ASHET News

Volume 4, number 2
April 2011

Newsletter of the Australian Society for History of Engineering and Technology

ASHET annual general meeting Thursday 28 April

ASHET's 2011 annual general meeting will be held at History House, 133 Macquarie Street, Sydney, on Thursday 28 April at 6 p.m. Light refreshments will be served at 5.30 p.m. before the meeting. The meeting, expected to be brief, will be immediately followed by a joint meeting of ASHET and the Royal Australian Historical Society, with talks by Matthew Connell and Rob Renew.

Each member is entitled to appoint another member as proxy by notice given to ASHET's public officer no later than 24 hours before the time of the meetings. Go to ASHET's website http://ashet.org.au/ to download a proxy form. Send the form to ASHET's public officer who is the secretary, Ian Arthur. ASHET's Constitution requires that no member may hold more than five proxies.

The following business will be conducted at the annual general meeting:

Confirm the minutes of the last preceding annual general meeting.:
Receive committee report on activities during 2010:
Receive and consider financial statement for the year 2010:
Elect office bearers and ordinary committee members.

In accordance with ASHET's Constitution no other business may be conducted at the annual general meeting.

Copies of the the committee's report and the financial statement that will be presented to the meeting are included in this issue of *ASHET News*.

Election of office bearers and committee members

At the close of the ASHET annual general meeting on Thursday 28 April 2011, all the present office bearers and committee members retire. Office bearers and committee members for the coming year will be elected at the annual general meeting.

Nominations are called for election to the following positions:
President,
Senior vice-president,
Vice president,
Secretary,
Treasurer,
Three ordinary committee members.

Nominations must be in writing, signed by two members of ASHET and accompanied by the written consent of the candidate. They must reach the secretary by Thursday 21 April, seven days before the date of the meeting on 28 April. A nomination form may be downloaded from the ASHET website http://ashet.org.au/ .

100 years ago: The Australasian Antarctic Expedition of 1911–1914

Douglas Mawson (later Sir Douglas), Australian geologist, was working at the University of Adelaide in 1907 when Shackleton stopped there on his way to Antarctica as leader of the British Antarctic Expedition. Mawson approached Shackleton to ask if he could join the *Nimrod* on its voyage to Antarctica, do some geological work there, and return to Australia on the *Nimrod* at the end of the summer. Mawson's mentor Professor Edgeworth David, also a geologist, had already been invited by Shackleton to make the voyage. He supported Mawson's request, which was granted. Mawson stayed in Antarctica until 1909, and while there was one of the first party, led by David, to climb Mt Erebus, and again with David, one of the party to reach the vicinity of the South Magnetic Pole.

In 1910 Mawson started planning for an Australasian Antarctic Expedition, to leave the following year under his leadership. He received substantial funding from the Australian Association of the Advancement of Science, supplemented by public subscriptions and other donations. 22 of the party who would stay on the Antarctic Continent were Australian, four new Zealanders, three British and one Swiss. Most were from universities. Three had previously been to Antarctica. The main objective was research.

The party left late in 1911 on the *Aurora*, and established a base on Macquarie Island, about half way to the Antarctic Continent, for research and as a radio station. The main base was established in 1912 at Commonwealth Bay on the Antarctic Continent, and the scientific program was under way before the winter. Several expeditions were carried out during the following summer, including one, led by Mawson, in which one of the party, Ninnis, disappeared down a crevasse, and was not recovered, and another, Mertz, died. The rest of the party, suffering severely from starvation and fatigue, reached the base to find that the *Aurora* had departed without them. They stayed on the continent for another year.

The official reports, in 22 volumes edited by Mawson, were not completed until 1947. In 1928 J.Gordon Hayes wrote that 'judged by the magnitude both of its scale and of its achievements, it was the greatest and most consummate expedition that ever sailed for Antarctica', and this assessment has been endorsed by others.

The Australian station at Macquarie island

Next ASHET event

Saturday 2 April–Sunday 3 April, 2011

Country tour: Glen Davis and Rylstone locality

Glen Davis is the site of a government sponsored oil shale mine and processing plant that operated from 1940 to 1952. A model town was built to house the workers. There are interesting relics remaining and Leonie Knapman, an RAHS member who is an expert on the history of the oil shale industry in New South Wales, will be our guide.

We plan to stay overnight at a motel in Kandos, or elsewhere if you choose, and on Sunday morning visit the museum at Kandos, and the historic Dabee homestead near Rylstone. After lunch at Rylstone we will have a walking tour of Rylstone's historic buildings guided by members of the local historical society.

200 km from Sydney, Glen Davis is renowned for its scenery as well as its historic associations. Those with time to stay an extra night might wish to visit other attractions in the area including Lue pottery, Mudgee, Gulgong and wineries.

ASHET is organising this tour; members of RAHS and others are welcome to join in the tour. Participants will arrange their own transport, meals and accommodation, except for dinner on the Saturday evening, which is included in the fee for the tour.

Cost: $60 for members of ASHET or RAHS and for participants from the Rylstone-Kandos area. $70 for others. Includes admissions to each of the venues and dinner at Rylstone on 2 April, but no other meals or accommodation.
More about the tour: Go to the Activities page on the ASHET website http://ashet.org.au/activities/ where you can download an information sheet, maps, and an application form to register as a participant.
Join the tour: To participate in the tour you need to register and pay the fee in advance. Download the application form from the ASHET website and return it with your cheque for the tour fee.
More information: Email Ian Arthur at sec@ashet.org.au or phone him on 02 9958 8397.

More ASHET events

Thursday 28 April, 2011

ASHET Annual General Meeting

The Annual General Meeting will be brief. Prior to the meeting, all ASHET members will receive an agenda for the meeting and proxy information by mail or email.

Venue: History House, 133 Macquarie Street, Sydney
Time: 5.30 for 6 pm

The meeting will be immediately followed by a joint meeting of ASHET and RAHS: see details in next column.

Thursday 28 April, 2011

Talks by Matthew Connell and Rob Renew
The Tote – the invention and global success of the automatic totalisator

An 1913 an enormous mechanical calculator linked to 30 ticket terminals was installed at the Ellerslie Park racetrack in Auckland, New Zealand. This was the world's first automatic totalisator, a system capable of adding records of bets made simultaneously on many horses in a race, keeping running totals of the bets on every horse and of the total 'pool' of bets, and calculating the dividends payable to successful punters.

Our talk will trace how George Julius, a railway engineer, invented and improved the automatic totalisator and established Automatic Totalisators Limited, the company known as ATL. Over a period of 60 years ATL installed precision-made totalisator systems in racetracks first in Australia and then in numerous other countries. Tote betting transformed and popularised the gambling experience for punters, and provided a financial lifeline to struggling state, provincial and city governments around the world, creating a dependency on income from legalised gambling which continues today. The automatic totalisator is now recognised as a major advance in the history of computing technologies, and is arguably Australia's most distinctive and enduring contribution to this field.

Matthew Connell was Curator (mathematics & computing) and Rob Renew was Senior Curator (engineering & design) at the Powerhouse Museum in 1994 when they first inspected the 'lost' ATL archive and arranged for it to be brought into the Museum's permanent collection.

This is a joint activity of ASHET and the Royal Australian Historical Society.

Venue: History House, 133 Macquarie Street, Sydney
Time: 5.30 for 6 pm
Cost: $8.00 Includes light refreshments on arrival
Bookings: phone RAHS on (02) 9247 8001 or email history@rahs.org.au

Wednesday 25 May, 2011

Talk by Meg Stevenson
Recording Australian Decorative and Fine Arts

Meg Stevenson, a member of the Australian Decorative and Fine Arts Society, will briefly discuss who they are and explain why there are differences in how the Australian Societies operate compared with the parent National Association in the United Kingdom. However one of the volunteer activities undertaken by members of both societies is Church Recording. Meg is one of a group of twenty members of the Ku-ring-gai branch of ADFAS currently recording the furnishing and fabric of St Philip's Church, Church Hill on York Street Sydney. The process takes from two to three years, is structured in format, though modern electronic techniques are changing some established methods. In Australia four books are produced as a result of each recording; two for the recorded Church, one to goes to the National Library in Canberra, and in New South Wales, one is kept in the Royal Historic Society Library.

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Tuesday 21 June, 2011
Talk by Robert and Bruce Wheatley
Photographing Railways

Robert and Bruce Wheatley were given the freedom by their parents at ages 16 and 13, to roam the NSW railway network for up to a week at a time. With packs on their back and pocket money for survival, they travelled on all manner of trains, slept in railway waiting rooms, rode with the guard on goods trains and when confidence grew, with the crew in the cab. Their challenge was to capture on film, the steam railway in all its beauty and grime, before the era ended. The result of their years of railway photography have been put into print. Railway Portraits was published in 2006 and due to public demand, Railway Portraits Volume 2 was released in 2010. Robert and Bruce will present a sample of their photographs and provide background to the taking of their evocative images.

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ASHET Committee Annual Report 2010

ASHET membership

At the end of 2010, ASHET had 86 members, a net decrease of five over the year. Of the members at the end of 2010, 67 lived in the Sydney area, 6 elsewhere in NSW, 6 in Victoria, 4 in Queensland and 1 in ACT.

Meetings and other activities

ASHET held a series of meetings during 2010 at History House in Sydney jointly with the Royal Australian Historical Society, and conducted visits to places of interest. The events were as follows:

Tuesday 23 February 2010 Talk by Stuart Read
Early to Mid 20th Century Garden Designers in NSW

Tuesday 30 March 2010 Talk by Noni Boyd
Walter Liberty Vernon: NSW Government Architect

Thursday 15 April 2010 ASHET annual general meeting

Thursday 15 April 2010 Talk by Tony Dawson
E. G. Stone – Expert in Concrete

Thursday 27 May 2010 Talk by Peter Rickwood
The geology of the Blue Mountains

Thursday 22 June 2010 Talk by Tony Brassil
Industrial Archaeology; a personal perspective

Saturday 31 July, 2010 Visit to Sydney Trades Hall

Tuesday 27 July 2010 Talk by Ann Moyal
The Telegraph revisited

Tuesday 31 August 2010 Talk by Rosemary Broomham
Myall Lakes National Park: a pople's history

Thursday 23 September, 2010 Talk by John Brock
Edward Albin Amphlett: Surveyor of the Bridge

Thursday 14 October, 2010 Night tour of Sydney Observatory

Tuesday 26 October 2010 Talk by Chris Middleton
History of Whisky Distillation in Australia

Tuesday 30 November, 2010 Talk by John Jeremy
Cockatoo Island Dockyard, 1857–1991

ASHET committee

At the annual general meeting held on 15 April, 2010, the committee elected in April 2009 retired and the following office-bearers and committee members were elected, to serve until the close of the following annual general meeting to be held in 2011

President	Ian Jack
Senior vice-president	Rob Renew
Vice-president	David Craddock
Secretary	Ian Arthur
Treasurer	John Roberts
Ordinary committee member	Felicity Barry
	Neil McDonald
	Mari Metzke

The committee met seven times during 2010

Journal contents project

In mid-2010 the Sydney University Library completed the project to digitise and display on a web site the complete contents of the complete contents of two historic Australian engineering journals. Journal of the Sydney University Engineering Society and the Minutes of Proceedings of the Engineering Association of New South Wales, a total of over 10,000 pages and many images. The full texts of two volumes of each of the two journals are on the Sydney University Library website, where they are available for free access and downloading at:
http://escholarship.library.usyd.edu.au/journals/index.php/EANSW/index and
http://escholarship.library.usyd.edu.au/journals/index.php/SUES/index

On Tuesday 24 August the Friends of Sydney University Library, in conjunction with ASHET, hosted an event to launch the on-line volumes. The whole of the work of digitising the journals and displaying them on the website was carried out by the staff of the Sydney University

Library. The project was the outcome of an ASHET initiative. In 2007, ASHET received grants from the NSW Heritage Small Grants Program ($600), and the Sydney Mechanics School of Arts (SMSA, $6,000), and a donation of $900 from Don Fraser, an ASHET member to assist this project. However the total cost of the project were met by the Sydney University Library, which carried out all the work.

The Heritage grant has therefore been applied to assisting the digitisation of the early volumes of the Journal of the Royal Society of New South Wales, in accordance with the terms of this grant, and the unspent $6,000 grant from SMSA has been returned to SMSA.

Website upgrading project

This project, which was assisted by a grant of $850 under the 2009 RAHS Local History Research and Publication Grant Program, was completed early in 2010. The upgraded website includes a set of ten self guided tour brochures that relate to the history of engineering and technology in the Sydney area.

Electronic history project

So far, little progress has been made with this project. Its aim is to develop and start to implement a strategy for ASHET to make the best use of electronic means of communication both in its existing activities, and also in possible new directions that are compatible with its objectives as a society. Related to this project is ASHET's patents project, on which we have made substantial progress.

Patents project

In 2010 ASHET received a NSW Cultural Grant to assist in undertaking the first stage of a project to facilitate access to details of patents granted by State governments in Australia prior to federation. The work that was partially funded by the grant is now complete and consists of an electronic index to NSW patents granted up to 1884. This index is now on line at http://ashet.org.au/downloads-3/.

We are now looking for sources of funding support to assist in continuing the project.

ASHET/RAHS tour of the Darling Downs and Northern New South Wales.

Following the very successful tour in 2009 of outback New south Wales conducted by ASHET in conjunction with the Royal Australian Historical Society, we planned a two week history tour of the Darling Downs for 2010, but were unable to secure the number of participants needed to make it viable. We are hopeful of obtaining sufficient interest to run the tour in 2011.

ASHET Income and expenditure statement for the year ended 31 December 2010

INCOME	**2010**	**2009**
Members' subscriptions	1770	1,840
Donations	10	850
Income from meetings & activities (net of expenses)	0	3,897
Grant for Patent project	1,000	
Bank interest	530	358
	3747	**6,945**
Less: **EXPENDITURE**		
Insurance	385	413
Telephone & internet	6	260
Affiliation fees	186	180
Postage	20	28
Stationery & office supplies	106	108
Filing fees	47	84
Bank fees	5	0
Patents project	1189	0
Table of Contents project	0	0
Website project	1,400	0
Refund unexpended grant	6,000	0
Publications	83	0
	9,427	**1,072**
SURPLUS/DEFICIENCY for year		
Balance brought forward	23,012	17,139
Excess of expenditure over receipts/Surplus in 2009	-5680	5,873
Balance carried forward	**17332**	**23,012**
Represented by:		
Cash at bank	287	4,577
Cash at bank – on deposit	17065	18,545
Less Subscriptions received in advance	-20	-110

Patenting Australian Colonial Technology

James Harrison, pioneer of refrigeration

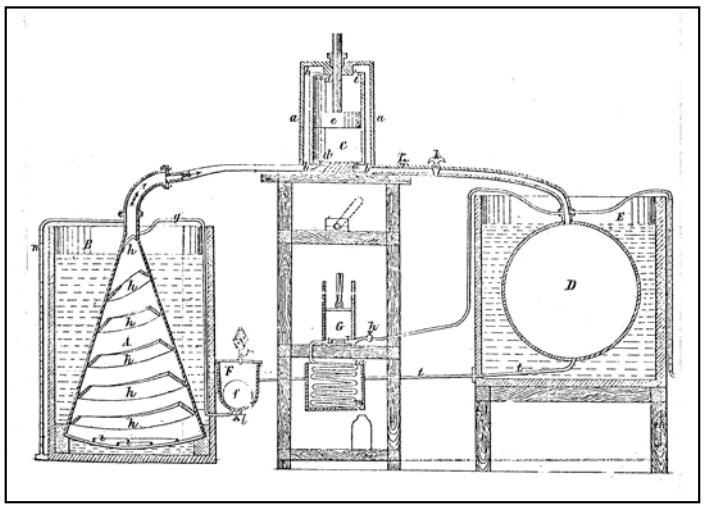
Among the earliest patents granted in Australia were those to James Harrison of Geelong, Victoria. His first patent was granted in 1856 in Victoria and bore the number 25 and the title 'Refrigerating Machine'. The patent was for 'refrigeration by the evaporation of a liquid under vacuum to produce a cooling effect and the recycling of the vapour by condensing it again to a liquid'. This was the basis for a refrigerating machine that Harrison had built in 1855 to be used for producing ice. In this machine the refrigerant was di-methyl ether, which Harrison had readily to hand because it was used for cleaning type in the printing and publishing business that he owned. But the patent application mentioned the possibility of using other refrigerants, such as alcohol or ammonia. Besides ice-making, the patent application mentioned possible use of the invention for preservation of provisions, cooling of buildings, and distillation of essential oils such as perfumes.

Harrison was owner, editor and publisher of the *Geelong Advertiser,* the local daily paper, and a printer by trade. Before emigrating to Australia he had attended lectures in chemistry given by Dr. William Cullen who had demonstrated the cooling effect that occurs when liquids evaporate and written 'An essay on Cold produced by Evaporation'. He demonstrated making ice on a small scale before building his 1855 ice-making machine that is said to have cost £1,000 and was powered by a 3.5 hp steam engine. It had a capacity of 3050 kg of ice in a day. However the machine suffered from leaking valves and gaskets, and Harrison decided to take his invention to England, where these problems might be more readily overcome. Before leaving Australia he made application for two British patents covering his invention.

He arrived in Bristol in June 1856 and found that the British patents had been granted while he was at sea. He made immediate contact in London with Siebe and Company to build first a one-half hp demonstration machine and then larger machines for sale and for his own

use in establishing an ice-works in Melbourne. The first machine was sold in 1857 to brewers Truman Buxton and Hanbury in England. This was the world's first commercial application of mechanical refrigeration. Harrison conducted demonstrations in England, Paris and Vienna, and entered into negotiations to sell his patents, apparently without a satisfactory result. He entered into a commercial agreement with Siebe and Company, the terms of which are not known; it certainly provided no great financial return to Harrison.

Harrison returned to Australia in 1958 with an ice-making machine that he used to establish ice-works first in Geelong and then in Melbourne. He ordered further machines to be built by P. N. Russell in Sydney for use in Victoria and South Australia. In 1860 the Bendigo brewers Glasgow, Thunder and Company installed a Harrison machine. The same year Harrison ordered another machine for the Sydney Ice Company in



British paptent drawing of Harrison's refigerating machine

which he and P.N Russell were partners. These ventures were financially disastrous for Harrison, and he was declared insolvent in 1861. However in Britain the Harrison-Siebe machines were successful. By 1862 the machines were standard equipment in field hospitals established for Briitsh campaigns in Africa. Both James Harrison and Daniel Siebe were awarded medals at the 1862 International Exhibition in South Kensington. H.J.West, who supervised the operation of the machine at the exhibition, joined Siebe and the refrigeration business was carried on by Siebe, West and Company. By 1874 they had built between fifty and sixty machines. Both Siebe and West were granted British patents for improvements. Harrison himself was granted patents for improvements in 1874 and 1878.

In 1872 Harrison played a leading part in a project to ship frozen meat packed in ice, all contained in a tank of brine and more ice, from Australia to Britain. After successful experiments on land, twenty tons of meat were shipped in the *Norfolk,* with Harrison on board. The brine tanks leaked during the voyage and the meat was thrown overboard. The experiment was not repeated.

Eugene Nicolle

Eugene Nicolle, an inventive French engineer who had settled in Sydney, was in 1865 manager of the Sydney Ice Company. At the time of Harrison's insolvency, he and others had bought the plant, and this gave him the opportunity to replace Harrison's refrigerating machinery with an ice-making plant of quite different and original design, which made use of the cooling effect that occurs when ammonia gas is absorbed in water. It was the basis of a refrigerating machine invented in France by F.P.E.Carre in 1858. Nicolle was granted a NSW patent jointly with his partner Richard Dawson in the Sydney Ice Company venture for his ice-making method in 1861, and another patent in 1863, for improvements to the design of the machinery.

In 1857 Augustus Morris, an eccentric Victorian pastoralist, had attempted to interest other sheep-owners in a proposal to land fresh meat in Europe by applying artificial cold. His proposal was treated as a joke. But he persisted, and in 1865 was introduced to Nicolle. Nicolle was immediately interested and produced drawings of the equipment to provide shipboard refrigeration. In 1866 Morris announced that they intended to make an experimental model of the equipment, and called a meeting to solicit subscriptions. Thomas Mort, who was interested in finding a way to export Australian meat, agreed to chair the meeting and to hold it in his rooms. He knew Morris but was not really interested in his project. The meeting was a failure.

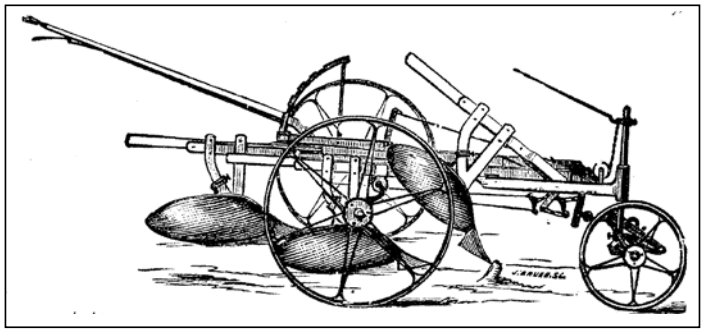
Afterwards Mort had second thoughts and called Morris and Nicolle to his office. Nicolle impressed him and Mort became convinced he had discovered an inventor and engineer of outstanding genius. He immediately provided finance for Nicolle to build a demonstration model of the equipment for freezing meat. By September 1867 it had been running successfully for several months and Mort was convinced of the practicality of shipping frozen meat to Britain. He sent Morris to Britain to secure patent protection for the process, and from 1867 Mort and Nicolle were granted NSW patents for the process and for various improvements. Nicolle, with Mort providing finance and facilities to build and test the experimental equipment, worked through a number of different ideas for building refrigerating machinery suitable for shipboard use. There were numerous problems to overcome, but Mort remained confident, though frustrated by the delays. His plan was to ship a large quantity of frozen meat, around 250 tons, to Britain on a demonstration voyage with shipboard refrigeration, and take the British market by storm. To freeze and store the meat prior to shipment, he built two cold stores (the first refrigerated cold stores to be built anywhere in the world), one in Sydney and one at Bowenfels, near Lithgow, with refrigerating plant designed by Nicolle, and these were very successful.

In early 1877 the cattle were purchased for the demonstration shipment and the *Northam* was chartered to receive the machinery that was being tested in Mort's workshops. The machinery was installed in the *Northam* and was working well, but at the last moment corrosion was discovered that would have taken weeks to fix. The ship had already been delayed and in the end Mort allowed it to sail without its cargo of frozen meat, and with the engineers on board trying to fix the machinery while the ship sailed to Britain. Mort had to abandon his project, and died, deeply disappointed, the following year. In 1879 there was a successful shipment of frozen meat from Australia to Britain in the *Strathleven*. The Bell-Coleman refrigerating machinery, which used air as the refrigerant, was designed and built in Scotland and installed in the *Strathleven* before it made the voyage to Australia.

Early agricultural patents

During this period there were some other notable Australian patents. One was for the stump jump plough, invented by Richard Boyer Smith and his younger brother Clarence Herbert Smith. It solved a serious problem for farmers in South Australia, where much of the land to be used for agriculture was covered in mallee scrub. When the scrub was cleared the roots remained and produced shoots, making the land impossible to plough. The farmers employed a process called 'mullenising' after a farmer named Charles Mullens. It involved crushing the shoots with a heavy roller, then burning them and loosening the ground with a spiked log before planting the wheat. It was less than satisfactory and the formers were struggling.

Richard Smith, eldest son of Owen Smith, was born in London in 1837, and reached Australia in 1828. He was apprenticed to an agricultural implement maker in South Australia and went into trade as a blacksmith and carpenter. In 1872 his younger brother Clarence, the ninth of Owen's twelve children, born in Australia in 1855, became apprenticed to Richard as a blacksmith and machinist. In 1876 they exhibited two versions of the stump jump plough at the agricultural show in Moonta and were awarded prizes. The *Farmers' Weekly Messenger* accurately forecast that Smith's invention had the potential to 'cause



Stump jump plough made by Mellors in 1893

a complete revolution in tilling uncleared land'. The invention was simple and effective. It consisted of hinging the plough shares so that on encountering an obstacle they would rise out of the ground. Attached weights forced the plough share back into the ground as the obstruction was passed. Richard applied for a patent under the South Australian Patents Act of 1877, but allowed it to lapse. Richard and Clarence made several improvements but Richard was finding it hard to make a living until the president of the Royal Agricultural and Horticultural Society of South Australia, Sir Richard Dalrymple Ross, took up his cause and petitioned the South Australian Parliament, as a result of which in 1882 it recognised Richard as the inventor of the stump jump plough, in the face of rival claims, and awarded him a bonus of £500. In that same year Richard was granted a NSW patent for his invention. In 1884 Richard moved to Western Australia where he exhibited the plough, but failed to make a profitable return on sales.

Meanwhile Clarence, in 1880, established an agricultural machinery works at Ardrossan. He died in 1901 leaving his sons to take over the thriving business that bore his name. The company Clarence H. Smith failed during the depression and went into receivership in 1935. Richard never acknowledged that his brother had played any part in the invention of the stump jump plough, even though the earliest drawings and several patents bore Clarence's name. The stump jump plough proved to be one of Australia's most important agricultural inventions, and its principle is embodied in modern disc ploughs.

Early Australian harvesting machines

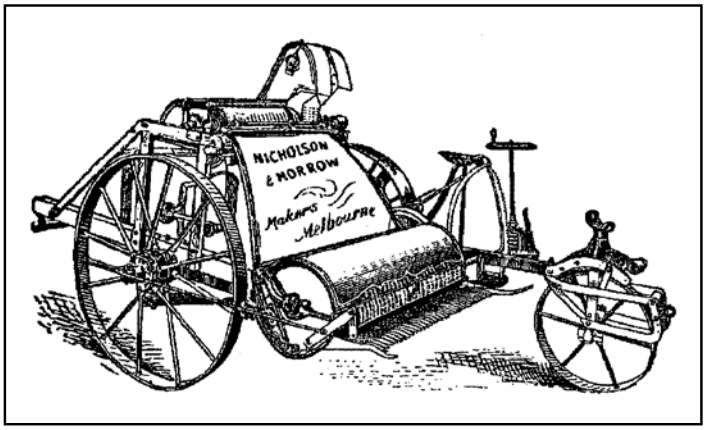
The history of harvesting machine inventions in Australia is complex and controversial. This article is no more than a brief outline of the important early developments. The first was the invention in South Australia of the stripper, a machine for removing and collecting the heads from a crop of wheat. John Ridley, a flour miller, won an Agricultural and Horticultural Society prize for his stripper in 1844, but there are claims that a model exhibited by John Wrathall Bull in a competition in September 1843 illustrated the principle of the stripper, that Ridley had seen the model and did not demonstrate his own machine till two months later. Bull considered himself to be the inventor of the stripper. The wheel-mounted machine was pushed through the wheat crop by two horses. At the front it had a comb that lifted the wheat heads which were then removed and threshed by rotating blades which sat above the comb. The heads were then stored in a box for later separation of the grain and the chaff in a stationery winnowing machine.

Neither Ridley nor Bull patented the stripper. Ridley made seven of the machines in 1845, and more later; over the years thousands were built by others. Ridley's returns from the machine were substantial but small compared with the income from his other business interests.

James Morrow, a Victorian manufacturer of agricultural machines, developed and patented several improvements to the stripper, the most important being his stripper harvester demonstrated in 1883 and patented in 1884. It combined in one machine the stripper, which removed and threshed the heads of grain, and the winnower which separated the grain from the chaff. It was marketed by the firm Nicholson and Morrow as the 'Union' harvester and sold steadily but slowly, yielding little or no profit. Morrow died in 1910 and the firm closed in 1914.

In January 1885 Hugh Victor McKay, then nineteen, member of a farming family in Victoria, demonstrated a stripper harvester made on the family farm and patented shortly afterwards. It was similar to Morrow's machine but McKay always claimed that he had invented it completely independently. Machines were made under contract by several manufacturers in Victoria and were marketed in competition with Morrow's. In the 1890s McKay made improvements to the machine, marketed it as the 'Sunshine' harvester and established his own manufacturing facilities at Ballarat with help from business associates. The business grew rapidly and produced handsome profits. In 1904 manufacturing moved to Braybrook, renamed Sunshine. In 1904 the Sunshine Harvester Company was the largest machinery exporter in the Commonwealth and the harvester works were for many years the largest factory in Australia.

All the inventions mentioned here, with the exception of Ridley's stripper, were patented in the Australian colonies. No doubt the inventors



Nicholson and Morrow stripper harvester

hoped that by applying for and being granted patents they would improve their chances of commercial success. I found no evidence that patenting resulted in substantially increased financial return to these inventors, or that patenting was an important factor in promoting interest in the technology. This is in marked contrast to the experience with patents in Britain and America in the nineteenth century where patent rights were a source of substantial profits to many inventors and entrepreneurs.

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ASHET News is the newsletter of the Australian Society for History of Engineering and Technology Incorporated ABN 47 874 656 639
ISSN 1835-5943

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