have been trying to trace one of these tiny balances for some years. The idea of the auxiliary balance was to speed up the assay process, and a description was published in Law's paper in the *Journal of the Chemical Society, London*.⁵ There is a brief reference to Law's balance in the *Annual Report of the Deputy Master of the Melbourne Mint for 1896*,⁶ and a full description published in the Mint papers in 1914:

the auxiliary balance designed by Mr Law, which has been in constant use here ... [is] in daily use in all branches of the Royal Mint. Its object is that, while an assayer is weighing one cornet [the 10grain sample of refined gold] on the ordinary assay balance, this auxiliary balance should, without any personal attention on his part, record the approximate weight of the next cornet to be weighed, thereby expediting his work in weighing many cornets.⁷

Law himself says:

the advantages are shortening of the weighing time, and lessening of wear on the assay balance and weights ... a factor not to be overlooked, and one which only those who have made or corrected small weights can fully appreciate.⁸

Oertling made a commercial copy of the Law balance, and although there are records of 13 of these being sold, the buyers are not known, for unfortunately many of the Oertling records were destroyed in the London Blitz. It is assumed that the buyers were the Colonial Mints (there are letters ordering Law balances from Oertling, London, in the Perth Mint correspondence archives), and there are also records of locally made versions in both Melbourne and Perth. During my visit to Perth in 2002, I was told of the existence of two locally made Law lever balances, and these will be the subject of a future paper.

Acknowledgements

I wish to thank Mike Williams and Steve Morton for photography, and my collaborators Dr Barry Oliver and Dr Peta Buchanan for all their help in identifying balances from the UK database. Mrs Anthea Harris, archivist at the Perth Mint, organised access to all the historical data and instruments, and her help ensured the success of my visit. I have also used as references my own travel diaries of 1995, 1997 and 2002, and my earlier articles in *Historical Records of Australian Science*, vol.12, 1998, and vol.14, 2002.

Endnotes

¹ Makins was a member of the Society of Apothecaries and was also a lecturer at the Middlesex Hospital Medical School.

² J.M. and G.C. Shannon, *The Assay Balance, Its Evolution and the Histories of the Companies That Made Them*, The Pressworks, Englewood, Colorado, 1999.

³ John McIlwraith and Anthea Harris, *Striking Gold*, The Perth Mint, Perth, 1999, p. 39.

⁴ *Ibid.*, p. 44.

⁵ R. Law, 'An auxiliary assay balance', *Journal of the Chemical Society*, vol. 69, 1896, pp. 526-30. Colonel Robert Law was a Chief Chemist and Assayer at the Melbourne Branch of the Royal Mint. He was also a fellow of the Royal Microscopical Society and a Fellow of the Institute of Chemistry, London (1890). In the 1920s he investigated the composition of gold nuggets from New Guinea.

⁶ '27th Annual Report of the Royal Mint', *Great Britain Parliamentary Papers*, vol. XXIV, 1897, p. 25.

⁷ '44th Annual Report of the Royal Mint', *Ibid.*, vol. XLIII, 1914, pp. 133, 140-42.

⁸ R. Law, 'An auxiliary assay balance', p. 526.