Australian inventions for sustainable farming

What is the name of the invention or new knowledge ?

Sunshine self-propelled Auto-header – a machine that strips, threshes and winnows and moves on its own

What did it look like ?

There is a line drawing of the "Sunshine auto-header self-propelled" in a November 1936 advertisement by HV McKay Massey Harris P/L on page 382 of Ken Arnold's *A century of farmyard relics in Australia 1840-1940.* 2011 Bendigo: Crown Castleton Publishers. Vol 4

There is a photo of a W class Sunshine self-propelled auto-header harvesting in wheat field in 1929 on the Yorke Peninsula, South Australia, at the Museum Victoria's *Sunshine Harvester Works* website
http://museumvictoria.com.au/sunshine/displayimage.asp?iid=11958

The H.V. McKay pavilion, at the Wimmera Mallee Pioneer Museum at Jeparit, houses Sunshine farm equipment. The photos below are of a Sunshine self-propelled auto-header – a 1936 model.

These are close up views of the machine above

The Sunshine factory built many different types of machinery. The auto-header below was pushed by horses, not self-propelled nor pulled.

When was it known ?

1923
on the market

Who was the scientist?

Headley Sheppard Taylor
of Henty NSW.,
Farmer, and self-taught technical drawing, pattern making and engineer, invented the header-harvester in 1912 and the self-propelled auto-header .
In 1916, to develop and make his invention, Taylor took up a position with

Hugh Victor McKay,
Agricultural machinery manufacturer under the Sunshine label
Was the industrialist who had the money to take the invention to the market.

In his next step, Taylor invented the self-propelled ability to his auto-header while a part of Sunshine enterprise.

for more details about Taylor and McKay see
Walsh, Gerald. *Pioneering Days – People and innovations in Australia's Rural Past ,* 1993 St Leonards: Allen and Unwin pp187-188

What need was there for this?

- **Harvesting grain has three tasks:**
  - **Strip = takes grain off the plant**
  - **thresh = knocks grain off stalks**
  - **winnow = separate grain from stalks**

These were originally three different jobs with strippers, threshers and winnowers.
In the 1880s, harvesters had been invented which combined:
  - **the stripping, by beating the wheat grain off the heads of the stalk**
  - **with winnowing, by separating the grain from the chaff.**

James Morrow had been the first to invent one of these machines and to manufacture them, but McKay had been better at commercialising them and has built a legend that he invented them, rather than buy the ideas of others.

These harvesters had cut down on labour needs a lot, but there was still a need to reduce the amount of labour needed for the harvest operation, especially as it was in the heat of summer, so a machine was needed which could combine all three operations.

For more details about the invention of the harvesters in the 1880s see
Lee, Tim. *New evidence casts doubt on harvester history.* First screened on ABC's *Landline* on 13 March 2005, and online at the *ABC Landline* website at www.abc.net.au/landline/content/2005/s1320660.htm

The Self-propelled machines of the time were side-draft operations. They lost the first part of any paddock they entered, as it was mowed down under them rather than being picked up by the machine.

Better self-propelled machines were needed to reduce the reliance on horses in the heat.

There had been big storms which had flattened crops. Current machines could only pick up standing crop. A machine was needed to pick up crops that were flattened.

For a photo of a Sunshine auto-header picking up flattened crop in 1933 see *Working the land 1933* on the web at *Museum Victoria's Sunshine Harverster Works* website
http://museumvictoria.com.au/sunshine/displayimage.asp?iid=12280

For more information on the background to this invention see:
Quick, Graeme Ross. *Remarkable Australian Farm Machines,* 2007 Dural: Rosenberg Publishing p 153

What was the discovery that led to this invention?

The self-propelled drive could be placed to make a T- shaped front so as to not knock down the first crop.

Two narrow fans could be used for winnowing instead of one.

A comb at the front to lift the crop, especially useful on flattened crop.

Advances in motors so that horses were not needed to move it.

For more information on the background to this invention see:
Quick, Graeme Ross. *Remarkable Australian Farm Machines,* 2007 Dural: Rosenberg Publishing p 70-71

How does it work ?

The key points are:

- the threshing drum had a fan which made the machine simpler
- Two narrow fans on either side of the threshing cylinder meant there was no need for a separate winnowing fan for the cleaning system. It brought air down by guide vanes under the riddle box.
- The comb at the front, with its twin augers and a sickle bar, lifts up and separates the stalks before they go into the machine to be cut off.

Comb front of a Sunshine auto-header

For a photo and explanation of the Sunshine auto-header, see the *harvesting equipment 1918* on the web at *Museum Victoria's Sunshine Harverster Works* website http://museumvictoria.com.au/sunshine/displayimage.asp?iid=10671

For more information on the specific design of this invention see
Quick, Graeme Ross. Remarkable Australian Farm Machines, 2007 Dural: Rosenberg Publishing p 72-77

For a general diagram of an auto-header for its named parts, see *Combine Harvester* at *Wikipedia* website at http://en.wikipedia.org/wiki/Combine_harvester

What shows its importance as an Australian discovery/invention ?

1000 of the auto-headers were sold in 1920, before the self-propelled ability was added.

Business set up on it	Taylor went in to and stayed in business at McKay's Sunshine agricultural machinery business, which had been begun with headers by McKay.
Where used on farm	in the paddocks at harvest
Changes it made to farming	reduced the labour and horse needs for farms, so that harvest was quicker and farms were able to grow in size
Contribution to sustainability	1 more crop able to be harvested 2 reduced costs of time, fuel and labour for the harvest jobs = ie made the farming enterprise more efficient
How quickly adopted	very quickly, spurred on by the ability of the headers to be able to pick up flattened crop
The places it spread to	across Australia, then exported to the USA, then Taylor set up a factory in Canada for sales to North America
Changes made to it for today	SP auto-headers have closed in cabs and GPS auto-steering. They are bigger and led to farm production increasing for grains and farms getting bigger
Still in use today	yes, as SP auto-headers 

	2013 SP auto-header harvesting wheat
Current use in the Wimmera-Mallee	for all grain and legume harvesting .  SP auto-header harvesting lentils 2013
Led to other knowledge or invention	further developments of headers

for more on the devlopments go to
Walsh, Gerald. *Pioneering Days – People and innovations in Australia's Rural Past ,* 1993 St Leonards: Allen and Unwin p188
on the web at *Museum Victoria's Sunshine Harverster Works* website
http://museumvictoria.com.au/sunshine/

Shape Sleuths Link –
An exercise for the 2013 Maths of Planet Earth

1 Make a drawing of an SP auto-header using the simple shapes that make it:

- *1930s SP auto- header from photos in the Museum Victoria website*
- *2013 SP auto- header from the photos above*

2 Name the shapes that are found in your drawings above.

3 In summer, look for some dry tall grasses with seed heads, that you can :

- *See if they will bend and/ or break off or if you need a knife to cut them off*
- *With a seed head, see if the seeds shake loose easily or if you have to bang them to get their seeds.*
- *See how big the seeds they are and how far they scatter to when they fall.*
- *If they were weeds, pick up the seeds in to a container for disposal- you don't want them growing anywhere.*
- *But if this was a crop, think about how much easier it would be if a machine could do all these three processes for you and bag the seed ready for you to sell or keep for seed to sow the crop next year.*

4 If you know someone who harvests a crop, interview them to find out:

- *Do they use an SP header or a PTO header? If a PTO, why not an SP?*
- *How many machines/vehicles are needed to support an auto-header when it is working?*

- *How quickly does a SP auto-header go in good crop conditions and poor crop conditions? What factors affect these conditions?*
- *How long does harvest last today? Has the timing of harvest been changing over the years?*

For further information :

Museums

H.V. McKay Pavillion at the Wimmera Mallee Pioneer Museum at Jeparit, Victoria 3423

Books

Arnold, Ken *A century of farmyard relics in Australia 1840-1940.* 2011 Bendigo: Crown Castleton Publishers. Vol 4 pp 376-436

Crocombe, Angela. *Grain Farming* 2006 Carlton: Echidna Books, Harcourt Education, p 12

Peterson, Cris. Fantastic Farm Machines. 2006. Honesdale, Pennsylvania: Boyd Mills Press p21-2

Quick, Graeme Ross. *Remarkable Australian Farm Machines,* 2007 Dural: Rosenberg Publishing pp 72-77

Van Oudtshoorn, Nic *Famous Australians*. Kensington NSW: Bay Books 1989 pp 66-69

Walsh, Gerald. *Pioneering Days – People and innovations in Australia's Rural Past ,* 1993 St Leonards: Allen and Unwin pp187-188

Websites

harvesting equipment 1918 on the web at Museum Victoria's Sunshine Harverster Works website http://museumvictoria.com.au/sunshine/displayimage.asp?iid=10671

Working the land 1929 on the web at Museum Victoria's Sunshine Harverster Works website http://museumvictoria.com.au/sunshine/displayimage.asp?iid=11958

Working the land 1933 on the web at Museum Victoria's Sunshine Harverster Works website http://museumvictoria.com.au/sunshine/displayimage.asp?iid=12280

Combine Harvester at Wikipedia website at http://en.wikipedia.org/wiki/Combine_harvester

An education activity for the Mathematics of Planet Earth 2013 AUSTRALIA **in the** 2011-2020 United Nations Decade on Biodiversity