

The mystery of the ‘John Donald’ winding engine ...

By PETER EVANS

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Sovereign Hill is an outdoor museum at Ballarat opened on 29 November 1970 and representing the historic gold mining era in Victoria. One of its many exhibits is an engine house with a battery of Cornish boilers, a Ruston-Proctor mine pumping engine, an Ingersoll-Rand two-stage steam-operated air-compressor (all operational), and what has always been said to be a ‘John Donald’ winding engine (due to plates mounted on the engine frames and attached with screws). This winding engine was operational when the old Normanby North mine was being re-excavated during the early years of the outdoor museum, but is not currently in use. It is, however, diligently maintained by the staff of the Steam Operations department at Sovereign Hill.

Figure 1: *The boiler house at Sovereign Hill with both century-old boilers banked for the night.*



Source: Photograph by Peter Evans.

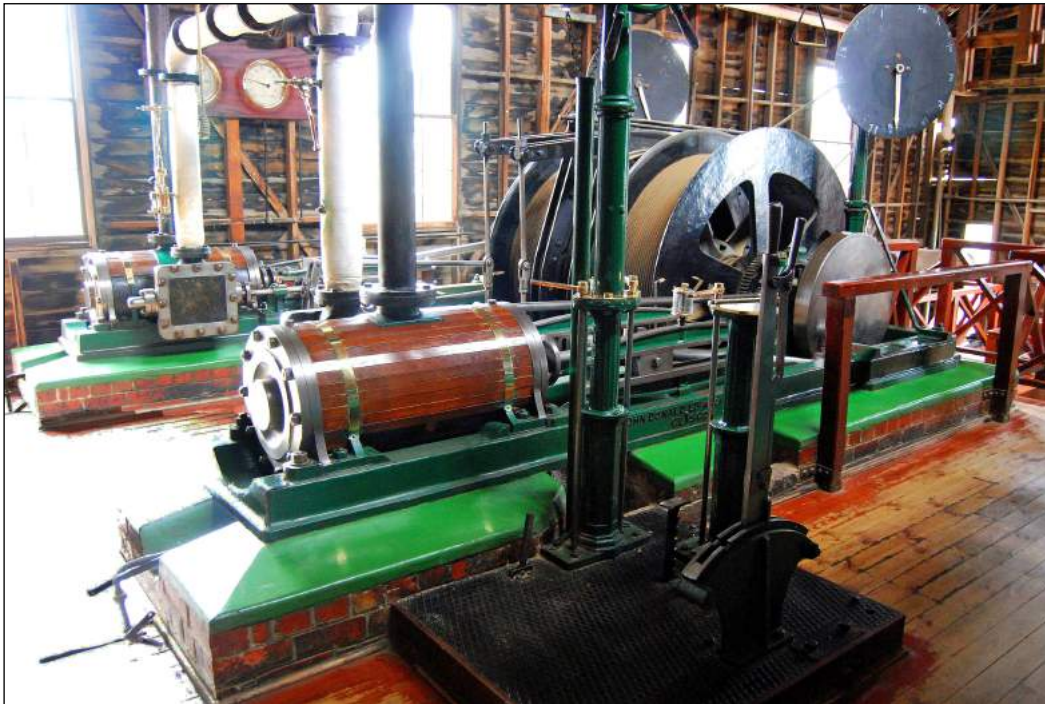
When Sovereign Hill was first opened, the resources available to research such an engine were limited. More recently, an investigation has revealed more of its past. Originally, Sovereign Hill’s understanding was that:

The winding engine at Sovereign Hill is a John Donald reciprocating engine, built in Glasgow in December 1908. It drives a first-motion winding engine pulling a wire rope connected to the cages which pass each other in the shaft: as one cage is going down, the other is coming up.

There are two problems with this statement. Firstly, John Donald would appear to be primarily an agent, not a manufacturer. And secondly, the date of December 1908 stamped only on the right-hand cylinder has none of the features expected of a manufacturer’s dating, but all the features expected of a fitter’s mark, possibly indicating a cylinder re-bore of ‘120 thou’ undertaken in December 1908. No such mark appears on the left-hand cylinder. It is entirely possible that any re-bore (which would indicate either

an accident or considerable wear) means that the engine was either second-hand and reconditioned when it was sold by John Donald or received a fitter's attention once it was in service in Australia.

Figure 2: *The 'John Donald' winding engine. The driver's man-stand is in the foreground with the throttle valve control above the driver's position. The modular nature of the frames and cylinders and the bar guides at the crosshead suggest an engine construction date much earlier than 1908.*



Source: Photograph by Peter Evans.

Certainly, the engine has features like modular construction and bar guides at the crosshead that would tend to indicate a construction date considerably earlier than 1908. The winder seems always to have been fitted with air-operated brakes and drum clutches. The counterweights for the brakes are substantial and could not be operated without some form of powered assistance.

New winding engines were still being constructed with steam-operated brakes in 1878, and that technology seems to have continued in common use in Europe well into the late 1880s.¹ Steam winders in the United Kingdom seem to have generally skipped the use of air braking, moving straight to hydraulic braking, although steam braking remained in common use and air braking was later used on electrically-powered winders.² [Fig. 3]

The earliest mention the writer can find of an air-braked winder in Australia is February 1889, when the Burwood Colliery in NSW sought expressions of interest for the supply of just such an engine.³ By 1903, air-braking systems were appearing more and more in connection with winding engines:

The vacuum and pneumatic brakes, which have proved, so useful in railway work, are now also often met with in winding engines. They enable the checking to be effected gently, with the desired power, and obviate the dangers that might arise from the deposition of water in the cylinders of steam brakes.⁴

So it would seem that the 'John Donald' winder was an unusual and early application of this air braking technology. [Fig. 4]

Figure 3: *The air actuation system. The vertical cylinders control the winder brakes, the horizontal cylinders control the drum clutches.*



Source: Photograph by Craig Ashman.

John Donald

John Donald was born on 5 December 1813 at Lochwinnoch, Renfrewshire, Scotland, the son of James Donald and Jessie Donald (née Turner). On 12 December 1843 John married Janet Anderson at Paisley Abbey, Renfrewshire, and she bore him five sons before dying in 1860. On 12 September 1861 John Donald remarried, wedding Margaret Knox Watt at Govan, and she bore him his first daughter in 1866. The census of 1871 shows the entire family living together in Glasgow under the one roof along with four unrelated persons (who were presumably the family's servants).⁵

John Donald was in business as an iron merchant in the partnership of Murdoch & Donald located at 26 St Enochs Square in 1849⁶ and, by 1860, the partners had moved to 21 Robertson Street.⁷ Robert Murdoch appears to have left the partnership around 1864 or 1865, remaining at Robertson Street as an iron merchant, while John Donald moved to 6 Hope Street, also as an iron merchant, with a further (and final) move to 42 Cadogan Street by 1866.⁸ His eldest son, James Turner Donald (born circa 1845), was definitely involved in the business by 1867 and it was officially John Donald & Son by 1872.⁹ John Donald invested in shipping in 1877,¹⁰ probably to secure a foothold in the export trade. Advertisements in the Glasgow Post Office Directories in 1871-1872 and 1872-1873 show that the firm was the sole agent for 'Globe' horse shoe nails and sold machine-made

horse shoes, Aland's patent fan blowers and exhausters, Galloway boiler tubes, Behren's rotary pumps and engines (manufactured by Appleby Bros, London), Hancock inspirators, steam-quietening chambers and centrifugal pumps; as well as a wide range of accessories for steam engines such as lubricators, whistles, gauge glasses and pressure gauges; portable blacksmiths forges and all manner of ironware like rails, fishplates, chairs, tie bars, spikes and bolts. All types of standard iron sections were also available. It is fairly clear from the huge range of products that John Donald acted as an agent for many manufacturers and probably had very limited manufacturing capability of his own (if any at all).

Figure 4: *The bar guides at the crosshead, with the 'John Donald Limited' plate screwed to the frames below. One of the plates has been carefully removed to see if there was anything underneath but only the plain cast frames could be seen, devoid of any maker's mark.*



Source: Photograph by Peter Evans.

We do know that in the early 1890s John Donald supplied a duplex winding engine to the Waratah Consols mine at Croydon, Queensland. (The Croydon goldfield was discovered in 1885, and John Donald apparently held shares in the Waratah Consols). The winder was later shifted to the Iguana Consols and is essentially extant today, although many parts have been robbed for scrap. It is a second-motion winder with the drums driven by chevron-gearing and is fitted with mechanical band-brakes, but it has cast frames, cylinders, drums, and gear-driven level indicators similar to those on the winder at Sovereign Hill.¹¹

On John Donald's death on 29 September 1889, the iron merchant business was taken over by his eldest son James Turner Donald. Shortly after the founder's death, the firm was reconstituted as 'John Donald Limited' in 1891.¹² (This would mean that the Sovereign Hill winder was sold by John Donald sometime between 1891 and possibly

1908). James Turner Donald in turn died on 13 February 1900. It may have taken some time to settle his large estate, as the following appeared in *The Engineer* in 1905:

By the will of the late Mr Donald [sic] the sum of £20,000 is bequeathed to the Glasgow & West of Scotland Technical College, to be paid on the death of Mrs Donald. After various other bequests have been made, the residue of the estate is to go to the governors of the Glasgow & West of Scotland Technical College for purposes specified in the trust deposition and settlement.¹³

There seems little doubt from the size of the bequest and its destination that this was very likely from James Turner Donald. The business seems to have then been in charge of James' younger brother Robert Killoch Donald (born c1851) until c1907.¹⁴ The firm continued as John Donald Ltd and was still operating in 1953,¹⁵ more than a century after its inception.

History of the Sovereign Hill winding engine

Sovereign Hill's account of the history of the winding engine states:

The [winding] engine and the compressor for the air brakes were retrieved from an abandoned antimony mine at Costerfield in 1973 and 1974. They were in a very derelict condition and many pieces—especially the brass fittings and name plates—had to be remade by Sovereign Hill or with local Ballarat firms.

So the task at hand is to try and work up to 1973 in regard to an engine of late nineteenth century appearance sold by a machinery dealer sometime after 1891.

The deposit of antimony on Wapentake Creek was discovered by a man named Doyle in 1853. Some mineral was sent to Melbourne but, at the time, had little industrial use. Some work was underway by 1858, but the field lacked capital and expertise in processing the ore.¹⁶ The first intensive exploitation of the resource started in 1860 with a party consisting of William Youle, Peniston Coster, Allan Coster and Edwin Field; the latter giving their names to the location. Of importance was the discovery that the deposit contained not just antimony but also gold, the key to making the resource payable. The gold obtained returned sufficient to fund the purchase of a small steam engine and battery and the start of the mechanisation of the field. A number of parties began to work outside Coster and Field's claim, notably the Minerva, Bombay and Alison syndicates and, in 1861, an extension of the reef was discovered about one mile south by W. Morris.¹⁷ In 1865 Coster and Field floated the Costerfield Gold & Antimony Mining Company and erected machinery consisting of an engine of 50 nhp for crushing and pumping and a winder of 12 nhp, the improvements costing in excess of £2000.¹⁸ In 1867 the lease and machinery of the Minerva syndicate were purchased.¹⁹ After reaching the water table at 90ft, the ore was found to contain increasing quantities of sulphide and a reverberatory furnace was erected to process the ore, which was proving difficult to treat. Much of the antimony ore remained dumped on the surface while the mine relied on its gold output alone, which it was alleged caused a large reduction in the share price.²⁰ In October 1880 the number of shares in the mine was doubled in order to attract additional capital.²¹ In 1881 new winders were being erected at the Costerfield and the Bombay Company's shafts.²² A final call of 15s on the capital of the Costerfield Gold & Antimony Company was made in May 1882, and steps were taken to wind-up the company and to form a new

company to purchase the mine lease and machinery.²³ It would appear this failed, for operations were abandoned in 1883 for a period of twenty years. It seems likely any remaining plant would have been removed during that interval.

In 1903 the field was reopened using English capital and a patented process for the treatment of the ore, aided by an increase in the price of antimony to £100 per ton.²⁴ The area of operations started with the old Bombay ground and included a 50 nhp winder. An air compressor was added in 1907 and a new Roberts & Sons winder in 1912.²⁵ Production later included the original and Minerva shafts and the South Costerfield shaft, at which was erected a winder purchased second-hand from Bendigo.²⁶ Production peaked in the period 1910-1920, aided by an increase in the price for antimony during the 1914-18 war but hindered somewhat by a shortage of shipping (as the concentrates from the mine were all processed in England). By 1922, mineral to the value of £1,000,000 had been extracted. The processing plant was driven by a Robinson [sic] Brothers of Melbourne condensing engine 'equal to 250 hp'. However, a decrease in the price for antimony after the First World War and a concurrent increase in wages put pressure on the operation. By 1926 the field was idle pending the floating of a new company, Antox Limited, to purchase the plant for £10,000, operate the mine and use the antimony to manufacture paint. At that time the mine plant consisted of:

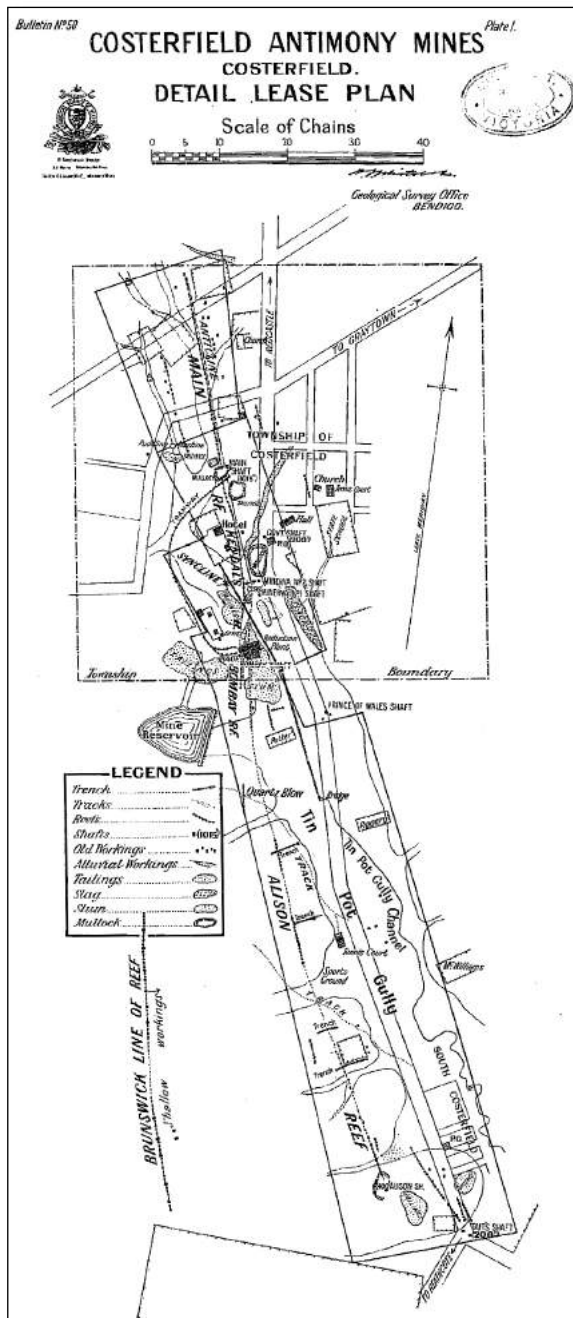
Main Shaft – Winding, Air-Compressing, Electric Pumping Plants &c.	£12,000
Minerva Shaft – Hauling Plant	£ 2,500
Bombay Shaft – Hauling and Air-Compressor Plant	£ 3,500
Alison Shaft - Hauling and Air-Compressor Plant	£ 5,000
Milling, Concentrating and Ore Recovery Plant, Fitting and Stores	£30,000
Dwelling Houses and Offices	<u>£ 2,600</u>
Total	<u>£55,600</u>

Antox Pty Ltd took over the mine and erected smelting furnaces and experimented with improvements to the ore concentration process.²⁷ However, shipping problems, wage rises and other price increases made the mine uneconomical and, in November 1924, operations were suspended, and shareholders voted by a narrow margin to place the company in voluntary liquidation. A brief reprieve was offered when political instability in China precluded competition from cheap imports of antimony, but lasted only until April 1925. In June 1925, Antox Pty Ltd was placed in liquidation with the forlorn hope that the English company would take the mine back.²⁸ Instead, arrangements were made to sell the plant. That its removal was complete is suggested by a request in 1936 for a government prospecting battery to be installed at Costerfield.²⁹

In early 1932 there was interest in reopening the Costerfield mines³⁰ [Fig. 5] using South African ore-treatment expertise. In November 1932 a dryback boiler built by Roberts of Bendigo was registered to the Costerfield Antimony & Gold Mining Company, presumably based around the old Costerfield shaft. The New Alison Mining Company, based in Bendigo, intended to work the southern half of the field. Both companies installed their own milling plant.³¹ In December 1934 an air receiver (formerly a water-tube boiler steam drum) was registered to the Costerfield Mining Trust Ltd³² so, in addition to work being carried out on tailings (from previous mining) by the Costerfield Smelting & Refining Company, Costerfield was once again a busy place. In January 1941,

work was underway to reopen the Tait shaft at South Costerfield as well.³³ However, none of the new mines appeared to be spectacularly successful [Fig. 6].

Figure 5: *The Costerfield mine leases in 1922.*



Source: See endnote 30.

take over the existing but flooded Shellback mine (dating from 1869) on the Paddys Gully line of reef at Eaglehawk near Bendigo.³⁸ By November the smokestack had been repaired and new foundations had been put in for a boiler and air compressor, the delivery of which was expected shortly. The plant consisted of a first-motion John Donald winder with a bore of 14½ in [368.3 mm] and a stroke of 30 in [762 mm] fitted with 6 ft [1.8 m] drums, capable of winding from 667 yards [610 m], and having air-operated post and foot brakes. The air compressor was by Ingersoll-Rand with in-line steam and air cylinders and twin

Antimony Mines of Victoria NL was formed in Sydney in 1951 to take over the South Costerfield property and consolidate the leases on the wider area including the Alison, Bombay, Bradley's and original mines. It would have a capital of £200,000 in shares of five shillings, with the South Costerfield Company to be paid shares to the value of £50,000 for its assets.³⁴ The new company would dewater the main Costerfield shaft and introduce a new plant for processing the ore. Profits in excess of £100,000 a year were anticipated.³⁵ Active operations were commenced in August 1952 with production expected to be underway by April 1953. In July, the new processing plant was declared to be a complete success.³⁶

The South Costerfield Company paid a first and final liquidation dividend of 3½d a share in April 1956.³⁷ It is assumed that any steam plant still on site when the Victorian Antimony mines relinquished the mine was completely outdated and would have been abandoned as largely unsaleable except for scrap.

Virginia South Extended mine

The Virginia South Extended Gold NL was registered in October 1933 to

flywheels. Steam was provided by two Cornish boilers. By January, the poppet legs were almost completed and the delivery of a winding engine was expected in the near future. Erection of all the machinery was completed by the end of February, and it was trialled in early March.³⁹ The Cowley Cornish boiler installed at the Virginia South Extended in 1934 was already second-hand and Miller & Coy (Machinery Merchants, Melbourne, Bendigo & Ballarat) acted as the intermediary for the sale.⁴⁰ (It is likely that the winder and compressor were obtained through the same intermediary). The next few months were engaged in dewatering and cleaning out the mine, and laying new air pipes and tram rails. Crushing commenced in August 1934.⁴¹

By early 1935 a promising spur of quartz had been uncovered in a new winze being sunk from the 950ft level. A crushing of 20 tons at the Sheepshead Company's 20-head battery (the Virginia South Extended did not apparently possess its own battery) realised 1½ oz to the ton.⁴² However, the initial rich yields did not last and, by this time, losses of £2,463 had been accumulated, leading to a decline in the value of the shares in the mine.⁴³ Further losses of £1899 were incurred in early 1936.⁴⁴ It was hoped that the disposal of 15,950 forfeited shares would enable further development of the mine to proceed.⁴⁵ Unfortunately, the losses continued to accumulate.⁴⁶ In March 1937 a new reef was discovered at the 450ft level (which raised expectations as well as doubling the share price).⁴⁷ The reef initially yielded only 4 dwt per ton; there was plenty of stone but little gold, and the losses continued to mount, with only a single call remaining on the shares. Operations at the main shaft had to be abandoned early in 1938 due to lack of finance, and work was concentrated on a small prospecting shaft 800ft north of the main shaft.⁴⁸

Figure 6: *Mine ruins at Costerfield in 1973.*



Source: Photo: John T. Collins, State Library of Victoria image H94.200/1209.

This prospecting shaft must have been unsatisfactory, as the company was placed in voluntary liquidation in September 1938 and all machinery except the winding engine was sold.⁴⁹ (A boiler must have been retained to provide steam to the winder and, as the winder was fitted with air braking, some form of compressor must have been retained as

well.) The motivation for this retention became clear when the company was reconstructed in late 1939 to resume control of the 69 acre lease and attempt to take advantage of the success of its neighbour, the newly-profitable South Virginia mine. Work at the Virginia South Extended recommenced in May 1940 with a return to the 450ft level and fresh work at the 330ft level.⁵⁰ The restart must have been in vain, for the mine fades from the mining reports of the day until the sale of its plant to the South Costerfield mine in May of 1948.

James Lerk in his *Bendigo's Gold Mining Revival 1929-1954* states that the last plant at the Virginia South Extended came from the Post Office Hill mine at Chewton.

Post Office Hill Mine, Chewton

The Post Office Hill reef at Chewton consisted of a network of spurs radiating from three distinct outcrops. It was first opened up by Opie and party in 1858 and, over the next three years, 2,582 oz of gold was obtained. Subsequent yields were 8,356 oz from 9,281 tons down to the 120ft level. The mine was then taken up by the Tresevean Company and the shaft was deepened to 200ft before heavy water and lack of machinery defeated the miners.⁵¹ There was renewed interest in the lode in 1871. Second-hand pumping and winding machinery were purchased and a contract entered into to have it removed and re-erected at the Post Office Hill site. The machinery was expected to be at work by the end of May 1871. In June of that year the Post Office Hill QMC was registered, all of the shareholders being Chewton men and, by September, quartz was being broken out.⁵² By the end of 1871, six calls had been made.⁵³ However, the growing number of forfeited shares showed that shareholders had lost confidence in the mine and little seems to have happened after 1872.

The mine seems to have been only worked spasmodically until 1936 when there was renewed interest in its potential due to the recent success of the adjacent Wattle Gully mine. In December 1936, steam was raised at Post Office Hill.⁵⁴ The pressure vessels at the mine consisted of a Roberts & Sons Cornish boiler registered as MDJ18 and an air receiver registered as MDH187.⁵⁵ Dewatering was by baling with a tank. In August 1937 a 'modern' Ingersoll-Rand air compressor was obtained (*not electrically powered as there was at that time no electricity at the mine*) and, by January 1938, the shaft had been deepened to 311 ft. At this point shaft sinking was ceased and crosscuts were to be driven east and west from the No.3 plat.⁵⁶ However, mining ceased soon afterwards and only an injection of capital obtained by the sale of forfeited shares to a West Australian investor enabled the mine to continue, with operations expected to resume at the beginning of 1939.⁵⁷ It seems this extra money did little to help as, in early September 1939, the directors recommended that the company be voluntarily wound up.⁵⁸ With the advent of the Second World War, interest in the mine dried up.

Ingersoll-Rand AA.2 Air Compressor No.13557

Sovereign Hill's John Donald winder seems to have been paired with a two-stage Ingersoll-Rand tandem air compressor for most of its Victorian mining history, the air compressor being required to operate the brakes and drum clutches on the winder. The

compressor feeds an air receiver constructed from the former steam and water drum of a Babcock & Wilcox water-tube boiler of circa 1910. This was registered as D5930 to the Nell Gwynne mine in Bendigo in 1941, and later moved to the Deborah Associated mine.⁵⁹ [Figs 7 and 8]

Figure 7: *The Ingersoll-Rand tandem two-stage air-compressor.*



Source: Photograph by Peter Evans.

Sovereign Hill originally believed that its air compressor was built in 1911, probably because that is the date printed on an instruction manual for the type. However, that same manual shows a compressor fitted with barring-gear, an improvement not present on the Sovereign Hill machine. The compressor therefore probably pre-dates April 1911. Ingersoll-Rand was formed by the merger of the Ingersoll-Sergeant Drill Company and the Rand Drill Company in 1905, so the air compressor will date from somewhere between 1905 and 1911. From 1934 it almost certainly had a similar history to the Sovereign Hill winder. So, there is a gap between 1911 and 1934 still to be researched.

The first newspaper mention of an Ingersoll-Rand air compressor in Victoria is at the New Nil [Desperandum] mine at Raywood which, in December 1910, ordered an Ingersoll-Rand air compressor ‘of the latest type’, available in six weeks, to cost £560 under steam, and to be installed by P. Jorgenson & Sons.⁶⁰ The second was the Diamond Creek Company at Diamond Creek, north-west of Melbourne. In February 1911 the directors decided to purchase an Ingersoll-Rand air compressor and seven drills.⁶¹ The Catherine Reef United at Bendigo installed a new Ingersoll-Rand air compressor in March 1911, capable of compressing 1603 cubic feet per minute at a pressure of 100 psi.⁶² The Hustlers Consols, also at Bendigo, installed a new Ingersoll-Rand air compressor in October 1911.⁶³ The Central Red White & Blue Company of Bendigo invited an

Ingersoll-Rand representative to an opening of its new plant in 1912, but it would seem that this particular Ingersoll-Rand compressor was powered by a suction gas engine, (similar to a machine installed at the Golden Pyke, Eaglehawk, shortly afterwards, in 1913.⁶⁴ By 1916, Ingersoll-Rand had an office in Melbourne and had appointed Cameron & Sutherland their agents at Bendigo.⁶⁵

This list may by no means exhaustive given the fact that items of machine plant were not often reported-on unless they were an innovation, but indicates that the majority of the new Ingersoll-Rand machines in the period 1905-1911 were at or near Bendigo. Miller & Coy (machinery merchants) operated a branch office at Bendigo so would be well-placed to deal in second-hand air compressors.

Figure 8: *Sovereign Hill's air receiver.*



Source: Photograph by Peter Evans.

Analysis

The upshot is that we have a winding engine of late nineteenth century appearance, sold in England sometime between 1891 and a date that could or could not be 1908, and ending up at Costerfield in 1973. Most if not all of the mines at Costerfield sold their machinery when they closed to recoup what money could be returned to long-suffering shareholders. The evidence suggests that both the John Donald winding engine and Ingersoll-Rand compressor were purchased by the South Costerfield Company from the Virginia South Extended mine at Bendigo in 1948, the plant being that installed for the latter Company in 1934. The winder was probably sourced in 1934 through second-hand machinery merchants Millers (an illustration of an almost identical winding engine appears in a Millers catalogue held by Sovereign Hill), and it is unlikely that it can be positively traced further back than that. There is a strong possibility that the plant was obtained by Millers from the Post Office Hill mine at Chewton, but it seems improbable that any earlier history can be definitely identified.

Endnotes

- ¹ *The Engineer*, 25 October 1878, p. 303; Julius Sprenger, *Hydraulische Bremsvorrichtung für Fördermaschinen*. In *Berg-und Hüttenmännische Zeitung*, Volume XLVII, No. 1 and No. 2, pp. 1-3 and 13-14, translated in *Transactions*, North of England Institute of Mining and Mechanical Engineers, Vol. XXXVII, Newcastle-on-Tyne, 1887-88, p. 43.
- ² Personal communication from Chris Allen, International Stationary Steam Engine Society; George McCulloch and Campbell Futers. *Winding Engines and Winding Appliances: their design and economical workings*, Edward Arnold, London, 1912, mentions only that winder brakes can be worked by steam or air.
- ³ *The Sydney Morning Herald*, 14 February 1889, p. 12.
- ⁴ Carl Volk, *Haulage and Winding Appliances used in Mines*, Scott Greenwood and Company, Ludgate Hill, 1903, p. 70.
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- ⁶ *Glasgow Post Office Directory* 1849-1850, p. 108.
- ⁷ *Ibid.*, 1850-1851, p. 211; 1860-1861, p. 210.
- ⁸ *Ibid.*, 1864-1865, pp. 112, 237; 1865-1866, pp. 97, 225; *ibid.*, 1866-1867, p. 127.
- ⁹ *Ibid.*, 1867-68, p. 130; 1872-1873, pp. 129, 164.
- ¹⁰ R.A. Cage, *A Tramp Shipping Dynasty - Burrell & Son of Glasgow, 1850-1939: A history of Ownership, Finance and Profit*. Greenwood Publishing Group, 1997, p. 57.
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- ¹² *Glasgow Post Office Directory* 1890-1891, p. 231; 1891-92, p. 229.
- ¹³ *The Engineer*, 28 April 1905, p. 424.
- ¹⁴ *Glasgow Post Office Directory* 1901-1902, p. 185.
- ¹⁵ *The Glasgow Herald*, 30 October 1953, p. 8.
- ¹⁶ *The Star* (Ballarat), 11 June 1858, p. 3; *The Argus*, 8 January 1862, p. 6.
- ¹⁷ *The Argus*, 2 August 1862, p. 3.
- ¹⁸ *Ibid.*, 20 January 1865, p. 4; 30 September 1865, p. 5.
- ¹⁹ *The Ballarat Star*, 26 March 1867, p. 1.
- ²⁰ *Ibid.*, 6 May 1867, p. 3; 7 May 1867, p. 3.
- ²¹ *The Argus*, 2 October 1880, p. 8.
- ²² *The McIvor Times & Rodney Advertiser*, 7 July 1881, p. 2.
- ²³ *Bendigo Advertiser*, 9 May 1882, p. 3.
- ²⁴ *The McIvor Times & Rodney Advertiser*, 7 June 1906, p. 2; *Bendigo Advertiser*, 13 July 1906, p. 2.
- ²⁵ *The McIvor Times & Rodney Advertiser*, 2 August 1906, p. 2; 17 January 1907, p.3; 13 June 1912, p. 2.
- ²⁶ *Ibid.*, 12 August 1915, p. 3.
- ²⁷ *The Age*, 17 April 1924, p. 12; *Farmers' Advocate*, 9 May 1924, p. 17.
- ²⁸ *The Argus*, 19 November 1924, p. 16; 29 November 1924, p. 37; 31 January 1925, p. 30; 2 July 1925, p. 8; *The Age*, 1 April 1925, p. 15.
- ²⁹ *Weekly Times*, 12 June 1926, p. 99; *The Age*, 18 May 1929, p. 24.
- ³⁰ The Costerfield mine leases in 1922. From H.S. Whitelaw, *The Costerfield Auriferous Antimony Veins*. Bulletin No.50, Geological Survey of Victoria, H.J. Green, Gov't Printer, Melbourne, 1926, Plate 1.
- ³¹ *The Argus*, 23 January 1932, p. 18; *Weekly Times* 17 June 1933, p. 13; *The Age*, 18 November 1935, p. 15; PROV, VPRS 9534/P1, unit 1, registration MDF35.
- ³² PROV, VPRS 9534/P1, unit 1, registration MDH147.
- ³³ *The Age*, 21 January 1941, p. 5.
- ³⁴ *Ibid.*, 11 August 1951, p. 11; 16 January 1952, p. 6; 25 March 1952, p. 11.
- ³⁵ *The Argus*, 8 May 1952, p. 8; *The Age*, 8 May 1952, p. 5.
- ³⁶ *The Age*, 6 August 1952, p. 6; 11 March 1953, p. 6; *The Argus*, 3 July 1953, p. 6.
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- ³⁸ *Ibid.*, 11 October 1933, p. 4.
- ³⁹ James A. Lerk, *Bendigo's gold mining revival, 1929-1954*, J. & E. Lerk, Bendigo, 1997, pp. 12, 122; *The Age*, 27 November 1933, 17; 18 December 1933, p. 13; *The Argus*, 15 January 1934, p. 6; 26 February 1934, p. 6; 6 March 1934, p. 4.
- ⁴⁰ PROV, VPRS 9534/P1, unit 1, registrations MDH148 (1934) and MDW89 (1948).
- ⁴¹ *The Argus*, 31 July 1934, p. 4; 24 August 1934, p. 6.
- ⁴² *Ibid.*, 21 January 1935, p. 6; *The Age*, 24 January 1935, p. 7; *The Australasian*, 8 August 1936, p. 48.

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- ⁴³ *The Age*, 13 February 1935, p. 18; *Weekly Times*, 1 June 1935, p. 13; 22 June 1935, p. 13; *The Argus*, 7 September 1935, p. 22.
- ⁴⁴ *The Argus*, 9 June 1936, p. 8.
- ⁴⁵ *The Age*, 17 June 1936, p. 20; 22 June 1936, p. 15.
- ⁴⁶ *Ibid.*, 3 March 1937, p. 8.
- ⁴⁷ *Ibid.*, 4 March 1937, p. 8; *The Argus*, 24 March 1937, p. 4.
- ⁴⁸ *The Age*, 1 June 1937, p. 8; 9 June 1937, p. 8; 9 December 1937, p. 9; *The Argus*, 17 December 1937, p. 9.
- ⁴⁹ *The Age*, 15 August 1938, p. 9; *The Argus*, 2 September 1938, p. 5.
- ⁵⁰ *Ibid.*, 6 December 1939, p. 11; 27 May 1940, p. 7.
- ⁵¹ *Mount Alexander Mail*, 3 March 1908, p. 2.
- ⁵² *Ibid.*, 28 April 1871, p. 2; 18 September 1871, p. 2; *Victorian Government Gazette*, Gazette 45, 30 June 1871, p. 1047.
- ⁵³ *Ibid.*, *Victorian Government Gazette*, Gazette 84, 29 December 1871, p. 2355.
- ⁵⁴ *The Age*, 13 October 1936, p. 29; 12 December 1936, p. 20; 26 June 1937, p. 20.
- ⁵⁵ PROV, VPRS 9534/P1, unit 1, folio 199; and unit 2, folio 19.
- ⁵⁶ *The Argus*, 2 August 1937, p. 6; 15 January 1938; *The Age*, 20 January 1938, p. 9.
- ⁵⁷ *Ibid.*, 13 December 1938, p. 27.
- ⁵⁸ *The Argus*, 1 September 1939, p. 9.
- ⁵⁹ PROV, VPRS 9534/P1, unit 2, folio 62.
- ⁶⁰ *Bendigo Advertiser*, 5 December 1910, p. 2.
- ⁶¹ *Punch Melbourne*, 2 February 1911, p. 8.
- ⁶² *Bendigo Advertiser*, 31 March 1911, p. 2.
- ⁶³ *The Bendigo Independent*, 28 October 1911, p. 2.
- ⁶⁴ *Bendigo Advertiser*, 14 March 1912, p. 3; 22 January 1913, p. 2.
- ⁶⁵ *The Bendigo Independent*, 21 January 1916, p. 4.