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## The Coorong Battery at the Winnecke Gold Mine, NT

Nigel Ridgway BEng (Mech) MBA FIEAust.

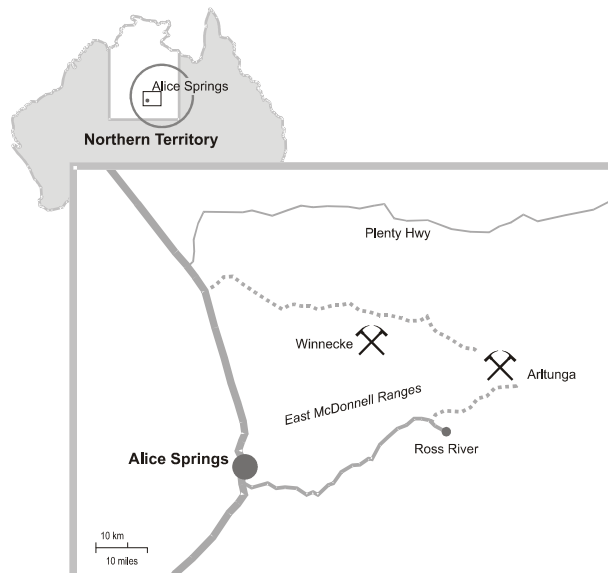
**SUMMARY:** The Winnecke gold mine was one of the remotest gold mines in Australia, not far from the more renowned Arltunga mines 90 km ENE of Alice Springs in the Northern Territory, which have been extensively researched by Donovan, Forrest, Holmes and Phelts et al. An examination of the site relics and literature reveals the important links to engineering in South Australia, early steam engine technology of Hawke and Co and their national contribution to mining. It was also found that the records of Hawke are randomly dispersed and it is hoped this paper will encourage others to conserve the engineering heritage and records of Hawke and Co.

### 1. GENERAL

The Northern Territory (NT) was administered by the South Australian (SA) government from 6 July 1863 until 1 January 1911 and the first gold rush was in the 1870s [1]. The Arltunga goldfield (also known as the McDonnell Range goldfield) was visited by the SA Government geologist H Y L Brown in 1888 and alluvial gold was discovered as early as 1887 [2]. Charles Winnecke explored to the north east of Alice Springs in 1878 and established a supply depot.

#### 1.1 Historic Phase

Reef gold was first discovered at Winnecke Depot (50 km NW of Arltunga) in 1902 and ore was mined by hand at the Coorong, Junction and Reward leases, and transported to the Arltunga Government Battery and Cyanide Works for processing (in the White Range, 97 km east of Alice Springs). It was mined by the *New Coorong Crushing Company* in 1903.



**Figure 1:** Location of Winnecke Goldfields

In May 1905 crushing with a new battery began at Winnecke and gold separation by mercury amalgamation was finished by the end of 1906.

It was a small operation and would have been managed by three people including an engine driver, ore feeder and stonebreaker. The engine driver would have several responsibilities including being the battery manager and amalgamator.



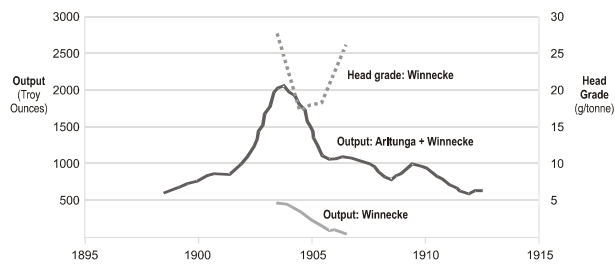
**Figure 2:** Coorong battery November 1905  
[NT Library PH0763/0016]

Figure 2 shows a 10 head stamp battery in the background, boiler on the left and tailings in the foreground.

The battery was deliberately built on the side of a hill (still evident today) to cause a hydraulic gradient so that the slurry would flow from the stamp battery and over the amalgam plates. It is not known if there was any other form of concentration. It is thought that the amalgam concentrate was then transported to Arltunga for separation of the mercury amalgam and gold by retort. (Some Winnecke ore was transported to the Arltunga cyanide works between 1905 and 1906. [4])

The battery was capitalized by a private miners syndicate until 1907 when it was sold to the Commonwealth Government. Sometime after 1913 the battery was shutdown by the Administrator of the NT, on the Mining Warden's recommendation, due to the financial losses accrued by both batteries at Winnecke and Arltunga, and the unsafe condition of the boiler at Winnecke [2].

The reported gold production between 1903 and 1906 was 968 troy oz for 703 tons of crushed ore at a head grade between 20 and 25 grams per tonne. The combined tonnes of mined ore from the Winnecke and Arltunga mines peaked in the same period (Figure 3).



**Figure 3: Gold production [4]**

The mine had a short life for a number of reasons:

1. Water was supplied from a well and could not meet the needs of the boiler and mining population which was up to 400 at one time. There is no surface water in the vicinity and the battery was commissioned in an arid environment. The well was sunk in 1903 and only had intermittent supply.
2. There was a typhoid health threat. The population grew from about 20 in 1902 to 300 in march 1903 and the well became contaminated by stock and four of the twelve victims died. [5]
3. The ore grade was not high enough to be profitable, and orebody discontinuous. Compared to today's methods there would have been very little planning and without the benefits of exploration drilling, development drives and mapping of the lode.
4. The SA Government withdrew its support after 30 years of patience in the NT.
5. Supplies had to be carted by camel train approx 592 km north from the SA railway at Oodnadatta
6. There was limited firewood for the boiler and fuel would have had to be transported to the battery. The wood species used is not confirmed however it is likely the cost to cut, collect and transport would have been very high for a modest energy value, and would have been less competitive than mines located near coal resources.
7. The water available was saline and high in mineral salts, resulting in rapid scale build up causing short boiler lives. The first boiler (supplied by James Martin of Gawler) at Arltunga exploded in 1901 and required replacement (by May Brothers of Gawler).

The history is typical of small gold mines in the NT commissioned with limited knowledge of the orebody and most economical method of mining. Cumming in fact found that the work by HYL Brown was of limited value to miners [2]. Little capital was available to prove the ore grade and most efficient technique of extracting the gold. This battery is unique for the NT in that the plant was manufactured by a South Australian engineering company who would have had some

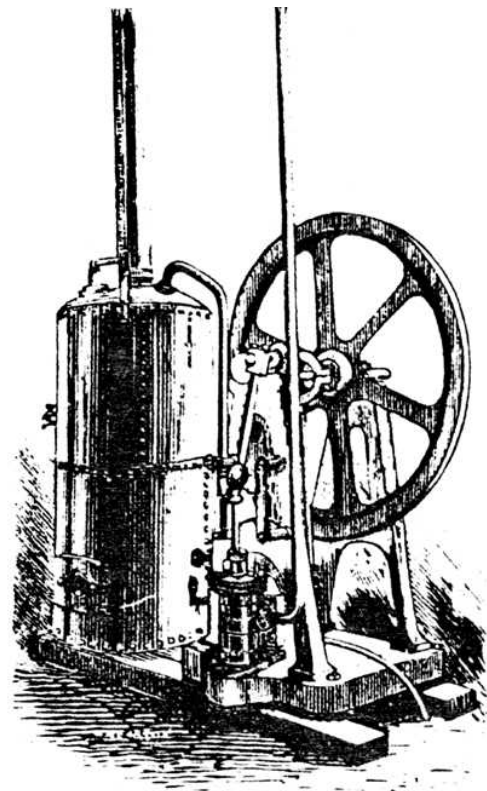
knowledge of the requirements. Similarly the Arltunga battery supplied by James Martin (and later May brothers) were also manufactured in South Australia. Many of the other mines in the NT were supplied by manufacturers in the UK, at greater cost and risk to the investors.

The battery has high social significance by association with the more recognized Arltunga mine and Government battery. The mines in this area were pivotal in increasing the population in the area, and social connections with Alice Springs and South Australia.

### 1.2 People

Key individuals associated with the mine are the Mine Warden and also the Government Geologist H Y L Brown. The miners were motivated by the potential financial returns, gold was 3 to 4 pounds per ounce, and may have earned up to 200 pounds per year. The other important individual is Henry Binney Hawke (1828-1904) from Hayle of Cornwall (home of the famous Harvey firm) who acquired an engineering business in Kapunda, SA, from J A Adamson in 1857 largely to supply the local mining industry, WA and NT goldfields, and Broken Hill mines [6].

A sketch of the first steam engine built in Kapunda is shown in Figure 4 below and was possibly built by Hawke or Adamson.



**Figure 4: First steam engine manufactured in Kapunda**

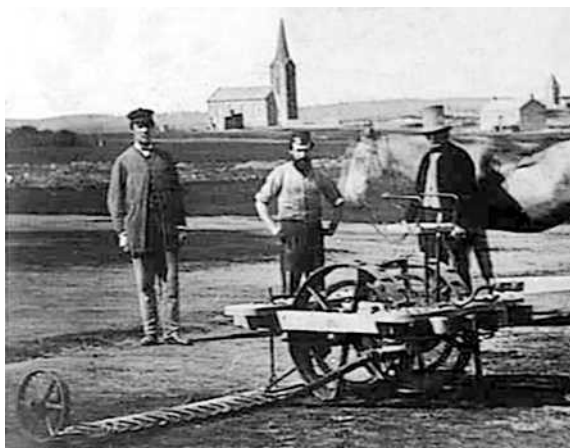
Hawke was born at Phillack near Hayle Cornwall, and was orphaned at an early age. He was raised by smugglers and at the age of nine ran away to London and worked in a foundry. He emigrated to the colony of South Australia in 1849.



**Figure 5:** *H B Hawke in the pattern shop c1900*  
[SLSA B 58568]

The business was sold to Rees Rees and Howard Thomas in 1884 and it is thought that Howard or Rees designed the engine for Winnecke [7]. Rees was originally apprenticed to the Fulton foundry in Adelaide and established his own foundry in Kapunda in 1883 before acquiring Hawke and Co.

Hawke worked for his first two years at Pappin and Jones foundry in Adelaide, (later Andrew Jones and Sons and Hawke supplied them with castings) and then opened his own business in Kapunda in 1866 to cater for “farmers, millers, mine proprietors and machinists”. Hawke designed and manufactured the first mowing machine in SA circa 1866 and was later famous in Australia for weighbridges.

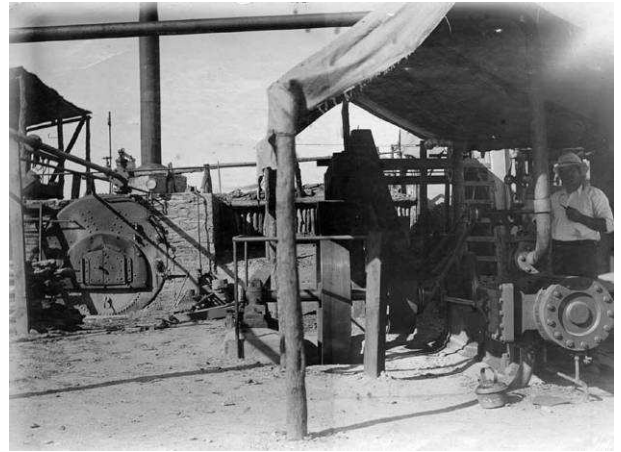


**Figure 6:** *Hawke's mowing machine*  
[SLSA B 45133]

The Winnecke mine was operated by the Gagliardi and Ciccone families in the 1930s using a 5 head stamp battery.

### 1.3 Technical significance

Fortunately a period photograph survives of the installation (Figure 7). The picture shows the proud engineer or mine captain in the foreground.



**Figure 7:** *Coorong battery 1905*  
[NT Library PH0756/0031]

The engine was a simple non condensing right handed mill engine layout. Control was by belt driven Pickering governor without any variable cut off. The installation shows a shade structure over the engine for the engineer and safety guarding around the flywheel. The footings are a combination of masonry and concrete and substantial for the installation. The engine powered a 10 stamp battery and the boiler was supplied with well water by a reciprocating steam pump which still survives.



**Figure 8:** *Transport of Winnecke boiler 1900*  
[NT Library PH0057/0030]

Figure 8 shows a large boiler being transported by horse team from Tarcoola to the Winnecke goldfields in 1900. Teamster of the 36 horse team was the late Steve Adams who married May Hayes of Maryvale Station (this family is a prominent pastoralist family in the NT and

SA today). Note that the boiler has the company name painted on for advertising effect. The date for the photo may be in error as it does not coincide directly with the commissioning date of 1905, unless there were delays in the installation. The description attached in the NT Library collection says the boiler is being transported from Winnecke to Alberga (in northern SA) which is in conflict with other descriptions and unlikely.

The mode of transport was common and another picture of a Hawke and Co boiler being transported to the SA Talisker mine is shown below (Figure 9). [8]



**Figure 9:** Boiler transport to Talisker mine [SLSA B 17641]

#### 1.4 Rarity

There are very few surviving Hawke and Co engines from a well established engineering company producing steam engines from the 1860's. Their range included:

- horizontal and vertical winders
- high speed inverted verticals
- portables
- mill horizontal compound types

The other known surviving engines in Australia are a cross compound 11/20 x 24" at the Kapunda Museum, SA; a horizontal mill engine approx 11 x 25" (Victorian Scienceworks register number 1990) located in a private collection in Victoria; and a small horizontal duplex winch at Paulls Consolidated Mine, Burr Well Station, SA. From the Hawke and Co drawing register at least 27 engines were manufactured after 1897. Records before this are missing.

#### 1.5 Representativeness

Much of the engine fabric remains and some parts of the installation and battery foundations. The site contains the concrete plinth for the engine and bedplate in situ. This is on a relatively high site with the battery being originally mounted high so the concentrate would flow by gravity over a sequence of amalgam tables to improve gold recovery. The engine is missing all of the small parts and the crankshaft, complete with flywheel, slide eccentric and governor pulley was relocated to the Old Timers Museum in Alice Springs in 1970 by the

Museum Curator of the time. The engine design is late for the period which indicates Hawke & Co were reliant on existing patterns and older designs. The cast bedplate is in the bayonet pattern and the crankshaft features a cast disc crank plate. The flat bar cross head design dates back to the 1850s and requires far less machining than trunk guides. However the cylinder is overhung so some more modern principles were applied, and the number of cylinder head and slide cover bolts indicate relatively high pressure for a remote location.

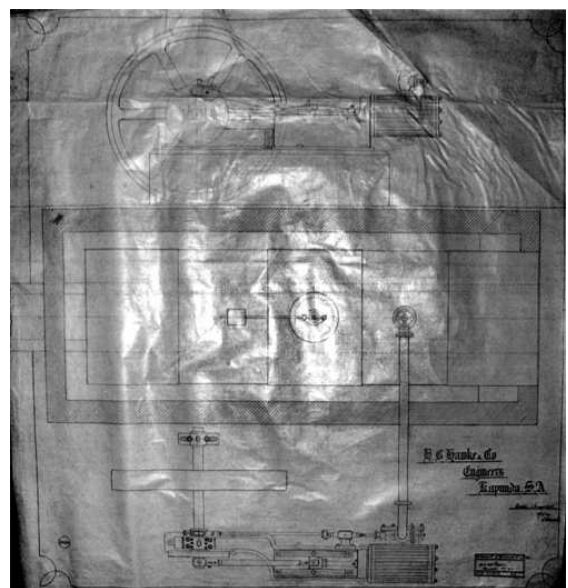
#### 1.6 Research Potential

Whilst the Winnecke battery does not have a high overall significance compared to the Arltunga battery, the Hawke engine bedplate and important civil relics of the mine remain in situ and there is an opportunity to install an interpretive sign at the site together with the crankshaft that belongs to the engine and place.



**Figure 10:** Hawke and Co engine bedplate at the Winnecke Goldfields

Some of the Hawke and Co drawings still survive at the Kapunda Historical Society museum in Kapunda and a search revealed a drawing for a 12" (bore) engine with 24" stroke and is dated 1897.



**Figure 11:** Hawke and Co mill engine drawing, 1897

The boiler and layout is almost identical to the relics at Winnecke and engine pictured in Figure 7.

An opportunity exists to scan the Hawke and Co drawings into PDF format for wider circulation, together with the surviving May drawings and brochures located at the Gawler museum.

### 1.8 Mill engine specification

Builder	Hawke & Co, Kapunda, South Australia
Bore	12" (305 mm)
Stroke	25" (635 mm)
Flywheel diameter	71.65" (1820 mm)
Flywheel width	10" (250 mm)
Piston rod diameter	2" (50 mm)
Crankshaft diameter	4.75" 120 mm
Boiler	Cornish type with dished ends

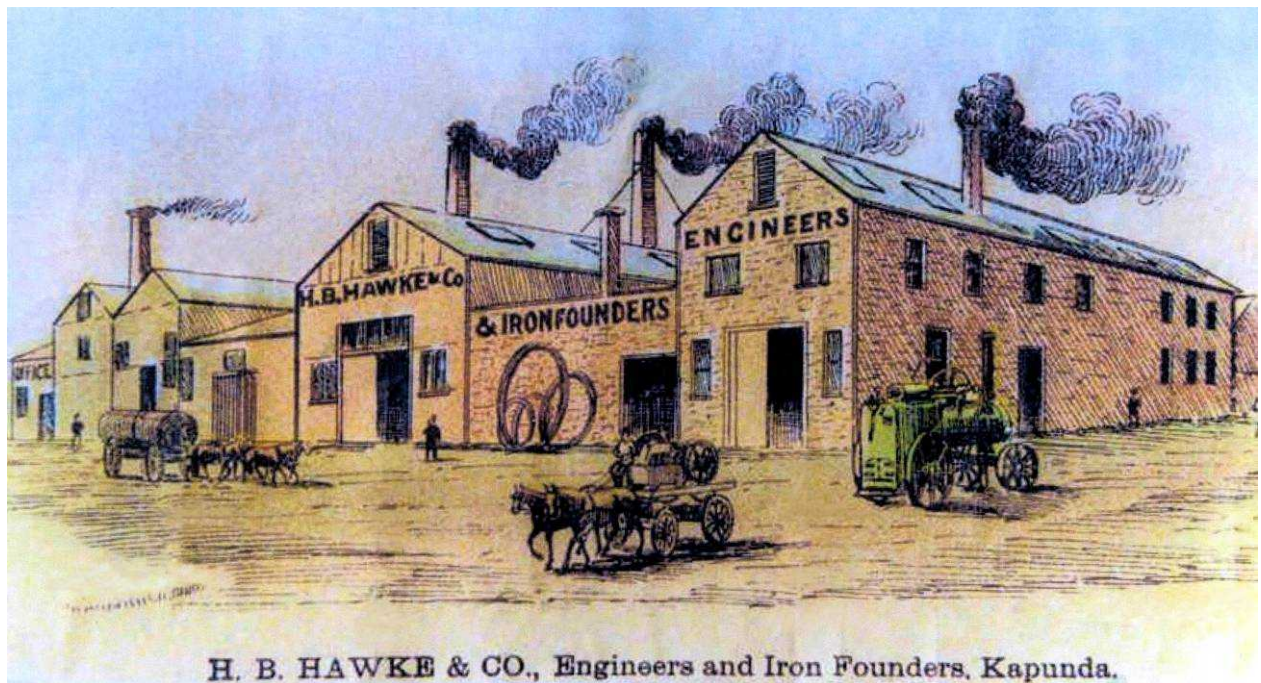
## 2. CONCLUSIONS

The Winnecke gold mine and Hawke and Co mill engine is a significant engineering heritage place considering the history of the mine, people, and unique combination of the period photographs, drawings and surviving relics. It is hoped that this work will encourage further conservation and interpretation of this engineering heritage.

## 3. ACKNOWLEDGEMENTS

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## 4. REFERENCES

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