

## **Robert Gray Ford - A man before his time!\***

By JAMES A. LERK

Have you ever heard the sound of a hammer striking hot metal on an anvil? Each different weight anvil has its own tone, just as the hammer which is used, can create its own sound; governed in part by the temperature of the metal being struck. Blacksmithing as an occupation, is as old as the Iron Age. From the time of Vulcan and Tubal Cain up until the late 18th Century the role of the blacksmith in society did not change a great deal across many and varied cultures but with the beginnings of the industrial revolution in England blacksmiths became increasingly important in the manufacture of a plethora of tools and equipment from iron and its immediate derivatives.

### **Early days and training**

Robert Ford, the father of our subject Robert Gray Ford was a blacksmith, living at Gateshead, Durham, England. He practiced his considerable skills of his craft for the manufacture of large components as well as very delicate ones. His son, Robert Gray Ford was christened on 18<sup>th</sup> August 1833 and was the eldest child, having a younger brother Michael and sister Jane. Robert Gray Ford was apprenticed as a blacksmith at an early age, in the Newcastle-upon-Tyne area. He completed his indenture by the time he was 17 years of age.

During Robert Gray Ford's apprenticeship, the railway boom that gripped England was still in full swing. Blacksmiths were in high demand as more and more a variety of work was required of them for railways. They could forge-weld metal, rivet, manufacture boilers and pressure vessels, be involved in finishing castings for machinery and increasingly interpret and make components from mechanical drawings. These were the skills that our subject had acquired before he was attracted to the colony of Victoria, most likely, because of the discovery of gold.

Robert Gray Ford was a self-funded passenger, on the ship *Ellen* that docked at Melbourne in October 1852.<sup>1</sup> At the time of his arrival one percent of the Victorian population was involved in the metal or engineering trades.<sup>2</sup> With the upheaval of the gold rush and the increasing demand for the skills of blacksmiths, the likes of Ford would have had no difficulty in securing work. Unfortunately, at this point no

employment records have been located as to his work involvement. Ford married Mary Walker at Melbourne in March 1853. He must have found employment in his own field sufficiently remunerative to motivate both his parents and siblings to join him in the colony. By the time that the ship *Carpentaria* had docked in Melbourne from Liverpool on the 12<sup>th</sup> of May 1854<sup>3</sup>, Ford was already engaged in acquiring new skills.

### **Entrepreneurial flare**

It is highly likely from the evidence researched to date that he became associated with the surveying and construction of the Geelong to Melbourne Railway Company line. In 1852 engineer/surveyor Edward Snell joined the company, his knowledge, bravado and entrepreneurial flair assisted in raising the profile of this private enterprise initiative.<sup>4</sup> The same qualities demonstrated by Snell were also evident when Ford later secured a position with the Victorian Railways.

Robert Ford senior had settled in Geelong and opened an engineering business and foundry at Victoria Terrace with his son Robert Gray Ford. The advertisement read, 'To Contractors, Agriculturists, and Others, R.Ford and Son, Engineers, Iron and Brass Founders, Boiler makers &c.' They went on to list steam engines, boilers, pumps, cast and wrought iron pipes, pallisading and grating, puddling mills, quartz crushers, stampers and horse powers made and fitted for the diggings.<sup>5</sup> This was 1858 and the diggings referred to were Ballarat.

The business partnership did not last and by mutual consent Robert Gray Ford was to withdraw. For sometime afterwards, Ford senior won a number of contracts for the supply of various components for works by public bodies. What Robert Gray Ford did at this point remains a mystery but by 1860, it is known that he was living in North Melbourne, the address given when he applied for his first patent on the 25<sup>th</sup> of August for, 'Ford's Improved Apparatus for Building and Lifting etcetera.'<sup>6</sup>

Ford's Lifting Apparatus's patent drawings, illustrate his lifting device raising an iron viaduct girder. It is my belief that he submitted this patent with future employment specifically in mind. Soon after the patent application submission Robert Gray Ford was appointed in 1860 as, 'superintending the erection of the ironwork of the Moorabool Viaduct.'<sup>7</sup> The Moorabool Viaduct is one of the early Victorian Railways engineering marvels. This viaduct is 396 metres in length and up to 35.1 metres above the Moorabool River valley. The viaduct's design came from prominent railway engineer I.K. Brunel and the trusses were of the Warren type, open lattice. Engineer in

Chief of this project was Robert Watson, who Ford was to have a close association with as a colleague in his subsequent career.

Robert Gray Ford was onboard the first train to cross the Moorabool Viaduct, the second train carried the Governor and suite and on 10<sup>th</sup> of April 1862, enroute to Ballarat, he joined in the banquet marking the opening of the Geelong Ballarat line. From this time on Ford was always referred to as an engineer. On 13<sup>th</sup> April 1863, Robert applied for his second patent, number 620, 'For securing railway chairs to sleepers by means of tubular wrought iron or steel treenails'. His address at the time of this patent application was given as Geelong. At the time the young Ford family had just moved to Sandhurst, as Bendigo was once called.<sup>8</sup>

### **Mining Opportunities**

A rented house was where the Ford's lived, just to the immediate north of the city centre, an area favoured by the establishment. Only a few blocks away was one of Bendigo's leading gold mines, there was something similar in railway and mining development that was not lost on Robert Gray Ford as railway work needed cuttings and tunnels as did mining. Over a three-year period, beginning in 1864, Ford began the task of developing his ideas for a rock boring machine.<sup>9</sup>

As a servant in the engineering and surveying branch of the railways, Ford had limited spare time in which to develop his drill. 'Ford's Rock Boring Machine' was patented on the 23<sup>rd</sup> of February 1867, its patent number being 989. Now that the patent had been accepted his next task was to have a prototype manufactured from his drawings. Ford realised that an innovative machine such as his, that was different from any other, required a foundry and engineering works that had a sound record for manufacturing machinery. He selected Vivian's Foundry at Castlemaine as he knew of their high standard of expertise in engineering<sup>10</sup> as compared to the Bendigo foundries in the same period.

Ford must have come to some financial arrangement with Vivian's in respect of the cost of manufacturing one of his rock borers. A man on a salary such as his position carried, was unlikely to have the necessary capital on his own account to fund such a project himself.

By early April 1868, a prototype of the rock borer was ready to be demonstrated at Vivian's Foundry, where the required air pump or compressor and air receiver were available. Astutely, Ford made certain that the people who would be instrumental in the

possible purchase of his machine were invited to the demonstration. Over 20 gentlemen from the mining industry, and the Department of Victorian Water supply were able to witness the drill in action.

Temporary would be the best description of the way the demonstration was conducted. Relatively small blocks of stone, about half a ton weight each; both blue stone and granite were on hand, to be drilled into. The blocks of stone were about 300mm thick, and these were drilled through in less than five minutes. The speed of the drilling impressed the engineer from the Victorian Water Supply as well as the mining men who were present.<sup>11</sup> The weight of the drill was 54.43 kg and it could be operated by a strong person without the need to have it mounted. Ideally, as in the case with the drill being demonstrated, it was mounted on a baulk of timber.

A second demonstration had been arranged for Ford's drill, this time a large contingent of mining men from Sandhurst came to Castlemaine to see the drill in action. Others from Tarrengower (Maldon) and Castlemaine were also on hand. Following this demonstration, which generated considerable interest, the Bendigo mining men were spurred on to form a Subscription Committee so that a drilling machine could be tested in a mining environment.<sup>12</sup>

Two of Ford's near neighbours, Latham and Watson, were the proprietors of the nearby Hustler's Reef Mine and instrumental in the process of supporting the formation of the Subscription Committee. Some time elapsed before the Subscription Committee had everything in hand for a drill to be manufactured by Vivian's, as well as a venue secured for its practical mining trial. The mine, which was made available, was Latham and Watson's Hustler's Reef Mine. Their mine manager, Joseph Millin played a key role in organising the Subscription Committee and the trial of Ford's Rock Borer.

On the 2<sup>nd</sup> of October 1868, the train from Castlemaine carried the long awaited drill. The machine was put on public display before being taken to the Hustler's Reef Mine. The rock borer was set to work in the mine for some time before the official demonstration. On the 5<sup>th</sup> of November 1868, Joseph Millin the host manager took a party of five in several trips by cage, including Ford, to the 183metre level of the mine. One of the mine's engine drivers, Samuel White, was the drill operator. The demonstration proved to be very successful, the drill having been mounted in a small crosscut, where slate, sandstone and quartz were bored. In the coming months, with regular use all would see if the machine was indeed a practical one.<sup>13</sup>

Robert Gray Ford could see ways to improve his rock borer and he submitted for patents numbers 1197 and 1197A to that effect on 11<sup>th</sup> December 1868. Rock boring machines require compressed air and the first compressor that Ford had made was almost a direct copy of that from George Low a Scottish engineer. One of Low's compressors and drills had been imported to Victoria for the Tarrengower Tunnel Company at Maldon in 1869.<sup>14</sup>

Humble and Nicholson's Foundry of Geelong manufactured the first of Ford's compressors. Ford soon designed another compressor, which worked on the same principle as that of Low. These new improved compressors were to become the most common in Victoria for at least two decades. The compressors and rock boring machines were adopted for many projects including tunneling for the Rocky Mountain Extended Gold Sluicing Company, Beechworth in 1879, a project 1,097metres long, and the Stawell Water Works tunnel in 1875. Others too adopted the Ford drill, including numerous quarries, the Isis Mine of Stuart Mill and the Albion Quartz Mine at Steiglitz.

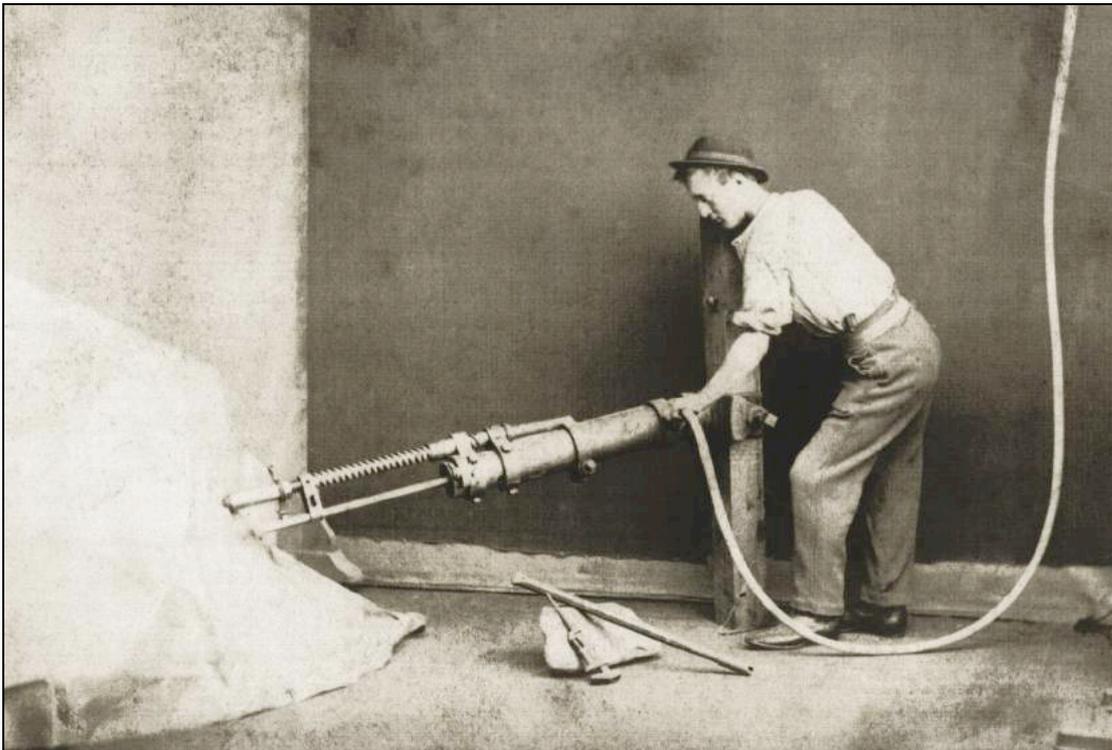
Ford saw a need for an exhauster to take away noxious fumes from explosives such as dynamite and for this purpose he invented and had manufactured his Patent Exhausters. This exhauster received praise for its efficacy.<sup>15</sup>

Robert Gray Ford's career saw advancement, as he was promoted to the position of Engineer for Construction with the Victorian Railways on 20<sup>th</sup> March 1878. He was to be very closely associated again with Robert Watson, Engineer in Chief, who was his immediate superior. For a man who had been a blacksmith Ford had done well. Unfortunately those colleagues around him over whom he had a supervisory role had a different background and training, and to have someone such as Ford alter their designs was an anathema. The jealousy that existed festered in the area over which Ford had control. For a number of years the lack of goodwill continued, eventually leading to charges being laid against him at the highest political level, of incompetence and maladministration. This situation was brought to a head in 1862, when the Victorian Parliament appointed a 'Board to Enquire Into Certain Charges Brought Against R.G.Ford'.<sup>16</sup> The Board in its findings exonerated Robert Gray Ford of the charges laid; however, they did state 'that he was somewhat gruff to those under him.'

In his work capacity, Ford was as the enquiry revealed, highly talented, inventive, uncorruptable, well organised, conscientious, capable, very hard working and saved the Department through his initiatives a great deal of money. During these

turbulent times Ford still managed to exhibit his inventions in a variety of Inter Colonial and International Exhibitions, gaining favourable comments from the juries in the different categories in which he had entered his work. At one of the exhibitions his Rock Boring Machine received a silver medal when it was pitted against two international rivals, the English Warsup and from the United States the Burleigh drill. In the allotted time, Ford's machine bored more than twice the depth of its nearest rival the Burleigh and over six times as much as the Warsup.<sup>17</sup>

**Figure 1:** *Robert Gray Ford with his rock drill, October 1868*



Photograph by B.P. Bachelder at Bendigo

### **Spreading his wings**

The Melbourne Harbour Trust in 1878 had brought out the leading harbour engineer of the time, Sir John Coode to make recommendations for the improvement of the Harbour and the Yarra River that flowed into it. One of Coode's recommendations was the deepening of the mouth of the river where a large rock bar had to be removed. To answer this problem Robert Gray Ford invented his huge submarine drill. Two submarine drills with their 13.7metre high supporting pylons were mounted on twin barges along with the vertical boiler, air compressor, air receiver, winches and other machinery all of which was designed by Ford. For the purpose of the submarine

drilling, Ford had also invented his Electric Blasting Apparatus for detonating the dynamite.<sup>18</sup>

Robert Gray Ford had invented a compressed air or steam powered Improved Winch, which could wind in mines for shaft sinking purposes at a rate of 20metres per minute under load. An air powered Pumping Engine, described as being ideal for shaft sinking was another efficient machine that came from Ford's inventive genius. This pump was designed to remove water at a rate of 2,250 litres to 45,000 litres per hour and throw it to any height required.

Yet another invention was R.G. Ford's Improved Patent Gas Compressor, described as being designed for compressing gas of high illuminating power such as acetylene, into the smallest possible bulk without fear of explosion. Again Ford believed that this gas compressor would serve a wide range of uses, including the illumination of mines, railway carriages, boats, and *etcetera*.

Following the Board of Enquiry into R.G. Ford in 1862, he transferred as an engineer to the Public Works Department, remaining there until 1888 when he retired to live at his home, Whitmuir Hall in East Brighton. He passed away there on the 22<sup>nd</sup> of November 1891, celebrated publicly with a very large funeral. Many newspapers carried an obituary and described Robert Gray Ford as 'a man before his time,' who was intellectually head and shoulders above his fellows.<sup>19</sup> A man of innate ability and great talent, he left an estate in cash of £10,000.<sup>20</sup>

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## Endnotes

<sup>1</sup> Immigration Fiche 13, p. 6, State Library of Victoria.

<sup>2</sup> Victorian Census 1851.

<sup>3</sup> The *Carpentaria* was of 1460 tons and specifically used as an immigrant ship.

<sup>4</sup> Tom Griffiths and Alan Platt (eds), *The Life and Adventures of Edward Snell, The Illustrated Diary of an Artist, Engineer and Adventurer in the Australian Colonies From 1849 to 1859*, Angus & Robertson and the State Library of Victoria, 1988, p. xvi.

<sup>5</sup> *Geelong Advertiser*, 20 November 1858, p. 4, column 6.

<sup>6</sup> Patent number 368, *Improved Apparatus for Building and Lifting etcetera*.

<sup>7</sup> *Victorian Railways Newsletter*, November 1936, p. 7.

<sup>8</sup> At first called Bendigo Creek then Bendigo Diggings, it became Castleton in December 1852 and in January 1853 Sandhurst. Never a popular name, in 1891 this was changed by a vote of ratepayers back to Bendigo.

<sup>9</sup> *Bendigo Advertiser*, 25 May 1868, p. 3, column 2.

<sup>10</sup> *Ibid.*, 1 June 1868, p. 2, column 5.

<sup>11</sup> *Ibid.*, 4 April 1868, p. 2, column 1.

<sup>12</sup> *Ibid.*, 23 May 1868, p. 2, column 5.

<sup>13</sup> *Ibid.*, 6 November 1868, p. 2, column 4.

<sup>14</sup> Ralph W. Birrell, *Australian Mining History Monographs Number 8, Rockdrills, Phthisis and Clean Air*, Strathfieldsaye, 2002, p. 7.

<sup>15</sup> Harvey Nankervis, Manager for the Contractor Rocky Mountain Tunnel, Letter to R.G. Ford, 6 February, 1879, in Brochure, *R.G. Ford's Improved Patent Rock Boring Machine*, Fergusson & Moore, Melbourne, 1880, p. 4.

<sup>16</sup> Report, *The Board Appointed to Enquire Into Certain Charges Brought Against Mr. R.G. Ford, Engineer For Construction, Victorian Railways*, Minutes of Evidence and Appendices, Presented to Both Houses of Parliament By His Excellency's Command, Melbourne, 1882.

<sup>17</sup> Brochure, *R.G. Ford's Improved Patent Rock Boring Machine*, Melbourne, c.1880, p. 1.

<sup>18</sup> All the work associated with the remodelling of the harbour was completed in 1886, see, A.J. Allan, *Victorian Historical Magazine, The Story of The River Yarra*, vol. XXII, no. 4, December 1940, p. 107.

<sup>19</sup> *Brighton Southern Cross*, 28 November 1891.

<sup>20</sup> James A. Lerk, *Robert Gray Ford, Colonial Blacksmith, Inventor, Engineer and One Time Bendigonian*, Golden Square, 2005, p. 48.