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ENGINEERING HERITAGE AUSTRALIA



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.

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



HS Taylor with his third Header Harvester, demonstrated successfully in 1914.

Image courtesy the Taylor family.

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.

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 c1910

Photo from B Taylor



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.

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 Taylor c1950s

Photo from B Taylor

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 2001 statement 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.



