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Cover Images:

Front – Bannockburn farmer Scott Agnew with his historic HS Taylor header harvester, Jan. 2014. Photo Zoe Phillips, Weekly Times.

Back – The Headlie Taylor Blacksmith Shop photographed in 2000. Photo M Doring

This is a quarterly magazine covering news items and stories about engineering and industrial heritage in Australia and elsewhere. It is published online as a downloadable PDF document for readers to view on screen or print their own copies. EA members and non-members on the EHA emailing lists will receive emails notifying them of new issues with a link to the relevant Engineers Australia website page.

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Editorial

It is very sad that I needed to include the Obituaries of two of the most outstanding stalwarts of the heritage conservation professions. Jim Kerr was well known to many of us in Australia – if not personally, certainly through his authorship of *The Conservation Plan* and his engagement with the *Burra Charter* of Australia ICOMOS. We knew Jim well in the 1980s and early 1990s when we were living in Sydney, and we met on many occasions. I still smile when I remember looking down from a balcony on Jim and Carl Doring chatting about something – I think at the Opening party of the Sydney Museum – both Jim and Carl with shocks of white hair and white beards wagging. Bronwyn Hanna, of NSW Heritage, interviewed Jim for the National Library a couple of years ago, and she was very pleased to be tasked with writing his obituary for me.

The other stalwart , Stuart Smith, will be less well known in Australia. He was English, and an eminent industrial archaeologist, and most recently, the Secretary of international TICCIH. Those who knew him will greatly miss such an important pioneer of Industrial Archaeology and Engineering Heritage. I first met Stuart Smith in 1983 – it must have been just before or just after he succeeded Neil Cossons and became Director of the Ironbridge Gorge Museum. I was visiting the UK from ICCROM in Rome and drove to Ironbridge for the day. Neil Cossons had asked Stuart Smith to show me around the Museum and the Institute, which he did – in great detail. He even gave me lunch at a pub near the river. I have never forgotten Stuart's kindness and that enjoyable and informative day. We met again in 1986 or 1987 at some function at the Ironbridge Institute when I was again visiting the UK – mainly to see my partner Carl who was studying for his Masters in Industrial Archaeology at the Institute at that time.

Stuart Smith's obituarist, Sir Neil Cossons, was formerly the Director of the Ironbridge Gorge Museum in Shropshire (1971-1983), and later Director of the Science Museum in London. He has been a Commissioner of English Heritage and most recently the Chairman of the Council of the Royal College of Art. He is not an engineer, but in 1993 was awarded the President's Medal of the Royal Academy of Engineeing. I met him in Rome in 1983 and fairly recently we met again when he was visiting Melbourne.

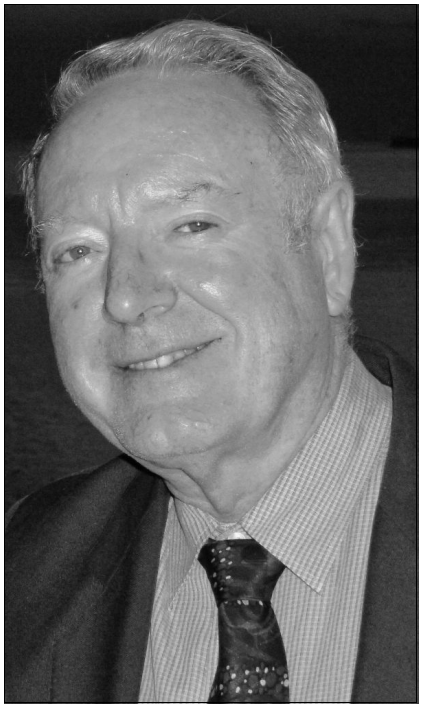
Other stories are about happier events. Firstly, the Sesquicentenary of the firm J. Furphy & Sons Pty Ltd in Shepparton, Victoria. The company has remained in the hands of the Furphy family for five generations. Secondly, the Centenary of the invention and successful operation of Headlie Shipard Taylor's Header Harvester at Henty NSW. I mentioned that the Dorings were asked to prepare a heritage assessment and conservation policy for the former Headlie Taylor blacksmith shop on the former Taylor farm. What I didn't mention is a personal interest I had in the Headlie Taylor story. My grandfather, DB Ferguson, happened to be Headlie Taylor's boss for many of the 38 years Taylor worked at the Sunshine Harvester factory.

David Beauchamp features again in this issue – first as the winner of the 2014 Engineers Australia John Monash Medal, and then as the author of the Excelsior Bridge story – a 1908 Monash designed and built bridge in Victoria. The subject of that story must be the most unusual way to save a bridge from demolition that I have ever heard. And that isn't the end of Monash Bridges in this issue – another 10 or so feature in a story from Owen Peake. There are even more bridges featuring in the story of building the Bairnsdale to Orbost railway, from Helen Martin and myself. That railway was half-built in 1914 and completed in 1916 – so another Centenary and half a dozen more bridges. I will try to keep away from bridges next time!

And now a note about EHA's presence at Engineers Australia's big function this year – the 2014 Melbourne Convention in November. Engineering Heritage Victoria members, helped by a few National EHA members, turned on a really good show. Owen Peake was the main inspiration and organiser, and he did an amazing job. EHV conducted several tours, including several walking tours of engineering heritage in the CBD, an evening cruise on the Yarra River from Princes Bridge down to the river mouth and back, and an all day bus trip of the *Seven Engineering Treasures of Melbourne*. All were well attended. There was a heritage recognition ceremony for the Duke and Orr Dry Dock Pump House which is enclosed within the building in which the Convention was held. And last, but not least, EHA organised a display in the exhibition section of the Convention, showing 19 full-sized interpretation panels from recent ceremonies around the nation, a number of leaflets from engineering heritage groups in different states, and a video screen showing engineering heritage videos most of the time. EHA & EHV people were detailed to man the stand each day so that they could talk to everyone who came by.

Professor Mark Bush from WA (left), Owen Peake, the Editor and a visitor (right) at the Engineering Heritage exhibition stand. Photo Carl Doring.

From the Chair – Industrial Heritage & ICOMOS



Keith Baker, Chair, EHA.

Industrial heritage received some attention at the General Assembly of the International Council on Monuments and Sites (ICOMOS) held in Florence in November. This was at the instigation of ICOMOS Ireland which has an active industrial heritage committee and was pushing for the creation of an ICOMOS International Committee on Industrial Heritage. The proposal was not a high priority from Australia ICOMOS, other than through personal submissions from members of Engineering Heritage Australia (EHA) who are also members of ICOMOS. Separate from this individual membership of a number of engineering heritage practitioners, the Board of EHA was recently accepted as an Institutional Member, signifying our alignment with the principles and ethics of ICOMOS.

Australia ICOMOS prefers to leave industrial heritage to its sister organisation The International Committee for the Conservation of the Industrial Heritage (TICCIH), with which ICOMOS has a joint statement known as The Dublin Principles and a Memorandum of Understanding.

Our reasoning for encouraging ICOMOS to be more directly engaged in industrial herotage is threefold: firstly that ICOMOS is primarily concerned with place, and while much of our engineering heritage, particularly civil/structural engineering heritage, is related to place and fits well with the Burra Charter, there is also much of our industrial and movable heritage, such as locomotives, operating machinery and even equipment like electro-medical devices, that do not fit as well and need further guidance for their appropriate conservation. Secondly, while we recognise TICCIH's expertise in industrial heritage, the fact that it is a separate organisation allows ICOMOS to pay less attention to industrial heritage. As ICOMOS Ireland has stated in proposing an International Scientific Committee on Industrial Heritage,

> *our operational arrangements need to be such that in terms of the agenda of ICOMOS we can ensure industrial heritage – no more than 20th century heritage, vernacular buildings or structures, etc – is flagged throughout the work of ICOMOS International.*

Thirdly, while TICCIH covers some of the same heritage that we do in EHA, it is not a perfect match and would exclude many of the heritage works that we cover, such as scientific and military subjects or engineering services within buildings.

Over more than a decade EHA has progressively developed a fairly comprehensive document, entitled *Engineering Heritage & Conservation Guidelines*, which can be found at https://www.engineersaustralia.org.au/engineering-heritage-australia , along with specific *Practice Notes* and other information about EHA. The guidelines set out conservation principles and practice, then discuss the management of engineering heritage, based on the significance of the work and the elements within it. The guidelines append a number of charters, including the Australia ICOMOS *Burra Charter*, the TICCHI *Nizhny Tagil Charter for the Industrial Heritage*, and other lesser-known charters for conservation of traditional ships and heritage railways. There are other areas of engineering heritage such as operational aircraft that are not specifically covered but the guidelines are not regarded as a static document.

I commend the *Engineering Heritage & Conservation Guidelines* to all readers, whether engineers or not, and invite them to contact me if they wish to comment on the guidelines specifically or on the issues that I have raised.

Finally I would like to add my congratulations to three members of EHA who in the past month have been recognised for their contributions to engineering heritage and the profession: David Beauchamp for his award of the 2014 John Monash Medal which was presented at the Engineers Australia AGM; Richard Venus, Chair of the SA Branch of Engineering Heritage South Australia, who was honoured when the SA Division of EA presented him with the Engineers Australia Medal which recognises meritorious service at the divisional level to achieve Engineers Australia's goals in the interests of the profession; and Professor Mark Bush, Chair of Engineering Heritage Western Australia who was made an Honorary Fellow of Engineers Australia. It's great to see outstanding service by our members being recognised.

Keith Baker, Chair
Engineering Heritage Australia

David Beauchamp MICE, MIEAust, CPEng(Ret.)

The 2014 Winner of the Engineers Australia Sir John Monash Medal

The Engineers Australia John Monash Medal for Heritage recognises an individual who has made, over a considerable period of time, an outstanding contribution to engineering heritage in Australia.

The Citation

David Beauchamp has been a significant advocate for the preservation and restoration of heritage buildings and an engineering consultant in the field for over 40 years. He became the first president of the Carlton Association in 1969 to fight for the preservation of a large group of 19th Century terrace houses at risk of being demolished by the Housing Commission of Victoria. In that same year he established a consulting practice to give advice on the repair and restoration of historic buildings. His consultancy developed and expanded to produce conservation management plans for a large number of bridges for VicRoads and other bodies, and to carry out inspections, heritage assessments and reporting on historic bridges and other buildings.

He shows great leadership in the field through a broad range of activities. He initiated research on lime mortars to assess their suitability for the repair of historic buildings and has written many papers and articles on this topic and a diverse range of other topics in engineering heritage and related areas. He regularly gives presentations on historic structures and innovations, assessment of heritage value, restoration techniques and construction materials encountered in heritage buildings. David has served on a variety of committees. He was appointed a member of The Heritage Council of Victoria in 1995, specifically because of his engineering skills, and served on the Council for 6 years. He also served on Heritage Victoria's Technical Advisory Committee until 2013, is a longstanding member and current Deputy Chair of Engineering Heritage Victoria, and actively participates in national and international heritage organisations such as the National Trust, The International Council on Monuments and Sites (ICOMOS), and the Association of Preservation Technology in the USA.

David is an outstanding advocate for engineering heritage, not only within the engineering community but also by raising awareness of heritage in the general community. He has contributed to community events, written newspaper articles and has served as an engineering heritage tour guide. Most notably, he worked to raise community awareness of the important, but largely forgotten, 19th Century engineer John Grainger, who designed numerous bridges, water supply systems and buildings in several states. David undertook a fundraising campaign to place a headstone on Grainger's unmarked grave, and generated publicity in major newspapers.

David Beauchamp has committed much of his career and life to preservation and reuse of heritage structures, providing encouragement and imparting knowledge to others, and increasing community awareness of engineers and engineering. He has made an outstanding contribution to heritage engineering and serves as an excellent role-model for others to follow.

The citation starts with David's membership of the Carlton Association (in Melbourne), but there is a lot more to this engineer's life and career than his heritage work. David Beauchamp was born and raised in New Zealand. At the completion of secondary school in 1955 he won a Ministry of Works Bursary which took him to the Canterbury University College Engineering School. He graduated with a B.E. 4 years later and started work with the MOW in Wellington, but was soon sent to Nadi Fiji to help supervise the extension of the runways at the airport. After 10 months he returned home via Sydney, his first experience of Australia and surfing.

He returned to Australia in 1960 to run with an NZ University team in an Intervarsity competition in Melbourne. He was very impressed with Melbourne, and returned in 1963 to work in the private sector, at first with Civil & Civic, and then with John Connell and Associates. The list of major construction projects he worked on is also impressive. He took a year's leave in 1967 to work in London – no doubt where he gained his membership of the ICE – came back to Connell's for a while, and then in 1969 moved on to set up his own practice, eventually with 6 or 7 staff. He worked on design with many of Melbourne's top architects, and this is the period he became involved with heritage work with architectural firms such as Allom Lovell, with the National Trust, with Heritage Victoria and with the Historic Places Branch of Parks Victoria. He 'officially' retired this year!

The Editor

100 Years of the Header Harvester

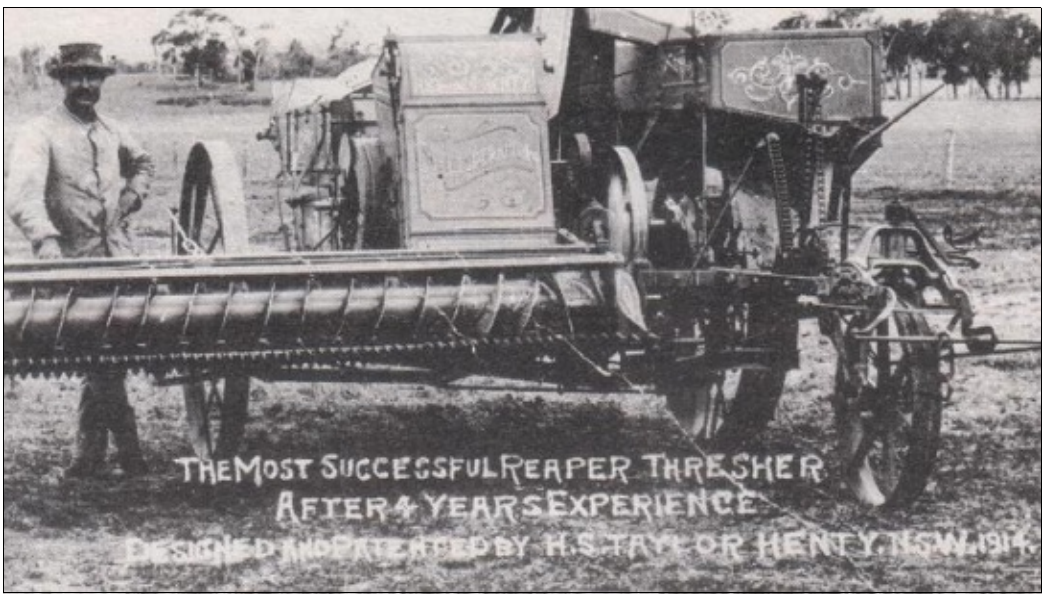
Headlie S. Taylor builds the first header harvester in his farm Blacksmith Shop

There was more than one important Centenary happening in 2014, and I was reminded of that when the Weekly Times (a Victorian rural newspaper) published a story in January:
REAPS AND BOUNDS – A HEADER OF ITS TIME *– Bannockburn farmer Scott Agnew takes his historic Headlie Shipard Taylor harvester for a run last week. The HST harvester celebrates its 100th birthday next month*. (I take no responsibility for the WT headline! – Ed.)

Bannockburn farmer Scott Agnew with his historic header harvester in January 2014. Photo - Zoe Phillips, Weekly Times

In 2000, the Museum of the Riverina engaged us (Carl and Margret Doring) to prepare a heritage assessment and conservation policy (and an inventory of the contents) for an endangered, small, timber-slab and corrugated iron Blacksmith Shop on a farm near Henty in NSW. The farm, then *Emerald Hill* and later merged with neighbouring *Wattle Grove*, was owned by the father of Headlie Shipard Taylor, the inventor of the world famous Sunshine Header Harvester.

The Blacksmith Shop was the place where HS Taylor built his first experimental harvesters, over the period 1911-1916 and *Wattle Grove* farm was the place where he gave the first public demonstrations of the Header at work harvesting wheat in 1914. It was a great success. So much so that he got the firm of Robinson in Melbourne to manufacture three more demonstration models in 1915.



HS Taylor with his third Header Harvester, demonstrated successfully in 1914. Image courtesy the Taylor family.

In early 1916 Taylor demonstrated one of the Robinson headers harvesting wheat, again on the neighbouring *Wattle Grove* farm. Various farmers and machinery manufacturers watched the demonstrations, but HV McKay, who had been invited, couldn't be there. He was in Newcastle for a Director's meeting of the BHP Company, so he stopped off at Henty on the way home by train a few days later, to attend a special private demonstration of the header in action. One of Headlie's great-nephews told me what happened at that demonstration. Headlie set off around the paddock, riding his header behind his team of (probably) six horses. Through the clatter, he became aware of some shouting behind him. He looked back to see HV running after him, probably waving his hat, as one did in those days to attract attention. Alarmed, Headlie thought something must have broken, or dropped off the machine, so he pulled up the horses and waited. HV panted up to him to say – That's enough – I'll have it! HV was so impressed he agreed to manufacture the Taylor-designed headers at his Sunshine factory near Melbourne, and he immediately hired Taylor to supervise initial production and further design development of what became the famous Sunshine Header.

A 1915/16 Robinson built HST header working on G Shipard's farm at Henty NSW photo courtesy the Taylor Family

Our report included a brief history of the blacksmith shop and its setting, with emphasis on the period when HS Taylor was using it, and a summary of Headlie Taylor's career as one of this country's most important designers of agricultural machinery. We mentioned some history of the development of harvesting machines, and some of the history of the H.V. McKay company, but only enough to put the role of the *Emerald Hill* blacksmith shop in context. We noted that some of the most important innovations in grain harvesting machinery have been developed in Australia, including the Ridley/Bull stripper of 1843, the combined stripper/winnower harvester developed by HV McKay in 1884, the horse-drawn header harvester developed by HS Taylor in 1911/14, and the self-propelled auto-header developed by HS Taylor for McKay in 1924 - the basis for most grain harvesting machines used today.

Hugh Victor McKay is widely recognised in Australia as the most famous inventor and developer of agricultural machinery of all time. My feeling is that Headlie Shipard Taylor surpassed McKay as an inventor and designer, but has not been widely recognised because he worked for McKay's firm and its later manifestations all of his working life after 1916, and after 1916, all his inventions and improvements were developed and manufactured under the McKay name. Certainly McKay earns the credit for instantly recognising the brilliance of Taylor's design and adopting it as the critical component of the McKay/Sunshine line, superseding his own 1880s harvester (which did continue to be manufactured for some years – for some clients who would be satisfied with nothing else).

The Sunshine Header Harvester

The very high significance of the Header lay in a number of aspects of its innovative design – most simply described in point form. Technical innovations which were successful in the header were:

- a reciprocating knife to cut, rather than beat the heads of grain from their stalks. The concept of a reciprocating knife used to cut grain was not new – Obed Hussey and Cyrus McCormick both developed such blades for reapers in the 1830s, but HST put together the combs, reciprocating knives, threshing, grain collection bins and straw walkers to carry the chaff and straw away from the grain, all in one machine;
- two counter-rotating spiral conveyors (like Archimedes screws or grain augers) which quickly and gently removed the heads of grain to the threshing drum;
- an adjustable-height comb that remained parallel to the ground, facilitating ease of harvesting, whether in long or short crops;
- streamlined parts to reduce size, weight and breakdowns;
- careful positioning and design of mechanical drives to reduce wear and tear, and breakages, and thus reduce maintenance bills;
- the provision of an attachment called the Headlie Crop Lifter, which was a set of wooden (later steel) arms to lift downed crops up to the comb;
- a versatile design able to handle any condition of wheat crop, ie. light, heavy, storm tangled and fallen, or weed infested. The Header was later able to be adapted to other crops, including rice and peas.

To those points, I would add the extraordinary longevity of his basic design and the features of the design which allowed serial improvements to the header over many years without radical departures from his original conception. Frances Wheelhouse, in *Digging Stick to Rotary Hoe* said: "It would be difficult to assess the enormous economic value of Taylor's Header to Australia and the world. Worth millions of pounds, it set a pattern for further development. Perhaps the greatest achievement of Taylor's Header, is that, with its huge harvesting capacity, it substantially aided [via his Auto-Header] the trend towards the bulk handling of wheat in Australia".

Who Was Headlie Shipard Taylor?

Headlie Shipard Taylor (HST), without formal qualifications or university degrees, still deserves to be recognised as one of the most mechanically skilled, original and innovative engineers ever to practise in Australia. At age 14 (c1897) HST left the Henty school to work on his parents' farm. In those days this was a normal school leaving age for country and city children who did not come from professional or wealthy families. If a country boy won a scholarship, or his parents could afford boarding school, he might go on to higher education or even the University. Most farm boys got their higher education, if they had a thirst for it, from books (in those days borrowed from the local Mechanics Institute Library if there was one), and observation. Headlie Taylor was obviously one of those boys with a thirst for knowledge, keeping a perceptive eye on how things were done on his father's farm, and probably on neighbouring farms, and taking every opportunity to learn new skills. I expect he must have been particularly interested in learning blacksmithing skills, so that he could repair farm machinery and make spare parts as well as fit them.

Headlie Taylor c1910 Photo from B Taylor

At that time wheat farmers in Australia used horse-drawn (or horse-pushed) stripper-harvesters or stripper/beater harvesters, based on the mid-19th century designs of Ridley and Bull and the later "Sunshine" (stripper) harvester of HV McKay. McKay's machine combined the stripper with a winnower to pluck the heads of wheat and separate the grain from chaff & straw while the machine moved through the crop. HST watched the mechanical stripper-harvesters at work, and thought he could improve their design, and in particular their ability (or inability) to handle crops that had been flattened by heavy rain.

Headlie Taylor c1935 Photo from B Taylor

He set about teaching himself engineering by buying and studying technical textbooks and in 1910 he lodged his first patent application for improvements to stripper-harvesters. During 1911 and early 1912 he constructed his first experimental harvester, built in the farm blacksmith shop at *Emerald Hill*. This first experimental machine was tried out in the 1911/12 harvest, but did not work well. HST built a second experimental machine in time for the 1912/13 harvest, and this worked much better. He lodged patent applications for this improved design, and then built a third machine which improved on that design again. This was the same machine exhibited at the Henty Show in 1914, demonstrated at the following harvest, and then copied by Robinson. It was a Robinson built machine that HV McKay saw and liked. McKay also liked HST – so much so that he immediately invited HST to visit the factory in Sunshine, arranged to manufacture the Taylor header, pay HST royalties, and employ him at Sunshine to supervise production and design modifications if needed.

Headlie Taylor c1950s Photo from B Taylor

Six headers were made at Sunshine 1916, and the numbers grew each year until by 1924 and thereafter, 2000 to 3500 were being sold each year. Although HST's initial contract required him to work at Sunshine for two years, he in fact stayed for 38 years (long after HV McKay had died). At first he concentrated on minor improvements to the basic horse-drawn header, including the crop lifters, but he later designed major changes to the header, and several other successful machines including the Auto Header and the Sun Seed Drill.

HST retired from H.V.McKay Massey Harris Pty Ltd on the 30th of June 1954. He was then holding the position of Superintendent of Agricultural Research. He is reported to have been offered a Directorship with the company but had declined, as he wanted to concentrate on technical development and not get involved with the administration of the company. HST died on 22nd March 1957 at Sunshine.

Headlie Shipard Taylor's Blacksmith Shop

Blacksmith Shop viewed from SE, showing added double doors in the east wall. Photo M Doring

The Blacksmith Shop was built by Headlie Taylor's father in c1885. Then, it was a small, gable-roofed, earth-floored, pole-framed shed with corrugated iron roof cladding and vertical split slab walls – typical of the early blacksmith shops on small farms in the Riverina, used for shoeing horses and mending farm implements. In about 1911 when HST started work on his experimental headers, he added a wide, partly sawn-timber framed skillion along the west wall, clad in galvanised iron. At some later date, HST is said to have removed part of one wall to get his completed header out of the building. This was probably the east wall, where a post had been removed and double doors added. Otherwise there had been few changes to the building post 1911 – except perhaps the addition of the large brick hearth with bellows that extended into the skillion.

When we saw it in the year 2000, the blacksmith shop/workshop was set on the edge of a grove of large, old and picturesque peppercorn trees (*Schinus molle*). Branches of the trees hung over the roof, and the ground outside the west, north and east walls was covered with a debris of leaf and peppercorns. In the year 2000, the shed was the sole surviving relic of the time of the farm *Emerald Hill* and the Taylor family. In general, the building was in remarkably good condition considering it appeared to have had virtually no maintenance or attention for at least 40 years.

We started our field work by photographing everything 'as found' – first around the outside, and then moving inside. The shed was filled with jumbled piles of objects, rusty and dirty, with much junk from 50 years of deposits as a storage shed overlaying relics of its former use as a farm blacksmith shop up until about the 1950s. Most of this jumbled junk overlaid evidence of the brief period about 35 years before that, when it was HS Taylor's developmental workshop from 1911-1916.

We gradually worked our way through the shed, selecting nearly three hundred items of possible interest inside the shed (and a few outside it). Each item of possible interest was identified with an individually numbered manila label tied on with string and photographed. Notes were kept for each item of interest, recording where in the shed it was found, its principal dimensions, a descriptive name, and (for many items) a rough sketch of its shape. In the process of selecting the items of interest, we also tidied the shed to some extent and, with the owner's consent, discarded much rubbish (for instance, tangles of baling wire, a modern cracked toilet bowl, modern bottles, tins and jars and just plain dirt - leaves and straw, cow, horse and bird droppings, cobwebs, clods, rat's nests, mud-wasp nests, termite traces, etc.). After recording, all the numbered items were put back inside the shed with their manila labels, but not necessarily in same place as they had been found.

Blacksmith Shop viewed from SW showing the skillion built on the west wall Photo M Doring

Blacksmith Shop interior 'as found' Photo M Doring

Only a small number of items could definitely be attributed to HST and his experimental work in the shed. A somewhat larger number had a possible or likely attribution, and the greatest number were listed simply as "don't know". The age of most items was indeterminable, but if anything not part of a header was clearly post 1930 in age, it was noted as not relevant to HST. Principal artefacts found in the blacksmith shop which could definitely be attributed to HST's experimental work have an extremely high significance. These included various components for the experimental headers, such as a header comb, several reciprocating header knives, some wooden crop lifter arms, some wooden framed riddles or screens, samples of perforated metal, distinctive HST designed bearings, and the brick-walled forge or hearth with its associated flue and tuyère – but not HST's bellows, which were removed to his brother's neighbouring farm, probably c1924, along with a vertical post drill, an anvil, a grinder, a steel leg vyce and various blacksmiths' tongs and other hand tools.

Quite recently we learned that the Blacksmith Shop had been in increasing danger of collapse or demolition in its spot next the peppercorn trees, and the Taylor family and other members of the Headlie Taylor Header Museum in Henty had decided to deconstruct and re-erect it next to the Museum's reconstructed 1915-17 HS Taylor Header, inside a purpose built large shed at the side of the highway in Henty. Our original 2001statement of significance for the Blacksmith Shop was largely based on its provenance and essential intactness in its original location on the former Taylor family farm. Here are some excerpts from that statement, and I leave it to the reader, or viewer in its new location, to judge whether that significance is still relevant.

Blacksmith Shop interior 'as found' Photo M Doring

Blacksmith Shop interior & Forge 'as found' Photo M Doring

The Headlie Taylor Blacksmith Shop, on what is now known as *Wattle Grove* farm (formerly *Emerald Hill*) near Henty, is unique in its historical locality because it marks the place where Headlie Taylor designed, made and developed the prototypes of his Header. The Headlie Taylor header became an industry benchmark in the field of wheat harvesting internationally. The Blacksmith Shop, built in circa 1880, was enlarged and modified by Headlie Taylor in 1911, and thus is not truly representative of the traditional small farm blacksmith shop devoted to shoeing horses and repairing farm implements. Instead, by virtue of its association with one individual and the unique engineering accomplishments practised within it, the Blacksmith Shop stands alone – unique rather than representative.

The blacksmith shop was the part of *Wattle Grove/Emerald Hill* farm most closely associated with Headlie Taylor, and with the invention/development of the header. This is where Taylor built his first three experimental headers, translating his concepts into physical form and hence proving their practical worth. The building was enlarged and equipped by Headlie Taylor personally, and was used by him for most of his working hours during the crucial developmental phase, 1911-1915. Without the facilities of this workshop/blacksmith shop, his invention would never have come to fruition. It (the Blacksmith Shop) is predominantly intact.

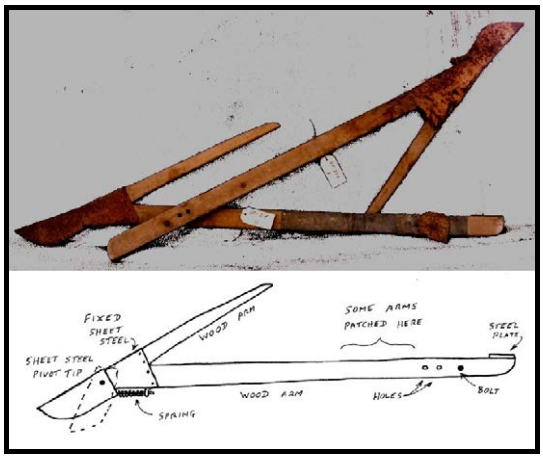


Image at right: Two of the experimental wooden crop-lifter arms found leaning against and on the forge hearth. Sketch shows details of their construction.
Photo & sketch - C Doring.

John Monash & His Innovative Bridge Designs

Eight Bendigo Bridges Establish the Era of Monier Reinforced Concrete in Victoria

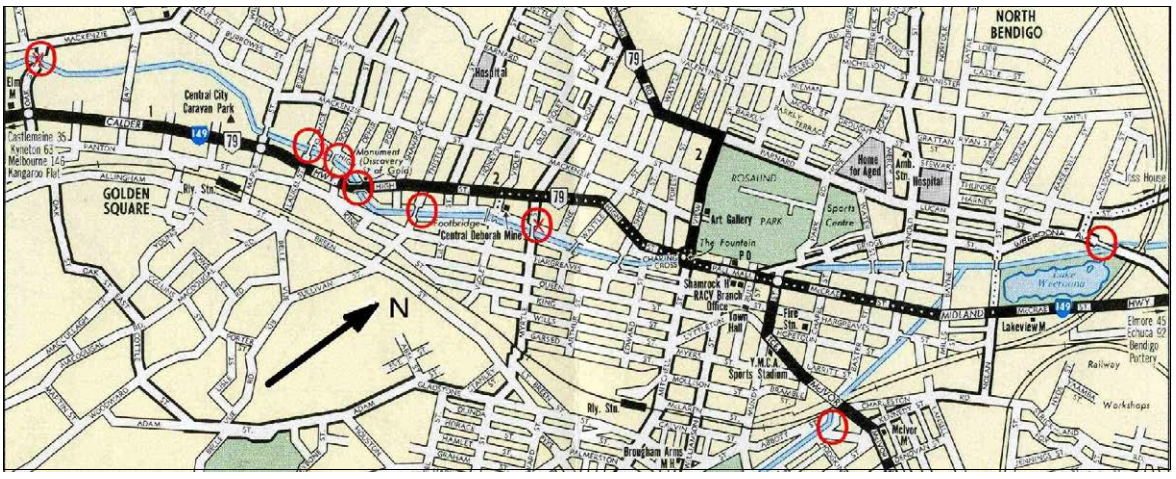
Joseph Monier (1823 - 1906) was a French gardener and one of the principal inventors of reinforced concrete. He was looking for a way to produce unbreakable planter troughs. He experimented with concrete embedded with iron mesh and got his first patent for these in 1867 and another for bridges made with iron reinforced concrete in 1873. He built the first reinforced concrete arch bridge over the moat of the chateau de Chazelet in 1875. It had a span of about 15 metres. The first reinforced concrete arch bridge in America was built in 1889. It is still extant in San Francisco's Golden Gate Park (American Society of Civil Engineers).

In Victoria the engineering firm of John Monash (later General Sir John Monash) & Joshua Anderson obtained rights for the use of the Monier patent in Victoria and South Australia, and built many bridges using the method. The Fyansford Bridge near Geelong was their first Monier arch bridge to go into service, in late 1899. Next was Wheeler's Bridge, near Creswick in Victoria, completed in 1900. The eight Bendigo Bridges – the subject of this story – were next.

Abbott St Bridge Bendigo — Photo Owen Peake

In what became a major innovation in bridge and concrete design in Victoria, in 1901-02 Monash and Anderson were contracted to build seven single span reinforced concrete arch bridges over Bendigo Creek plus one over a tributary of Bendigo Creek called Back Creek. The contract was let by the Bendigo Council as part of a project to control flooding and silting after Bendigo Creek had been subject to gold-winning operations. The creek was to be controlled by building a concrete-lined channel right through the City, and this required the replacement of a number of bridges. The eight bridges designed by Monash and Anderson were (from North to South):

1. King's Bridge carrying what is now called Weeroona Avenue over Bendigo Creek. This bridge had a span of 93 feet (28.5 metres) and was designed to be skewed at an acute angle to the creek bed. The design computations did not allow effectively for the increase in span and reduction in strength of the concrete caused by the skewed shape of the deck. The bridge failed under extreme testing on 14 May 1901, causing the death of a bystander. It was subsequently rebuilt as a two span bridge which remains in service today. The bridge was widened to four lanes in 2004, by adding a new bridge of similar appearance alongside the original King's Bridge.
2. Abbott Street Bridge (over Back Creek), still in service.
3. Myrtle Street Bridge has been replaced by a new bridge. It is thought that the motive for the replacement was the need for greater width rather than any failure of the original bridge.
4. Thistle Street Bridge. This bridge shows a little more "flattening" at the crown of the arch than the other bridges.
5. High Street Bridge. This carries what is now the Calder Highway over Bendigo Creek. It was always regarded as a highway bridge and is wider than the other bridges in the group, carrying four traffic lanes. It had a span of 55 feet in a shallow arch, and a width of 99 feet.
6. Booth Street Bridge, still in service.
7. Wade Street Bridge. Curiously this bridge no longer has its bluestone coping stones on the top of the parapet walls. It is not known why. Were the walls rebuilt at some time or was the bridge originally constructed with the simple concrete coping slab present today?
8. Oak Street Bridge has been replaced by a new bridge, for the same reason as the Myrtle Street Bridge was replaced.



Map of Bendigo showing the 8 Monash bridges, from 1 (R) to 8 (L) in red circles. — Adapted from an old RACV map

King's Bridge, Bendigo. Photo Owen Peake

Thistle Street Bridge, Bendigo. Photo Owen Peake

Except for the rebuilt King's Bridge, with its two spans and metal parapet fences, and the High Street (Calder Highway) Bridge with its four-lane highway width, all the bridges were very similar to each other. In the references used, it is noted that the High Street Bridge was designed with a 55ft (about 17metres) span, but no other bridge spans are recorded in references seen. It is probable that all the bridges (except King's Bridge) had similar spans – they certainly look similar, with elegantly simple appearing shallow arches, such as could never be obtained with unreinforced concrete. The arches and spandrel walls of all the bridges are reinforced concrete. All the parapet walls (except King's Bridge) are brick with a row of bluestone blocks at the base of the parapet wall and as a coping, except for Wade Street as mentioned above.

John Monash Overcomes Problems & Develops His Design Skills

Some of the engineering heritage we study is particularly important in that it incorporates innovations in engineering which were quite new at the time of construction. In some cases the new concepts changed almost everything in construction design which followed. The eight reinforced concrete bridges in Bendigo represent such a case. We should take note of the engineers who invented or used these new engineering concepts. They are an important part of our engineering heritage. Some were giants whose innovations literally changed the world. The eight bridges in Bendigo may look somewhat modest now but the men behind them were visionaries who were prepared to take great risks to implement innovative technology.

The key individuals in this case were business partners John Monash and Joshua Anderson. They made a huge contribution to the modern Australian engineering world. Before Monash & Anderson started to use the Monier reinforced concrete patents there were very few concrete bridges in this part of the world. They took risks, sold the new innovations with great vigour and, after much heartache, successfully demonstrated reinforced concrete technologies which remain familiar today.

Until the Monier patents were applied most bridges in Australia were built of masonry, wrought iron or timber. Masonry could only be used for arch bridges where it was in compression. Wrought iron had to be imported and was expensive and took a long time to deliver from the United Kingdom. Timber lacked durability and was terribly vulnerable to bush fire and flood damage. Concrete, before Monier, was good in compression but poor in tensile strength. Monier added wrought iron (or later steel) to the structure to give concrete structures tensile strength. Now we can build soaring structures of reinforced concrete. These structures are not only strong but have a very long life. The early Monier arch bridges mark the beginning of the use of reinforced concrete for structures such as bridges. That makes them very important milestones in the history of engineering.

King's Bridge under test before failure Melb. Uni. Archives

The Bendigo project was not without problems. The King's Bridge failed under test when the Council engineer increased the test loadings and one man was killed. Monash & Anderson rebuilt the bridge as a two-span structure at their own expense.

They also engaged Professor William Charles Kernot, first Professor of Engineering at Melbourne University and a highly respected academic of the era, to try to understand the cause of the failure. It became clear that the failure did not stem from material deficiencies, construction errors or problems with the design calculations. Rather the investigation revealed that the informal design standards of the day were deficient in dealing with highly skewed bridges.

King's Bridge after testing failure. Melb. Uni. Archives

So where did concrete bridge development go after the early Monier bridges? We only need to look at where concrete bridges now stand to see something of what happened. Monash cut his teeth on the Monier patent arch bridges but he was an innovator and soon moved on. It is said that Monash led in reinforced concrete girder bridge design and construction in Australia after Anderson left the partnership. The impressive Janevale Bridge on the Loddon River at Laanecoorie just 40 km to the west of Bendigo, built in 1910-11 shows just how quickly the fertile mind of Monash moved. To the casual observer the Janevale Bridge looks very little different to modern "T" beam bridges.

Janevale Bridge under Test c1911 Melb. Uni. Archives

Janevale Bridge c1997 Photo Lesley Alves

During almost every journey by road or rail we cross reinforced concrete bridges in large numbers. Most are small, standard designs, built to the standard drawings of road and rail authorities, and we cross them without much thought. Now and again we cross a big concrete bridge such as the mighty Gladesville Bridge in Sydney Harbour, which held the "longest span for a concrete arch bridge" record for 16 years. Whilst modern "T" beam bridges incorporate off-site fabrication of the beams and pre-stressing techniques they look much the same. The use of modern trucks and large mobile cranes has also contributed to the capability of modern bridge engineers to build impressive bridges quickly.

General Sir John Monash GCMG, KCB, DEng., wasn't just a Soldier

We tend to think of General Sir John Monash more as a soldier than as an engineer. We should remember that John Monash was as much an innovator on the battlefield as he was on the bridge sites of Bendigo. He planned his battles with a level of detail and precision which confounded the enemy but which would be familiar to engineers. He grasped and applied the concept of "integrated force" – using infantry, artillery, tanks and aircraft in close co-ordination to reinforce his attacks in such a way that he literally terrified the enemy into submission. Perhaps he regarded the battle plan as an engineering challenge? It is certainly true that he captured vast amounts of ground on the Western Front and brought World War I to an end much more quickly than had he not been involved. However that is another story. We in the engineering profession can do worse that remember that this giant of his time was first and foremost an engineer.

Engineering Heritage Victoria (EHV) has had a sub-program within its Heritage Recognition work to recognise structures designed or built by General Sir John Monash, the firm Monash and Anderson or later iterations of companies with which Monash was associated, as a contribution towards the celebration of the centenary of the ANZAC Campaign in 2015. Heritage recognition ceremonies so far accomplished for Monash works include bridges mentioned above and the Yallourn Power Station in the Latrobe Valley, built while Monash was Chairman of the State Electricity Commission of Victoria in the 1920s. The EHV ceremony for the eight bridges in Bendigo was held on 9 August 2014 with partners City of Greater Bendigo and VicRoads. The marker and interpretation panel are erected between the High Street and Booth Street Bridges on the bank of Bendigo Creek within a few metres of the point where the first gold was found in Bendigo. Bendigo made a huge economic contribution to the development of Victoria during its incredible Gold Rush but perhaps the emergence of the reinforced concrete bridge was an even richer treasure.

Owen Peake
Engineering Heritage Victoria

References and more information

The nomination document for engineering heritage recognition of the Bendigo Monier Bridges should be available for downloading from the Engineers Australia website in due course. In the meantime, Alan Holgate's website on the Engineering Enterprise of (Sir) John Monash prior to WW1 has an extensive section on the Bendigo Monier Arch Bridges – contract acquisition, planning, design & construction. This can be found at:

http://www.aholgate.com/texts/bgobrshist.html

Meanwhile, typing *Bendigo Monier arch bridges* into a search engine, brings up a number of information sources and images. Find a biographical article about Monash from the ADB at: http://adb.anu.edu.au/biography/monash-sir-john-7618

High Concrete Strength Saves a Monash Bridge

Monash's 1908 Excelsior Bridge faced with demolition – it couldn't take the loads.

The Hepburn Shire in the gold mining region of western Victoria has three Monash Bridges. Wheelers Bridge at Lawrence is a two-span Monier arch bridge completed in 1900, the Excelsior Bridge over Jim Crow Creek at Shepherds Flat is a two-span T-girder bridge built 1908-09, and Coomoora Bridge over Wallaby Creek at Coomoora was built in 1909 with single span T-girders spanning between existing bluestone abutments.

Excelsior Bridge in c1997, showing the form of the central pier. Photo Lesley Alves from the Alan Holgate website.

In 2013 the Shire of Hepburn became concerned that the Excelsior Bridge was not able to carry T44 [1] loads because of exposure and corrosion of the reinforcement to the two outer beams. A decision was made to demolish the bridge and replace it. Shortly after this decision was made the Shire realised that the bridge had historic worth and commissioned a report on the historic significance of the bridge. The report recommended that the bridge be retained and suggested various ways that it might be repaired. Despite this report the Shire still decided to demolish and replace the bridge but agreed to record details of the bridge as it was demolished.

Demolition started on 23 August 2014. After the road pavement was removed the concrete of the deck, piers and abutments was tested with a Schmidt Hammer, which gave concrete strengths varying from 28 MPa to 47 MPa.

The contractor realised that it would be harder to demolish the bridge than had been anticipated. The suggestion was made to raise the level of the new bridge sufficiently so that the new single span prestressed T-girders would be clear of the existing historic bridge, which would be left in place underneath.

Engineering Heritage Victoria wrote to the Shire and urged them to adopt this solution. The Shire considered the proposal and agreed to it provided the contractor repaired the existing bridge. The new girders were then put in place and the road levels adjusted. The new bridge is slightly wider than the existing historic bridge, thus protecting it from the weather.

Because the 1908 Monash T-girder Bridge is protected, and no longer carries any load, it is likely that it will survive for another 100 years.

David Beauchamp

Excelsior Bridge before the new bridge was built over it in 2014 David Beauchamp

More information about the Excelsior Bridge can be found in *Alan Holgate's John Monash – Engineering enterprise prior to WW1* in the section *T-girder bridges, Part 2*. See: http://www.aholgate.com/girdertexts/gdrtext2.html

A description of Coomoora Bridge follows the Excelsior Bridge section, and Wheeler's Bridge can be found elsewhere on the website.

The Editor

Right: Monash's Excelsior Bridge with the new single span concrete T-beam bridge built over it. Photo David Beauchamp 2014

1 A T44 vehicle is a 44 Tonne vehicle, nominally equivalent to a semi-trailer tipper

Catching a Train from Orbost

Building the Bairnsdale to Orbost Railway in Eastern Victoria – 1912 to 1916

From the 1850s, South Gippsland and the east of East Gippsland were fairly well served by a few coastal ports, but these became less and less relevant as settlement increased and moved up into the river valleys to the north. Victoria's first railways were built in the 1850s, and by 1864, an important line to Bendigo, 150km northwest of Melbourne was servicing the goldfields and hundreds – possibly thousands – of farmers and townspeople and businesses along the route. The settlement of Gippsland was burgeoning too, and the settlers were pressuring the Government for a railway to serve their needs. They wanted food and machinery and breeding stock from the Melbourne markets, and they had timber and livestock and wool and produce to move to Melbourne. The Government responded by building a railway through central Gippsland. Sale to Morwell (going backwards) was opened in 1877 and the line through to Melbourne from Sale was completed in 1878.

But this wasn't enough for the settlers up the valleys to the north of the line – they wanted something closer. In 1883 they got a separate line travelling north from Traralgon to Heyfield. This line had been extended through Maffra to Stratford by 1887 and on to Bairnsdale by 1888, with a grand opening on May 8th. Oddly enough, a new line joining Sale to Stratford was opened on the same day, giving Bairnsdale residents a choice of routes to take when visiting Melbourne. The northern arm of this giant passing loop continued in service for one hundred years, which perhaps explains why the Melbourne to Bairnsdale line is still officially called the *Heyfield and Bairnsdale Railway* from Stratford.

The Snowy River flood-plain railway viaduct at Orbost in 2000. Photo - Tim Gibson for East Gippsland Shire

There was much less local pressure to continue the line on to Orbost – the population was sparse, the country mostly steep and rugged, with fertile agricultural land confined to the comparatively narrow river flats near Bruthen, Nowa Nowa and Orbost. Beyond Orbost seemed almost entirely a forested wilderness – indeed many viewed all the country beyond Bairnsdale as the wild frontier. But it did have potential. Some considered the hardwood forests a source of great future wealth, if only a railway could carry out the timber. Others thought great wealth would be found in the mineral resources of the region, if only a railway could attract prospectors and miners. And others wished for a train to carry their agricultural produce to market. A centenary history of the CRB (Country Roads Board) quotes the first Annual Report of the Board, as follows:

During its initial tour of Gippsland's shires in 1913 to study road conditions, the Board encountered a herd of 500 pigs at Hospital Creek, between Bairnsdale and Orbost. The herd had been driven 110 kilometres from the Cann River Valley and still had another 65 kilometres to travel to reach the railhead at Bairnsdale. Those would have been some tough piggies – but their owner must have contemplated how much more tender they would have been had they been able to catch a train from Orbost.

These were some of the reasons for the Government to extend the railway to Orbost. Another was a sort of wishful thinking, along the lines of the reasons for building Frontier Railways in the USA – ie. if we build it they (the settlers) will come and fill the prairies with farms and factories. In the USA it worked, but of course it never happened in far East Gippsland. The region is still mostly wild mountainous country.

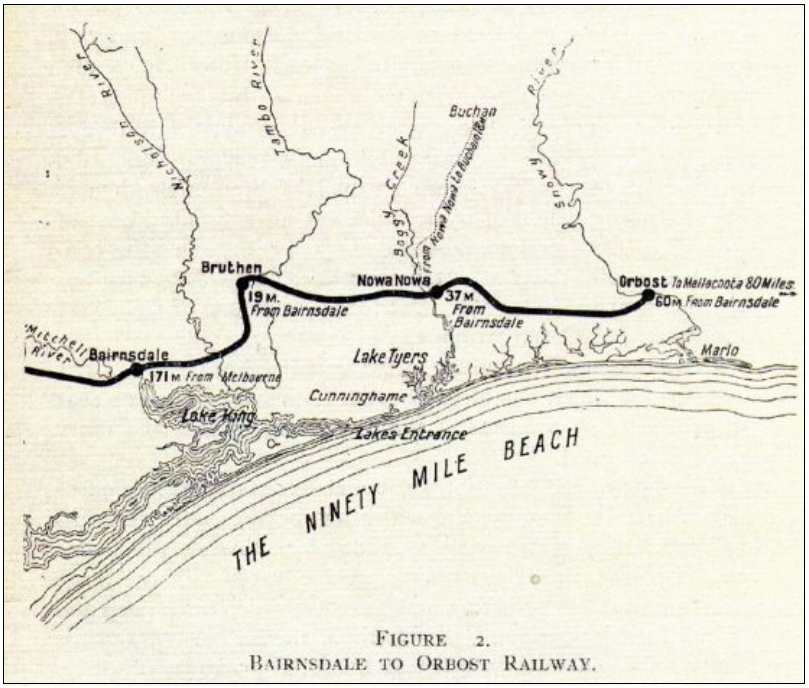
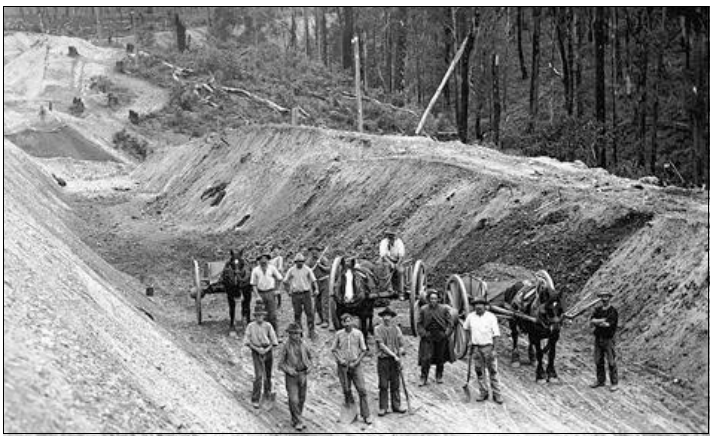


FIGURE 2.
BAIRNSDALE TO ORBOST RAILWAY.

Fig.2 from ME Kernot's paper to the Victorian Inst. Of Engineers, October 1916.

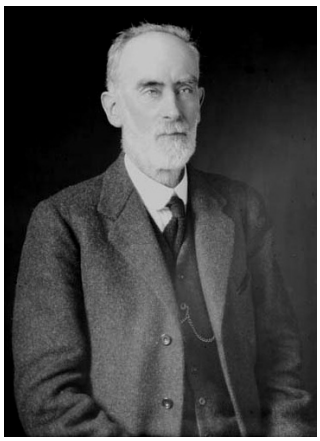
In 1888, at the time of the Bairnsdale opening, the Government had a pie in the sky idea that if they built the railway to Orbost, it would then be easy to continue it to the NSW border and beyond, and so link up with the NSW railways. But by the time the Orbost extension was under construction, the idea was abandoned. The country to the north was wild and steep and virtually uninhabited and the NSW line from Cooma to Bombala was still just an idea that might never be realised.



Excavating a railway cutting 1914.. Note the horse-drawn tipping carts lining up to be filled with spoil from the cutting.. Photo S Vogt, Bairnsdale

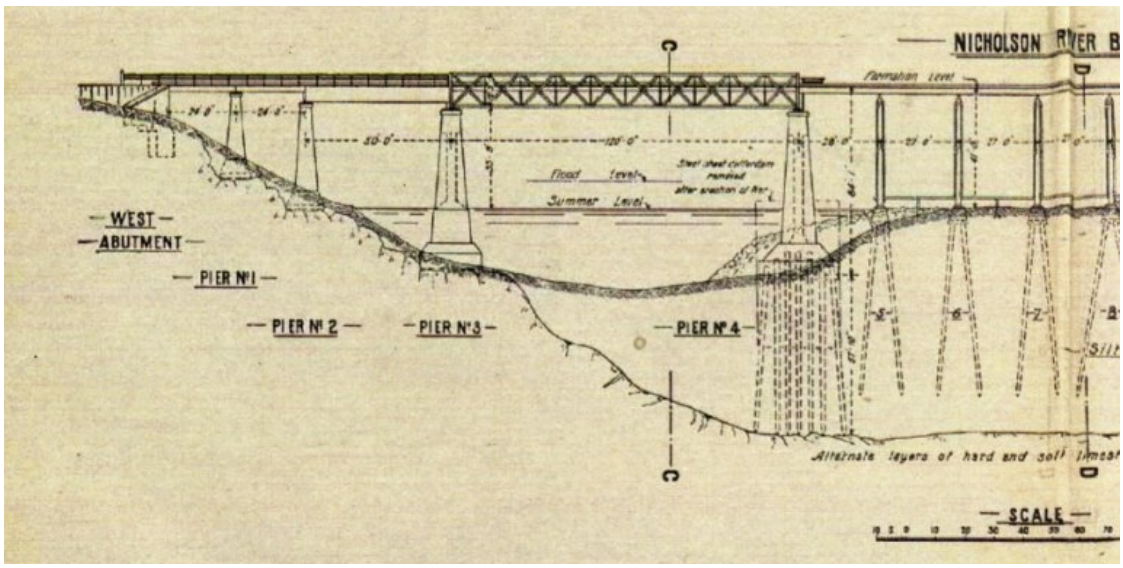
Horse-drawn tipping cart dumping fill through a timber platform into rail wagons below during railway construction 1914. Photo S Vogt, Bairnsdale

Building the line on from Bairnsdale was no picnic. It had to be built through the forest – across gullies and through ridges most of the way. It might have been built across already settled and flatter land closer to the coast, but the northern route was the choice of the Railway's Engineer-in-Chief, Maurice Edwin Kernot, who gave his reasons in a paper addressed to the Victorian Institute of Engineers in 1916. Maurice Kernot was a younger brother of the more famous William Charles Kernot who was Professor of Engineering at Melbourne University from 1880 until his death in 1909, but Maurice seems to have been equally or perhaps more skilled as an engineer and an original thinker. He was the Vice-President of the Victorian Institute of Engineers in 1916 and had been Chief Engineer of the Railways since 1907. His Biographer in the ADB notes that: *He achieved some distinction in his career as a railway engineer, being "the first to apply the principles of technical analysis to railway location in Victoria", and achieved large savings through his administration of the "butty gang" or "direct labour" system, which replaced the letting of large contracts in the 1890s. While he was engineer-in-chief of the Victorian Railways from 1907 to 1923, over 1000 miles (1600km) of railways were built.*



Maurice Edwin Kernot
From Victorian RailwaysArchives.

Kernot tells us in his paper that the Bairnsdale to Orbost line: *is the heaviest and most expensive extension of the Victorian railway system which has been constructed during the last 23 years. The amount of earthwork which has been involved is nearly 2,000,000 cubic yards. Three large rivers are crossed by permanent bridges, which have deep and difficult foundations, viz., the Mitchell, the Nicholson, and the Tambo. The latter is subject to floods of great impetuosity. At the Nicholson River the foundations had to be executed in a depth of 80 ft. of mud.* The route was carefully considered to give a balance between steep grades and tight curves to the north, and the exceedingly difficult river crossings close to the lakes. At Bairnsdale, there was no choice. The railway crossed the river at the edge of town. But then instead of following the Omeo Highway (then the main road) north through steep country to Bruthen, the line swung east to cross the Nicholson River at Nicholson, then turned north through less difficult country to Bruthen, where it crossed the Tambo at a less challenging spot than any found downstream.



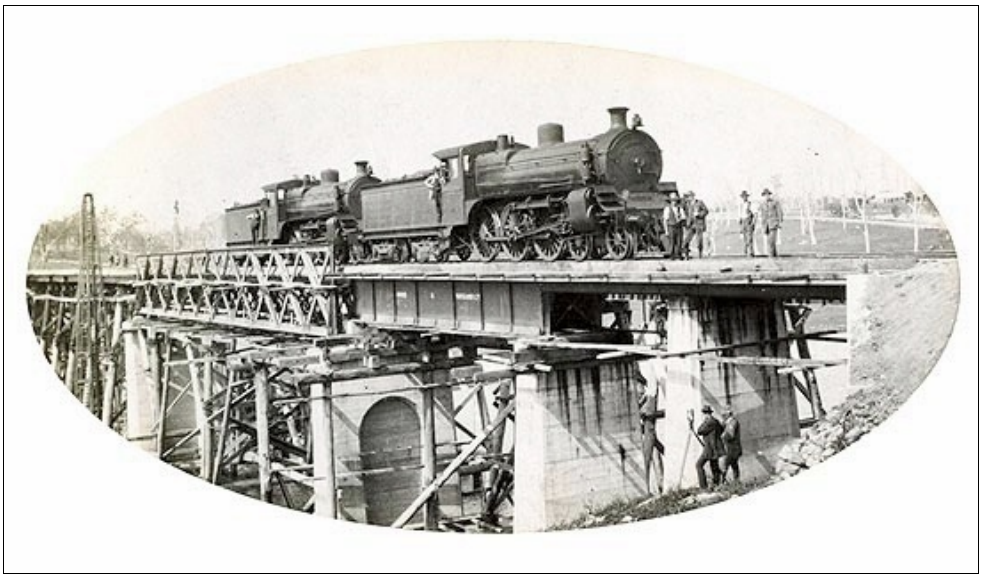
The Nicholson River crossing in 1915. Note the wagon on the temporary trestle bridge, the coffer dam for Pier 4 at left, and the pile driving derrick at right. Source – Charles H Perrin Album.

From Bruthen to Orbost via Nowa Nowa was fairly straightforward, except for 10,960 linear feet (3.34km) of timber trestle bridges. This was apart from the three major river bridges, and included two long viaducts across the Snowy River floodplain and major bridges at Boggy, Mundic, Three Mile, Stony, O'Grady's and Hospital Creeks. There seem to have been countless smaller creek crossings, with spans of around 15ft to 20ft. Some of the bridges were composite structures, with timber trestles on timber piles and steel or (reused) wrought iron or timber girders, and some had concrete piers.

The Nicholson River crossing had everything – steel lattice girders, plate girders, rolled steel joists, concrete piers, timber trestles, timber piles and a timber deck.

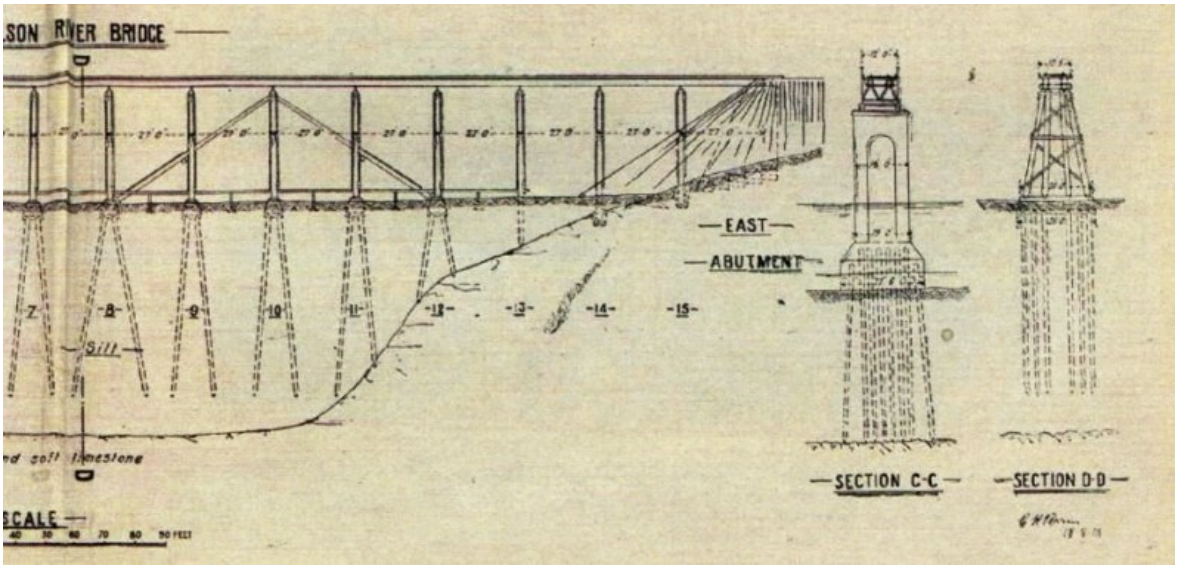
The drawing of the Nicholson Bridge and Viaduct reproduced below and on the previous page, is signed C.H. Perrin.

Charles Heber Perrin joined the Railways in 1885 as a junior draftsman and rose through the ranks to eventually follow Maurice Kernot as Chief Engineer when Kernot retired in 1923.



Nicholson River Bridge in 1915. The girder sections are being load tested with two A2 117 ton locos. Men under the deck at right are checking deflection of the steel girders under load. Source – Charles H Perrin Album.

Kernot tells us: *The designs of these bridges were worked out by Mr. C.H. Perrin, assisted by Mr. Malcolm Moore, Assoc. M. Inst. C.E., B.M.E., Melbourne University, and their erection was carried out by Mr. Malcolm Moore in consultation with Mr. Perrin. Mr. David Craig, Assoc. M. Inst. C.E. was Engineer-in-Charge of the works of the whole line.*

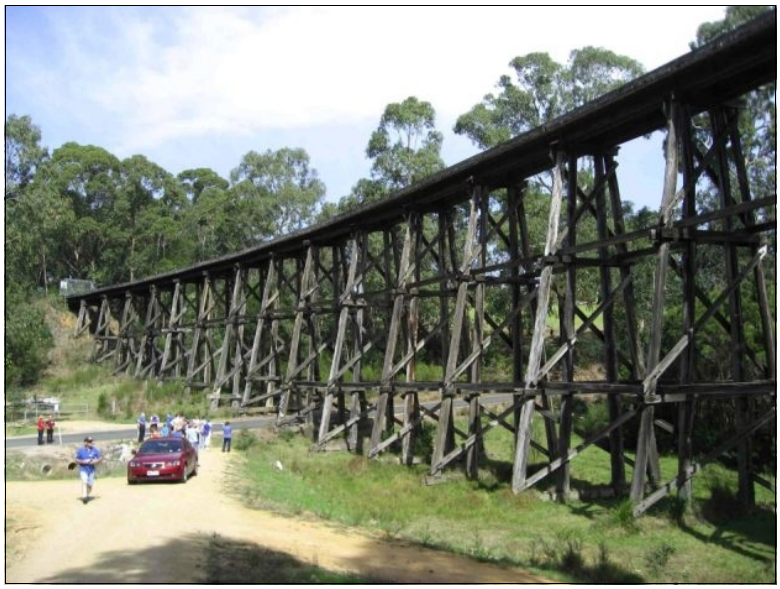


The drawing at left (on pages 16 & 17) is part of Plate II from ME Kernot's paper to the Victorian Inst. Of Engineers, October 1916. It shows all the different types of structure used in the one bridge.

Left: This image of the Mundic Creek trestle bridge is given some scale if you notice the tiny figure of Charles H Perrin standing at the base of the timber pier at centre – barely visible.
From Museum of Victoria.

Right: "Mr Perrin of Construction Branch" – presumably the same Charles H Perrin who became Railways Chief Engineer in 1923..
From Victorian Railways Archives

Right: The Wairewa Road O'Grady's Creek trestle bridge under construction in 1914-1915. Timber trestles/piers and cross beams are complete and the wrought-iron rivetted girders are set on the cross beams but not yet fixed in place. These girders are said to have been recycled from a bridge on the North East line to Wodonga – probably the bridge over the Broken River at Benalla, which was rebuilt with larger steel girders at about the same time. The recycling is typical of Kernot, to whom economy and keeping costs down was extremely important.
From Charles H Perrin Album.



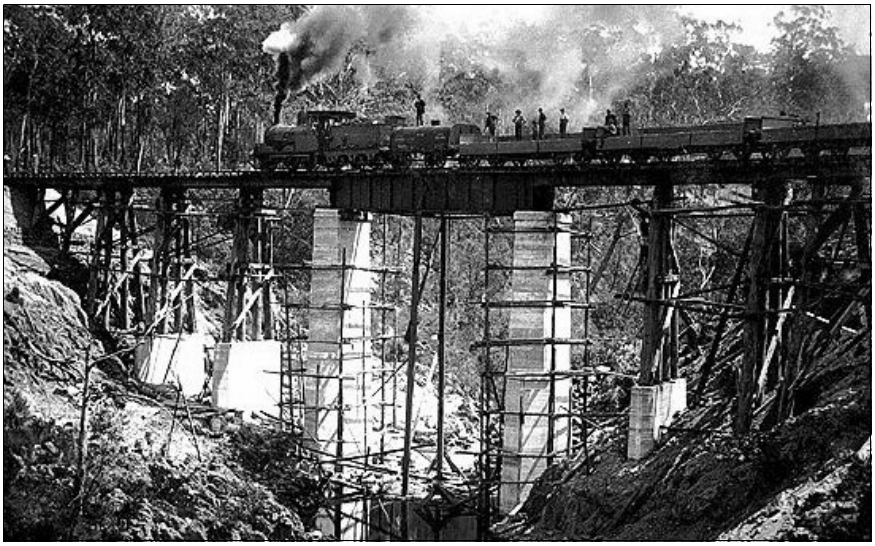
The Wairewa Road O'Grady's Creek Iron girder and timber trestle/pier bridge as it stands in 2007 Photo Helen Martin

Moore appears to have been another original thinker and talented. This very senior position might have been his first job, since he graduated BCE only in 1912, but Kernot has occasion to praise his original ideas several times – for instance, for excavating the concrete well piers on the Mitchell Bridge: . . . . .*owing to the presence of numerous seams of clay, etc., not shown by the bores, also logs, brushwood, etc., it was found more economical to use a small grab bucket, a very efficient type of which was designed by Mr. Moore, Assistant Engineer, and by its use the cost of excavation was largely reduced.* Also: *The 100ft. girders (6 ft. 3 in. depth) were taken down to Bairnsdale on a special train, travelling at reduced speed, and represent probably the maximum size that could be transported without danger to structures or passing trains on curves. They were erected quickly and simply by a method devised by Mr. Moore.* This neat method is described in the paper – at some length.

The design and construction of all these bridges, and the line, is well covered in Kernot's paper, which is available online (see refs.) , but the most notable sections, and fascinating to me as an ex-builder, are about the costing and construction methods. First the estimates – it was *recommended in November, 1909, the construction of a railway from Bairnsdale through Bruthen to Orbost, having a length of 60 miles (100km), at an estimated cost of £391,360. On account of increased wage rates since the estimate was made, the cost of the completed line will be 10% over the estimate. But for the increase of wages its cost would have been within the estimate.* Could anyone equal that today?

Kernot's comments on the construction work are enlightening:

The whole of the works of the line were carried out by day work and piece work, mostly day work, under the control of the Staff employed under me. We have been carrying out work in this way continuously for 24 years, and, though on two (2) occasions public tenders for constructing railways have been called, on both occasions it was found advisable for the Department to carry out the work itself, which it did to its own profit. On this particular line, as the Department had neither plant nor trained staff for sinking concrete bridge piers, tenders were called – and well advertised for that part of the work, but not a single tender was received, and we had to buy the plant and do the work ourselves. Now we have finished it, we are quite satisfied that we have saved money by doing without a contractor.



A train crosses the Boggy Creek Bridge while it is still unfinished, c1914/1915. Source unknown

And on the earthworks he says:

The heaviest cutting on the line – about 50,000 cubic yards – was advertised for public contract. Several tenders were received, but only one came near the Departmental estimate, which was about £6,000. The tenderer was called upon to carry out the work, but after some delay refused to proceed, so we got to work and executed the cutting in quick time at a cost of 3 per cent. below that of the lowest tender. It is the continuance of results like this that has confirmed us in carrying out work by Direct Labour, though we are quite ready to let contracts if by doing so we can get the work done at the same price as we can do it for ourselves.

Further: . . . . . *it was found that, for the narrow single line cuttings which had to be made, steam shovels could not do the work as cheaply as the simpler appliances of earth waggons and horses and tip-drays. The country was such that the cost of transporting steam shovels to the works, together with the necessary waggon plant, would have constituted an overhead charge so large that they would have had no opportunity of doing payable work.*

From *the Editor & Helen Martin*

Maurice Kernot's paper, published in the Proceedings of the Victoria Institute of Engineers vol.XVI, can be downloaded in PDF format from:
https://digitised-collections.unimelb.edu.au/handle/11343/24599

Stony Creek rail bridge at Nowa Nowa. From Heritage Victoria

Helen Martin lives in East Gippsland. She is a planner and a well known heritage conservation expert. She is a Member of Planning Panels Victoria and has been a Member of the Heritage Council of Victoria. When she was Director of the East Gippsland Shire Council, she engaged C&MJ Doring P/L to do a CMP of the Bairnsdale Pumping Station. She inspired this story when she sent me a copy of her presentation "Bridges of the Bairnsdale to Orbost Rail Line" with some photographs and the link to Kernot's paper. *The Editor*

The Nicholson River Bridge as it stands today – still in use as part of the East Gippsland Rail Trail Photo Helen Martin

Blackall Woolscour & the Electric Light

Some readers may remember the story about the Blackall Woolscour in the June 2014 issue of this magazine. The occasion for this story was the awarding of an Engineering Heritage National Marker to the Woolscour, presented by the then Governor of Queensland Ms Penelope Wensley AC, on the 19th May 2014. In preparing the Nomination document which led to the Award, the writer, Brian McGrath, *travelled down a few research highways and byways during which what I considered was interesting information was discovered*. He considered *the information itself and the route by which it was obtained may be of interest to others*. This story relates to the early electric lighting at the Woolscour. Brian will have some more stories to tell on the Woolscour theme, in later issues of the magazine. *The Editor*

Some Rare Finds

Blackall Woolscour became operational in 1908. Its water supply came from an artesian bore drilled on what was to become the site for the Woolscour in 1906/07. The bore provided ample quantity of 58˚C water for the scour operation. In its 2nd July 1910 issue, the newspaper *Western Champion and General Advertiser for the Central-Western Districts (Barcaldine)* reported that: *The electric light has been installed throughout the Blackall Woolscour*.

The Blackall Woolscour Bore, September 2009. Photo Brian McGrath

In Vol. 1 of the 1991 report *Blackall Woolscour Conservation Study* for the Blackall Historical Woolscour Association Inc., the authors Allom, Lovell, Marquis-Kyle Pty Ltd, Architects, confirm that: *At the artesian bore, a small generating plant was installed to provide electricity for lighting the main building and the manager's residence. The generator had a 110v capacity and was driven by a Pelton wheel. Both the Pelton wheel and generator survive in reasonable condition*. Later in the same report it is stated: *the 110v generating plant at the bore head could be restored to working order and provide some lighting for the main building as it did during the period of operation of the scour*.

In an Appendix to that report, are notes on the plant and equipment at the woolscour written in August 1990 by the late Professor Ray Whitmore, a long time pioneer of Engineering Heritage recognition in this country. Whitmore reported: *Adjacent to the boilers is a Kohler, Model D, portable electric plant (No 20218); 110vDC, 1000watts*.

When I visited the site in September 2009, I was unaware of the above reports, but I did see the original artesian bore flowing as it has done for more than 110 years. The shed under which the Pelton wheel and generator would have been housed - or at least a good replica of the original shed – was clearly visible, but there was no sign of the Pelton wheel or its generator. Subsequent to my 2009 visit, I began to draft the Nomination for the woolscour and became aware of the Conservation Study report quoted above and the electricity generating plant mentioned therein. I was intrigued to find what relationship, if any, there was between the Kohler generator mentioned by Whitmore and the Pelton wheel and generator mentioned by Allom Lovell.

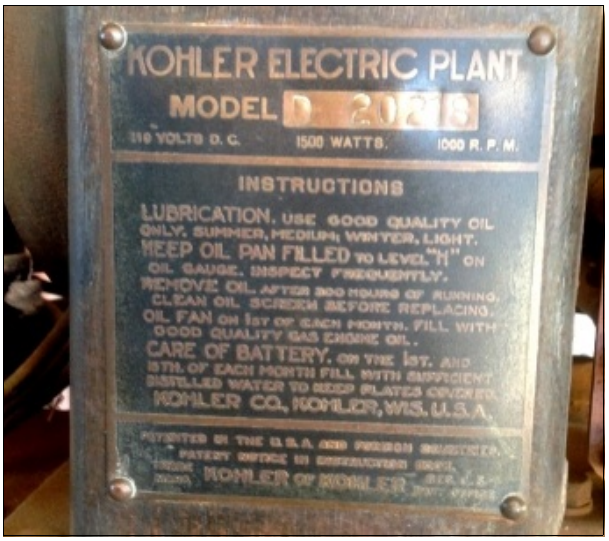
I did an internet search for Kohler, found they were still in business, and sent an enquiry to their USA head office, quoting the serial number. They responded and advised me to contact their Australian agent in Perth, which I did. That company replied that since it was a portable machine, I should contact the Sydney agent.

The Kohler Portable Generator Photo Woolscour Staff

The Sydney agent was most helpful and after he contacted the USA Kohler company, requested that I forward a photo or photos of the generator. The Woolscour Historical staff provided me with suitable photographs, which I forwarded to Sydney and which the agent forwarded on to USA.

The response from the Sydney agent stated: *Thanks for the details, this is* ***a rare find*** (my emphasis). *Kohler have advised that unfortunately they have no records for this set other than it was manufactured in 1928*.

Subsequently John Fordham, a member of EHQ Committee, knowing of my search for details of the Kohler, sent me copies of extracts from C.H. Wendell's book *American Gasoline Engines* detailing the history of the Kohler Company of Kohler, Wisconsin, which started out in 1873 manufacturing tools and farm equipment. It commenced making lighting plants in 1920, and is still in business as a major producer of gasoline and diesel engines.



The Kohler Generator Nameplate. Photo Woolscour staff.

The last piece in what started out as a bit of a puzzle was discovered when I was on site for the Award ceremony in May 2014. The Woolscour Historical Association President Bob Harvey showed me in a storage shed what appears to be the remains of the original Pelton wheel (lacking a cover) and a small generator. This small Pelton wheel, having been made pre-1910, and resembling a late Lester Pelton patent, could have come from the Pelton Water Wheel Company in San Francisco. The generator was made by the Western Electric Company – presumably the same company (sometimes abbreviated to WECo) which was an American electrical engineering and manufacturing company closely associated with AT&T (the telephone company) from the 1880s and well known for their manufacture of telephone handsets and switching systems. If the little hydro-system components could be inspected for identifying marks or labels – even a patent number – it might be possible to discover their origin. Perhaps the cover of the Pelton wheel, and shafts, could be discovered somewhere in the woolscour buildings.

Pelton wheel & WECo generator. Photo B McGrath

Western Electric Company Generator. Photo B McGrath

It now seems evident that the 1928 Kohler lighting plant would have been bought to replace the Pelton wheel and generator hydro-unit, which after about 20 years service, may have been worn out or broken down. The Pelton wheel is missing its case, and the WECo generator is probably beyond repair, but they could be cleaned up and set up as part of the historic displays. Despite their poor condition, this pair must be highly significant and are equally rare finds to the Kohler machine. The Kohler generator seems relatively intact and possibly could be restored to working order. Unfortunately the Woolscour Historical Association lacks the funds and expertise to effect the necessary work to restore it. I wonder if any EA member would be willing to donate some time and expertise to assist the Association to investigate and set up and restore THESE RARE FINDS.

BL McGrath, PSM
Engineering Heritage Queensland

J. Furphy & Sons Pty Ltd Celebrates its 150th Year

Good, better, best - never let it rest - till your good is better - and your better best.

The rhyming apothegm above was cast into the ends of every one of the famous Farm Water Carts produced by the Furphy company for most of the last 150 years. The Furphy company started as a blacksmithing and wheelwright shop in Shepparton, Victoria in 1874. It was founded by John Furphy who had bought land in 1873 in what would become the centre of town. He saw there would be a growing need for his services and he was correct. Still in the 1870s he had added a "steam works" and a cupola furnace, and by 1880 he had 38 men and boys on the payroll.

The firm continued to grow until it outgrew its original land and moved in 1906 to a more convenient site close to the railway station. The new factory even had electric lighting, with a suction gas engine to drive a large DC generator, and they were making a wide variety of agricultural implements and tools, farm gates (with the name of the farm or owner cast in the centre panel), ornamental castings, garden and household furniture. John Furphy retired in 1909, leaving the control to three sons. By the 1920s, three grandsons were working in the firm, and in 1938 it became a Propriety Limited Company, with the family members as directors. After the war, one of the grandsons, John Seeley Furphy, bought out his uncles and cousins and introduced his three sons to the business. Unlike so many such manufacturing businesses, it is still, to this day, owned by the family, and John Seeley Furphy's grandson Adam is now the Managing Director. Five generations !

Surprisingly, the famous Farm Water Cart is still in production – although the formerly cast-iron ends are now made from (pressed?) hot-dip galvanised mild steel, to match the galvanised cylinders: *Furphy's Farm Water Carts were the chief product of John Furphy's foundry. A deceptively simple invention, it consisted of a 180 gallon galvanised steel tank with cast-iron ends mounted on a wooden frame. The cast-iron ends provided an ingenious form of advertising for the foundry. The first carts were available in 180 and 250 gallon capacities. The 180 gallon unit proved most popular because when filled, it weighed about a ton and was a fair load for a good horse. The tank was carefully balanced over the axle to distribute the weight for the horse whether the tank was empty or full.*

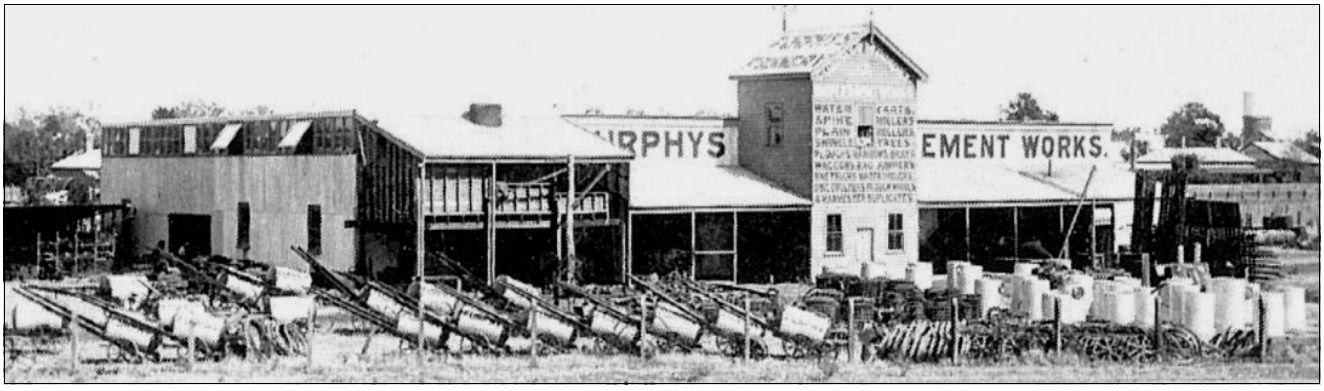
Furphy Farm Water Cart ready to go c1895 Image Furphy Company.

Furphy water cart end c1942
Image Furphy Company

The Furphy Farm Water Cart has its own anniversary to celebrate – the Centenary of the ANZAC landings in WW1. The Furphy website explains this very well: *The most distinctive product to carry the Furphy brand would certainly be the water cart. The presence of the cart in military camps in Australia during the First World War led to the name of Furphy becoming an indelible part of our language. The carts were typically placed near the latrine area, the only place in the camp where soldiers were out of the controlling eye of their officers, allowing them the freedom to express their thoughts on the latest news that was, at best, unreliable. Known as a "Furphy", water carts were used extensively in Europe and the Middle East to carry water to the troops. The drivers of the carts were notorious sources of information and gossip for the men as they moved from camp to camp. As could be expected, not all their news was reliable and so it was that the word Furphy rapidly became a synonym for suspect information or rumour.*

The Editor

The extracts in italics come from the Furphy website. A link to the Home page is http://www.furphys.com.au/



The new Furphy Implement Works in Hoskins Street, Shepparton in 1906 Image Furphy Company

Obituary – James Semple Kerr, Conservationist

6th July 1932 to 15th October 2014

Jim Kerr was a gentle giant in stature and manner. As the architectural historian and conservation consultant James Semple Kerr, he was the gentle giant of Australian heritage. He was admired for his major contribution to the writing of Australia's heritage 'bible' in 1979, the *Australia ICOMOS Burra Charter*. The *Burra Charter* sets an almost unquestioned (if aspirational) standard for practice across the historic heritage profession in Australia, and has been internationally influential. He was also renowned internationally for his brief but masterly guideline for writing conservation plans for looking after heritage places, *The Conservation Plan*. He lectured widely about conservation methodology in public while in private he gave generously of his advice upon request.

Jim's natural abilities were enhanced by his happy marriage with another remarkable intellect, Joan Lyndon, who would become renowned in her own right as the Australian art and architectural historian, Professor Joan Kerr. As Joan was dying of cancer in 2004, Jim offered himself some consolation by writing her 'conservation plan' as he initially called it, his memoir of her life (later published as Joan Kerr, A Pictorial Biography, 2006). In this beautifully composed monograph, Jim wrote: *She had a gift for developing the full potential of those around her and I have been the prime — but not only — beneficiary of that gift.*[1] Although they spent much of their free time together from the earliest days of their marriage in travelling the countryside, camping and poking around the old places they found, they only became architectural historians relatively late into their adulthoods. Nonetheless they both contributed immensely to the burgeoning study of Australian history, heritage and visual culture. Susan Macdonald has described them as 'two pillars of Australian cultural life'.

James Semple Kerr in 2011. Photo Bronwyn Hanna

Jim was born William James Semple Kerr in 1932 to Iris Lorna Rudd and James Semple Kerr, son of an eminent Queensland headmaster (also named James Semple Kerr) and grew up on Hampden Downs, a 10,000 hectare leasehold property in western Queensland. Both his sisters were some years older and his childhood was solitary but not lonely. Jim would invent games for himself such as stealthily observing animals on the property, spotting the occasional World War II aeroplanes that passed overhead and learning how to recognise his relatives by their scent(!). An unfortunate conflict with a teacher in primary school who tried to cure him of his left-handedness had the result, in his words, that *after about a fortnight I'd ceased to talk at all in class and didn't really talk again until eight years [later]*. He spent his last four years of school boarding at the old Kings School in Parramatta (the present home of the Heritage Council of NSW) but failed his leaving certificate and made no initial attempts to go to university.[2]

Instead Jim undertook an interesting variety of work experiences that equipped him well for his later life in conservation. He built a dry stone wall; he helped curate an exhibition for a car dealership; he observed ordinary workers doing their jobs with intelligence and efficiency; he learnt to keep an accurate ledger with 900 columns ('this meant that a certain precise attention to detail was extraordinarily important'); he worked as a forensic photographer; he joined the navy reserve (thus following a family tradition of military service) and he rowed. Rowing increased the physical coordination and strength of his 6'5" (195cm) tall frame. By 1955 he was at the Commercial Rowing Club in Brisbane and in 1957 he was invited to go to Sydney to join the NSW Eight. He understood that his team, which competed in the Olympic trials in pair oars, *could have done very well, it was our fault we did not do so.* They found out too late they had a defective rudder.[3]

Jim did eventually commence an Arts degree at the University of Queensland in 1956, and this is when he first met Joan, briefly. They corresponded when he moved to Sydney to row, at the end of the year. They wrote hundreds of thousands of words to each other, an apprenticeship in writing that may have been more educational than completing that degree. In Sydney he took a different tangent and enrolled in the art school at North Sydney Tech for two years, studying drawing and composition under Eileen Mayo and Harry Justelius.

1 J.S. Kerr, *Joan Kerr, A Pictorial Biography*, 2006, p17.

2 J.S. Kerr oral history interview for the NLA with Bronwyn Hanna, August to November 2011

3 Ibid.

When Joan finally agreed to marry, Jim became serious about his career and obtained an internship with a familiar Queensland firm—Qantas. He worked with them for 12 years while their two children were young, in Sydney, Geneva and London, moving through the ranks to an executive position in advertising. He developed skills during these years that would also empower his work in conservation, from effective letter writing and marketing to managing committees. Whilst living in London, Joan enrolled herself and Jim in evening art history courses — initially at the Courtauld Institute and later at Birkbeck College under Nikolaus Pevsner, one of the world's most respected architectural historians. They both became hooked on architectural history. 'We absorbed his meticulous methodology, particularly the process of reconstructing history from complex physical fabrics.' [4] When Joan applied for a position as a tutor in 1972, Pevsner's reference was glowing and, remarkably, it included comment upon Jim's abilities as well. It read:

> *Jim and Joan were my students at Birkbeck College before they left England. They were infinitely the best students I had at that time, and in fact, looking back over my 20 years at Birkbeck College, they were amongst the best students altogether. It was always a bit of a game to see whether in any one paper or intermediate examination, she came first or he came first. I don't know her abilities as a lecturer but my personal impression makes it likely to me that she would be good at putting things across.*[5]

Near the end of his life Jim would describe Pevsner's reference as *spectacular*, it was *the thing that caused me to resign from Qantas and also helped Joan to change her career.* The boy who had failed his leaving certificate had grown into one of Pevsner's brightest ever students (along with his beloved wife). This reference, dating from his 40th year, finally gave Jim the impetus to take himself seriously enough to enrol as a full-time student in architectural history and conservation.[6]

While Joan stayed in Sydney working as a tutor, researching her Master's thesis and looking after the teenagers, Jim enrolled in a Diploma of Conservation course—on the other side of the world, at the University of York (largely funded by his retrenchment pay-out). He found that the course run by Derek Lindstrom gave him time to think for himself and to observe a variety of European building conservation problems. At the completion of the year he came back to Sydney as assistant director to the National Trust — at an exciting time for heritage when the Green Bans movement was in full swing and the Whitlam Government was undertaking its survey of the 'National Estate'. After Joan was informed she would never rise above the position of tutor unless she got an overseas doctorate, they decided to take the family back to York and in 1975-6 they both enrolled to do PhDs, in Australian architectural history.

Jim's PhD thesis was on prison design and building for convicts in Australia, a little studied topic at that time. This research fed into a later scholarly book (Kerr's *Design for Convicts*, 1984) and exhibition (Kerr and Kerr's *Out of Sight, Out of Mind*, 1988). It was also foundational to his subsequent conservation work, as was the PhD qualification which he found to be respected by the bureaucracies. He learnt that you need to understand significance and conservation problems thoroughly before making any management decisions — a common sense approach that was nonetheless innovative and became a central tenet of the *Burra Charter*.

Jim came back to the position of assistant director to the newly formed Australian Heritage Commission (AHC) in Canberra. These were more exciting times for heritage as the AHC was setting up the Register of the National Estate and a grants program to encourage the conservation of historic, Aboriginal and natural places identified there. In this role Jim travelled throughout Australia and offered built conservation advice across a wide variety of forums.

The AHC's foundational chair, David Yencken, recognised a need to nurture a nationally networked professional culture to look after these places properly, following international principles set down by organisations such as the UNESCO-sponsored International Council for Monuments and Sites (ICOMOS). Yencken called the first meeting of the Australian national chapter of ICOMOS in Melbourne in November 1976. At its first conference in Beechworth two years later, Australia ICOMOS set itself the task of adapting ICOMOS International's brief but authoritative statement of heritage principles (the Venice Charter) to Australian conditions. Thus Jim Kerr was put in charge of facilitating the high-powered (and yet cordial) committee of six academics and heritage practitioners reporting to both Australia ICOMOS and the AHC, who would write the *Burra Charter* throughout 1979.

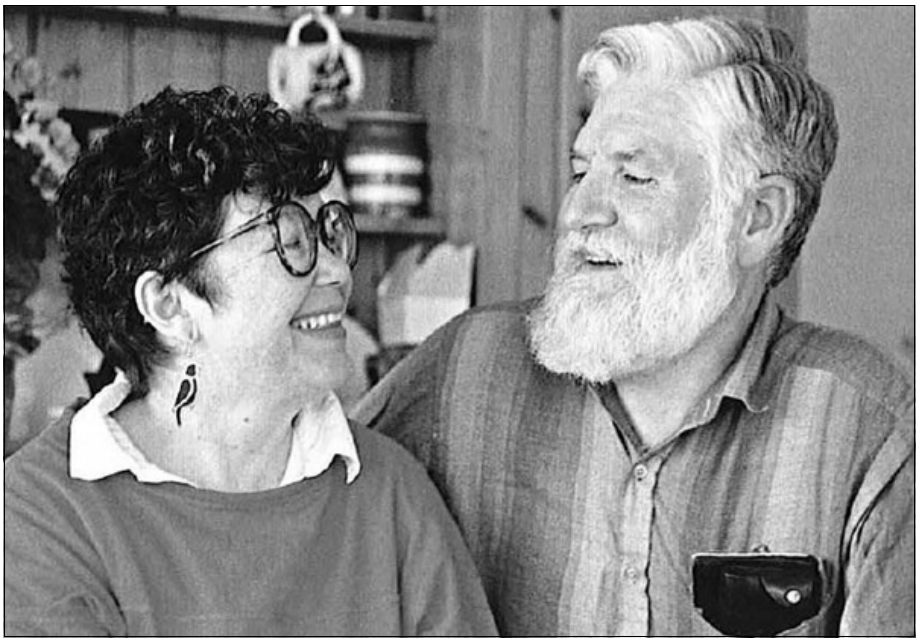
Jim Kerr (2nd from left) at Burra Sth.Aust. in 1979. Photo Richard Allom

4 J.S. Kerr, *Joan Kerr, A Pictorial Biography*, 2006, p39.

5 Ibid.

6 J.S. Kerr oral history interview for the NLA with Bronwyn Hanna, August to November 2011.

Provisionally adopted by Australia ICOMOS at its meeting on 19 August 1979, and formally endorsed in 1981 following a few amendments, the Burra Charter with its conceptual clarity and Plain English approachability was an instant success with professionals and lay-people. The fact that federal grant funding was tied to a commitment to follow *Burra Charter* principles meant that it quickly became incorporated across the heritage profession throughout Australia and remains so today. Nonetheless, Jim soon saw a need for it to be accompanied by a 'simple guide for preparing conservation plans' for individual places. When Joan was offered a lectureship in Fine Arts at the University of Sydney in late 1980, Jim resigned from the AHC and set out on the next stage of his career—as a private heritage consultant.[7]



Jim Kerr with Joan at their home in Cremorne, Sydney, in 1987. A family photo.

From 1981 Jim worked from their home in Cremorne, Sydney, specialising in writing conservation plans for a wide variety of historic places while at the same time developing his methodology for how conservation plans should be written. The first edition of his resulting booklet guideline, *The Conservation Plan*, was published by the National Trust in 1982 but he continued to hone it as he wrote more plans and learnt more about conservation processes, throughout seven editions (the last being an online edition published by Australia ICOMOS in 2013, which made it available for free download with Jim's generous consent). Through the 1980s and 1990s, Jim also promoted his approach to conservation by lecturing extensively, nationally and also internationally, about the methodologies he was developing.

In preparing a conservation plan he would scour primary as well as secondary sources for information which he usually copied onto hand-written cards, also photographing and hand-copying images and plans when necessary, all of which were used to write up a plan of great integrity that was succinct, incisive and sensible. He even designed each page himself, with the help of his typesetter (he never took to computers). All his conservation plans are readily available because he made their publication an integral aspect of his work and because of his insistence on retaining his own copyright in everything he did. On top of all that, but perhaps just as importantly, he could convince reluctant owners that his policies were for the best. Jim's conservation plans for many of the most significant heritage places in Australia — including three of our now World Heritage-listed historic places (the Sydney Opera House, Cockatoo Island and Fremantle Prison) — are widely recognised as exemplary. He considered his final conservation plan, for the Sydney Opera House, as revised in 2003, to be *probably about as good as I got*.[8] (It is also freely available online).

Jim was profoundly intelligent and hard-working yet gentle and kindly in his person. He was also courageous. He would voice a controversial opinion in an open forum but avoided belittling people in social situations. When he was recalling aspects of his life for his oral history interview for the National Library of Australia in 2011, he had a noticeable habit of softening critical observations with the phrase, "God bless them". He was reared in the Queensland outback and retained his old-fashioned, country manners.

Jim spent his last years working alone at home putting his papers in order for the National Library of Australia, as well as those of his wife Joan Kerr. He also put together a series of booklets documenting different phases of his own life story, which expand considerably (and wittily) on this account. He was supported by his long-time typesetter Lynda Howlett, and as his health deteriorated, there were also nurses, tradespeople, friends, neighbours, colleagues and people seeking his advice or permission to use his work, as well as his children when they could visit from Queensland. Although his task was not completed, he did manage to prepare about 20 bound volumes of selected and annotated records documenting key issues that he had addressed throughout his career. He was greatly relieved when these were safely deposited in Canberra late this year.

Jim died on 15 October 2014 at a nursing home in Willoughby aged 82 after a long-suffering and weary engagement with pulmonary fibrosis. He is survived by his two children Tamsin Kerr and James Semple Kerr Jnr, and their five children (including the next generation's James Semple Kerr).

Bronwyn Hanna, NSW Heritage Office.

7 Ibid.

8 Ibid.

Obituary – Stuart B. Smith OBE, Industrial Archaeologist

Stuart Smith on Hashima Island, the coal mining island off Nagasaki. Image: © Neil Cossons. 2014

For over forty years Stuart Smith devoted his life with boundless zeal, energy and diligence to the preservation of the industrial heritage. As museum curator and later director at Ironbridge, and chief executive of the Trevithick Trust in Cornwall, he committed himself single-mindedly to Britain's industrial past. Internationally, his work over 26 years as Secretary of The International Committee for the Conservation of the Industrial Heritage (TICCIH) and as consultant on World Heritage projects brought him into contact with many of the leading advocates in the field. They found in him a friend and colleague of unswerving determination. An engaging and irrepressible personality with robust views and at times idiosyncratic tendencies, he was a collector and bibliophile whose knowledge, focus and resolve marked him apart from others of his generation.

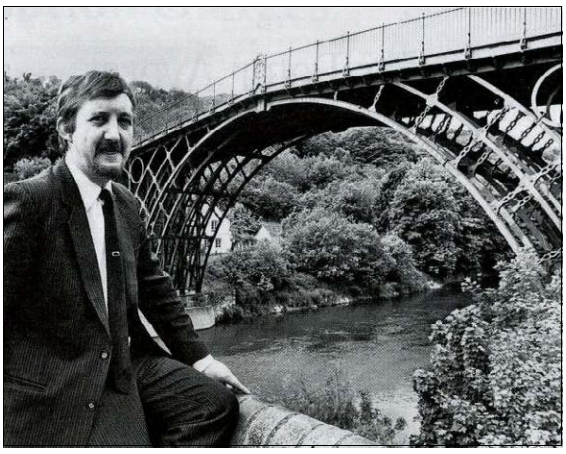
Stuart Smith was brought up in a strongly nonconformist family, stalwarts of Baillie Street Methodist Church Rochdale. After Rochdale Grammar School and graduation from the universities of Surrey and Manchester (UMIST), in 1968 he became a curator at Sunderland Museum where his acquisitive instincts were sharpened by the urgent need to capture evidence of the city's shipbuilding industry, then in decline. He was a founder member of the Ryhope Engines Trust, set up to preserve a pair of 1868 R & W Hawthorn beam water pumping engines and three 1908 Lancashire boilers, and present at the first steaming, forty years ago last Easter. He also worked as a volunteer for the new open air museum being established at Beamish, County Durham, dismantling buildings and machines and moving them there for preservation.

ln 1972 he was appointed Curator of Technology of the Ironbridge Gorge Museum in Shropshire, later becoming Deputy Director and, from 1983 to 1992, Director. His deep knowledge of social and industrial history and an unquenchable capacity to get things done made him an important asset during the formative years of the museum. Perhaps his greatest contribution there was the reconstruction of the ironworks, based on Walmsleys Atlas Forge, Bolton, the moving of which he organised. In this he had the advice of Keith Gale (Society President 1963-5), a member of the Museum's advisory committee.

In 1973 Stuart participated in the First International Congress on the Conservation of Industrial Monuments, held at Ironbridge, out of which the present international body TICCIH was to emerge. In 1986 he became Secretary of TICCIH, a position he held until 2012. This brought him into contact with world heritage initiatives and he was instrumental in the Ironbridge Gorge being inscribed in 1986 by UNESCO as a World Heritage Site.

From Ironbridge he went to Cornwall, to live initially in Richard Trevithick's cottage. This was as the first Chief Executive of the Trevithick Trust, a consortium set up to manage a group of important historic industrial sites in the west of the county. He contributed to the tin and copper mining landscapes of Cornwall and west Devon, which gained World Heritage status in 2006. Since 2002 he had worked closely with an international team in Japan dedicated to securing World Heritage ranking for a group of sites – mainly in Kyushu and the Yamaguchi Prefecture of Honshu – that signified the emergence of Japan as an industrial nation during the Meiji era. The nomination was submitted to UNESCO in January 2014. In 2004 he was appointed OBE in recognition of his contribution, nationally and internationally, to the conservation of the industrial heritage.

A Fellow of the Museums Association from 1982, Stuart Smith was from 1991 to 1996 a member of the Royal Commission on the Ancient and Historical Monuments of Wales and from 1993 ro 2002 of the English Heritage Industrial Archaeology Panel. He was a Vice President of the Association for Industrial Archaeology from 1992.



Stuart Smith at the Ironbridge c1983. Source unknown.

Stuart Smith made much of his northern upbringing. His at times bluff demeanour became something of a signature persona and validation for some of his more distinctive eccentricities. Immense motivation, application and capacity for hard work contrasted with his utter refusal to own or even use a computer, driving each day to collect print-outs of emails from his Secretary, Sarah, dictate answers and then file the hard copies.

Stuart Brian Smith died of lung cancer in St Julia's Hospice, Hayle, Cornwall on l3 April. He leaves his wife, Jacqueline, two sons and a daughter and two grand-daughters. In his death the industrial heritage has lost an indefatigable campaigner and a luminary of great character, humour and knowledge. Stuart Smith OBE, industrial archaeologist, was born on 19th August 1944 . He died on 13th April 2014 aged 69 .

Sir Neil Cossons OBE FSA FMA

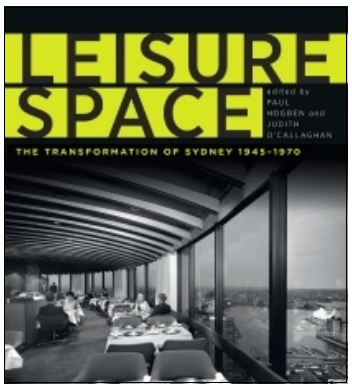
This obituary is ©The Newcomen Society 2014 and appeared in the September "Links" magazine.

Connections

Irish Industrial Heritage

EHA Chair Keith Baker mentioned, in his message on page 4, that ICOMOS Ireland have proposed the creation of an ICOMOS International Scientific Committee on the Industrial Heritage.. ICOMOS Ireland already has its own active industrial heritage committee and I wonder if this grew out of the very strong Industrial Heritage Association of Ireland (IHAI). My brother sent me one of their newsletters which mentions – *a late 1700s water-powered flour mill known as Haughton's Mills. This mill appears to have gone out of use by the 1840s* – that was visited on an IHAI excursion in 2009. The mill in question belonged to one of my ancestors, but I was also interested in the rest of the newsletter. All sorts of interesting stuff, and bit of an eye-opener for one who never thought of Ireland and Industrial Archaeology on the same page! I should apologise. I hunted up the IHAI web page (see http://www.ihai.ie/index.htm) and found many newsletters, a brochure, publications, a Directory of Specialists, etc., etc. , and notably, their Conservation Principles, which are the same *Dublin Principles* mentioned on Keith's page, and which can be downloaded from the page, along with their 68 page *Recording and Conserving Ireland's Industrial Heritage – An Introductory Guide*, written by Fred Hamond and Mary McMahon. Enjoy!

Leisure Space: The Transformation of Sydney, 1945-1970



Edited by Paul Hogben and Judith O'Callaghan, published by New South Publishing. Any of you remember dining at the amazing rotating restaurant shown on the cover of this book? The book classification says it's all about architecture, but I can't help thinking of the engineers who made the architecture possible.

The blurb says: *Mid-twentieth-century Sydneysiders embraced leisure like never before. Leisure Space details the architecture and design that transformed their city – through its new hotels, motels, restaurants, bars, clubs, shopping centres, drive-ins and golf courses, including landmark buildings such as the Gazebo and the Wentworth Hotel. With stunning images from Max Dupain, Mark Strizic and other outstanding Australian photographers, Leisure Space explores a dynamic period in Sydney's history and the dramatic impact of modernism on the city's built environment.*

Find it at: https://www.newsouthbooks.com.au/books/leisure-space-transformation-Sydney/

AE2 Submarine (1915) - Project Silent Anzac 2014 expedition

Maybe everybody but me got to see this episode of Catalyst on the ABC a few months ago, but I didn't, so I was very glad to get these links from Tim Smith, Executive Director of Heritage Victoria, and a Maritime Archaeologist:

> *Below is a link to ABC iview to see the recent Catalyst program episode on The Silent Anzac, featuring the AE2 Commemorative Foundation's 2014 volunteer expeditions' work. http://iview.abc.net.au/programs/catalyst/SC1302H007S00 For those interested in management of First War War battlefield sites underwater, there is a different 10-min interview piece embedded in the Federal Minister for Veterans Affairs media release dated 3 July 2014. http://minister.dva.gov.au/media_releases/2014/jul/va044.htm*

"Size Matters – Seeing the Values in Large Technology Heritage" by Alison Wain

Alison recently sent us a link to her Doctoral Thesis, which she is celebrating having completed. Find it at: http://hdl.handle.net/1885/11772 She included an abstract as follows:

> *Large technology heritage objects are impressive, exciting and fascinating. They can also be difficult, dangerous and expensive. When working with large technology objects every project demands more resources, every triumph is more newsworthy and every mistake is more visible. With large technology objects "getting it right" is vital.*
>
> *This thesis explores what "getting it right" means in both affective and practical terms, and for both producers of, and visitors to, large technology heritage displays. Over 80 producers and 368 visitors were interviewed at seven heritage sites and, for comparison, one non-heritage site within Australia. These interviews were analysed both qualitatively and quantitatively to examine people's attitudes to large technology heritage, and to understand the major influences that form, maintain and change such attitudes. The thesis also examines methods of interpreting and displaying large technology objects, as well as the impact of heritage industry standards on the preservation, restoration and management of large technology heritage.*