The Pyrenees Heritage Preservation Magazine

GOLDSMITH

No 151 Feb/April 2019

Lake Goldsmith Steam Preservation Association Inc

Registration No:- A0032895

Rally Grounds:-

1234 Lake Goldsmith-Carngham Road

Lake Goldsmith Vic. 3373

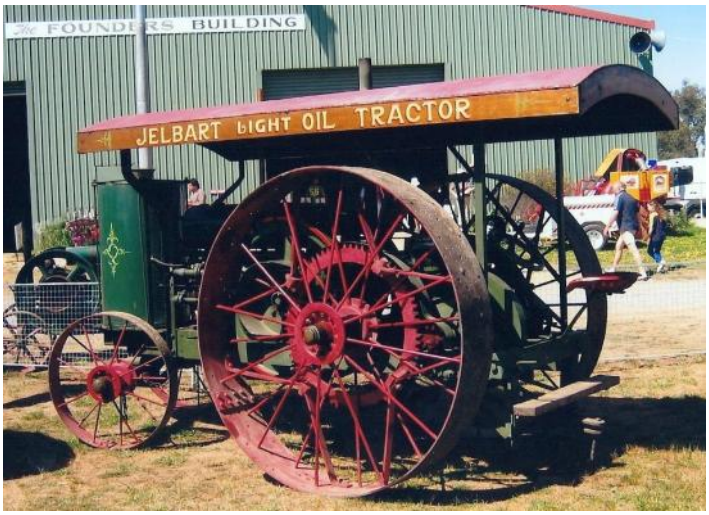
Next Rally No. 113

LAKE GOLDSMITH

AUTUMN RALLY MAY 4 & 5 2019

Highlight Theme:-

1 & 2 cylinder tractors



Garden Tractors, Ploughing Engines, Wheels & Tracks

Editors Overview

Welcome to Goldsmith 151, February & April 2019

Dear Readers.

The 113 th rally is nearly with us and the theme of ONE AND TWO CYLINDER TRACTOR opens up a wide field for exhibitors and an interesting spread of type make and model for visitors. The Industrial Revolution got underway powered by single cylinder steam and vacuum power. First they had to learn how to make cylinders and the machines to make the cylinders. When they got the cylinders sorted out they had to learn how to use them to rotate a shaft so that they could replace mills powered by wind and water. With that mastered, they had to make the engines small enough to mount on wheels.

With portable engines on the move behind horses, it did not take long for makers to figure out how replaces the horses by using the engine to drive the wheels and make the portables self propelled. With propulsion mastered the next trick was to get them to go around corners.

Single steer, single drive , dolly wheel steering Ackerman Steering and worm and chain were all tried. Lockable disengagable drive wheels eventually gave way to a differential. Then came multiple gears, dog clutches and friction clutches.

Eventually when all the various patents expired the traction engine emerged as a viable Prime mover for road and farm. It soon branched out in modified form to power special machines to make roads for its own use, and to provide Industry and the Military with special machines for work and war.

Internal combustion engines soon found their way into these engines and the tractor as we know it was born.

Multiple cylinder s took over for larger machines, but single and double cylinder engines live on for low power tractor work.

Single cylinders have powered tractors from c1860 to today, that is a lot of Tractors.

The President, Committee (and Editor) hope that you find something of interest in this Feb/April 2019 edition 151 of Goldsmith and enjoy a day at the May Rally.

A HD print quality version of Goldsmith 151 will be available from the website as usual at:-
www.lakegoldsmithsteamrally.org.au/magazine.html
Thanks to Eva's Gallery for many of the action Rally Pictures, if you would like a copy contact the editor.

Mission Statement

To foster, nurture, encourage and demonstrate technical, agricultural and life skills associated with the Industrial Era.
To provide a quality environment where these skills may be used to educate and entertain members and visitors.
To run two weekend rallies each year, and be available at convenient time for other interested groups or individuals.
To conserve and develop a heritage collection.

Find us on the net at:- www.lakegoldsmithsteamrally.org.au
Or contact us by email:- info@lakegoldsmithsteamrally.org.au
Or write to:- The Secretary:- P.O. Box 21 Beaufort 3373
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Single and twin cylinders

What a wide ranging theme for a tractor show. Cylinders have been with us from the first Tractor and they are still with us today.

A piston is a plug that can move along a cylinder in response to pressure difference across the piston.

The potential must have been recognised early, maybe when someone blew a pebble through a hollow grass stem. Blow pipes and darts elaborated on the idea and they became effective weapons, particularly if the dart had a poison tip.

Eventually some one developed "Gunpowder" which when ignited in a cylinder projected a shot out of the cylinder much faster than the blowpipe dart.

Special cylinders were needed. Coopers had been making barrels to hold liquids for hundreds of years, some of which were pressurised by fermented gas.

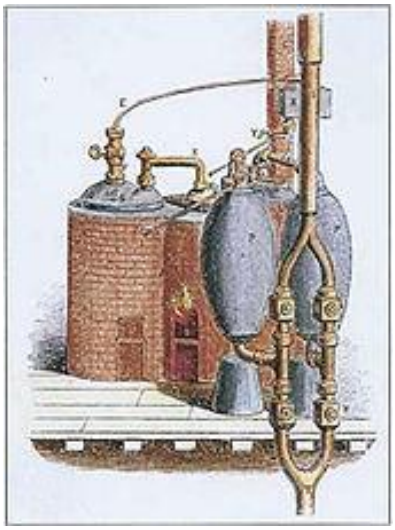
Special barrels with parallel timber staves and steel hoops were developed and the new cylinder became known as a barrel. Steel bands were shrunk around bored timber and a metallic liner was used later as can be seen on this 90mm Canon from the 14th Century Bulgarian Turkish war which is held in a Nuremburg Museum.

Projectiles were made from Iron and stone and they skipped along a bit faster now. They were made spherical and wrapped in a lubricated cloth or leather patch to create a seal and became know as balls.

Eventually the limits of timber or iron barrels with bands were overcome by using bronze and later iron and eventually steel barrels when techniques for boring precise smooth cylindrical inner bores were improved and later perfected in 1774 by John Wilkinson. The ball could now change, it could be made longer, with soft bands fitted around the circumference to create gas seals. (and pick up rifling grooves if fitted)

These projectiles became hollow to carry explosives inside and became shells.

They had now developed a means of using high gas pressure to do useful work.



Effective Canon barrels had been in use for a while before 1698 when Thomas Savery of Devon in England made the first commercial use of a steam powered machine. The patented machine created negative atmospheric pressure in a cavity by using steam to drive the air out and letting the condensing steam create a vacuum. The cavity was connected to a well of water by a submerged inlet which let the atmospheric pressure force water up into the evacuated cavity to a height of

about 9.7 Metres. By hand manipulating Valves, steam could be admitted to the top of the cavity or vessel to force the water down and out to a riser which transferred the water up above the vessel under steam pressure.

In spite of these limitations Savery's pump demonstrated that pressure could be and was used to raise water and Saveys pump became know as "The Miners Friend".

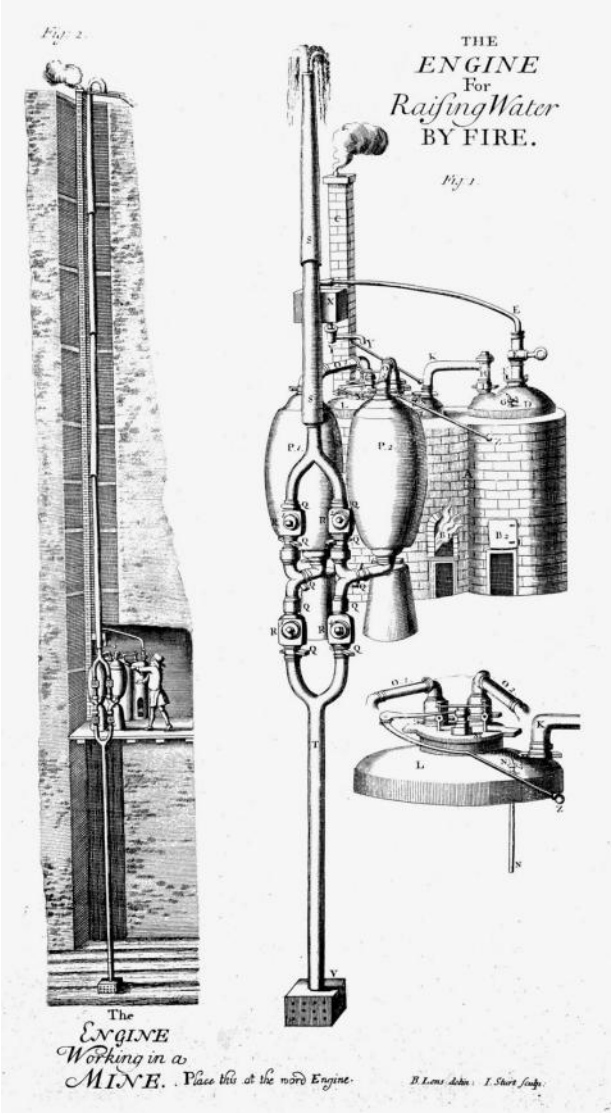
These mechanical pumps remained in service for some decades.

An act that became known as "Fire Engine Act" was enacted in 1699. It extended Savery's patent from 14 to 21 years, and as the patent read:-

"A new invention for raising of water and occasioning motion to all sorts of mill work by the impellent force of fire, which will be of great use and advantage for draining mines, serving towns with water, and for the working of all sorts of mills where they have not the benefit of water nor constant winds." !!!

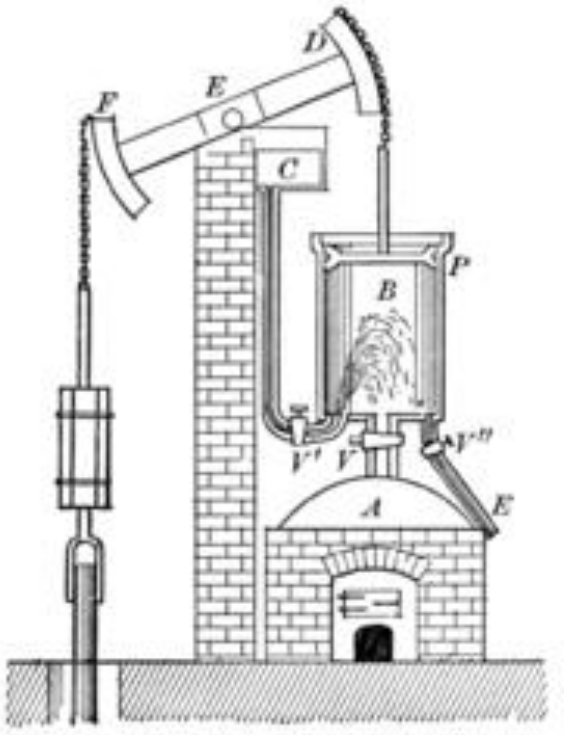
(Base Load Power Was Born c 1700)

It covered steam engine development for the duration of the patent.



A supplier of equipment to the mines, Thomas Newcomen formed a partnership to combine Savery's atmospheric engine patent with a Piston invented by Denis Papin to build a steam beam engine that could pump water from deeper mines. The first of these engines was built by Newcomen's partner John Calley and installed at the Conygree Coalworks in the West Midlands.

Positive Steam pressure was used to lift the piston which allowed the pump rod to move down. (the chain connecting the piston and pump rods to the beam avoided a connecting rod, so the piston could not push the beam). When the hand operated steam valve was closed a water spray valve could be opened to speed up the steam collapse to create a vacuum in the cylinder and increase the cycle time. Steam pressure broke the vacuum and allowed the piston to rise and the pump rod to fall. The warm condensate drained back to the boiler when the steam valve was open, or was drained away. This made it a double acting piston, although it only worked in one direction. These pumps were popular for the next 75 years or so. 99 had been built by 1770 when 57 were still in use.



Downtime for maintenance was about 6 hours per day, and a pump with a 5' stroke and a 12" bore could raise 250 000 gallons per day for a cost of 20 shillings. Steam pressure was 7PSI and water could be raised 150.'

The alternative to steam was pairs of horses on 2 hour shifts, who for a larger cost could only raise 67 000 gallons.

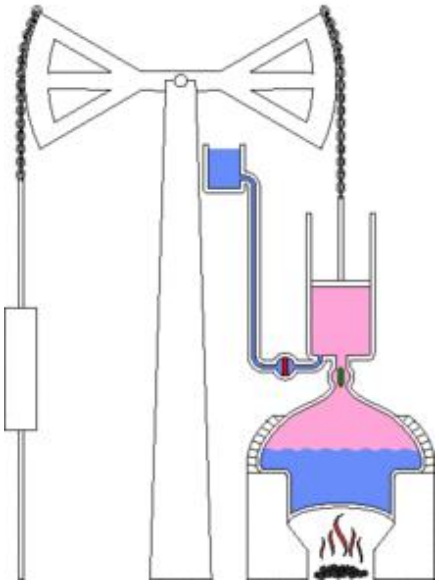
Cylinders were up to 6 feet in diameter. These early cylinders were difficult to manufacture. The walls were hammered and hand scrapped, and the piston clearance was a finger width. A leather seal was fitted to the piston and it ran with water above it as a lubricant.

The Newcomen engine in this 1930's picture above is believed to be the worlds oldest surviving steam engine It is in the Ford Museum

Newcomen soon fitted rods and escapement mechanisms to the valves to increase the operating speed and reduce incidence of error inherent in manual operation.

Self actuating machines were a source of wonder in the 1700's.

In 1981 Newcomen's engine was declared an International Historical Mechanical Engineering Landmark by the ASME.

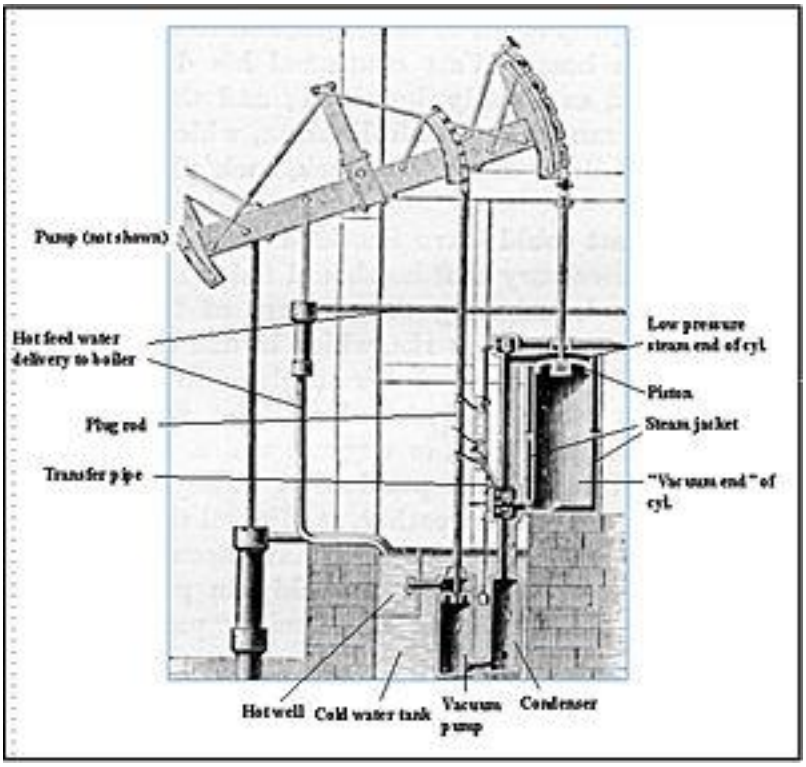


At last the Cylinder, Piston and Steam were combined in a practical reciprocating engine which could be used to pump water.

James Watt, a Scottish instrument maker, who had been asked to repair a model of Newcomen's engine in 1776 was the next to make major improvements to the efficiency of the steam engine. He introduced the condenser to collapse the steam in the atmospheric engine. This adaption eliminated spraying water into the cylinder which cooled the cylinder wall which had to be reheated wasting energy and time. The cylinder walls were jacketed with steam so that no steam would condense in the cylinder. Watts improved efficiency further by using expansion to recover more energy from the steam. The valves were arranged to cut of the steam at mid stroke giving a 1:2 expansion which still allowed effective pumping.

The condenser alone reduced coal consumption by half. The warm condensed steam was returned to a hotwell and used for boiler feedwater.

Watts arranged the valving to make the piston double acting, that is, it had a power stroke in each direction. <u>These engines used steam at atmospheric pressure</u> on one side of the piston to push against the Vacuum being created on the other side of the piston, alternating ends with each stroke. Watts was cautious about steam pressure.



The steam replaced air with a collapsible gas and provided heat.

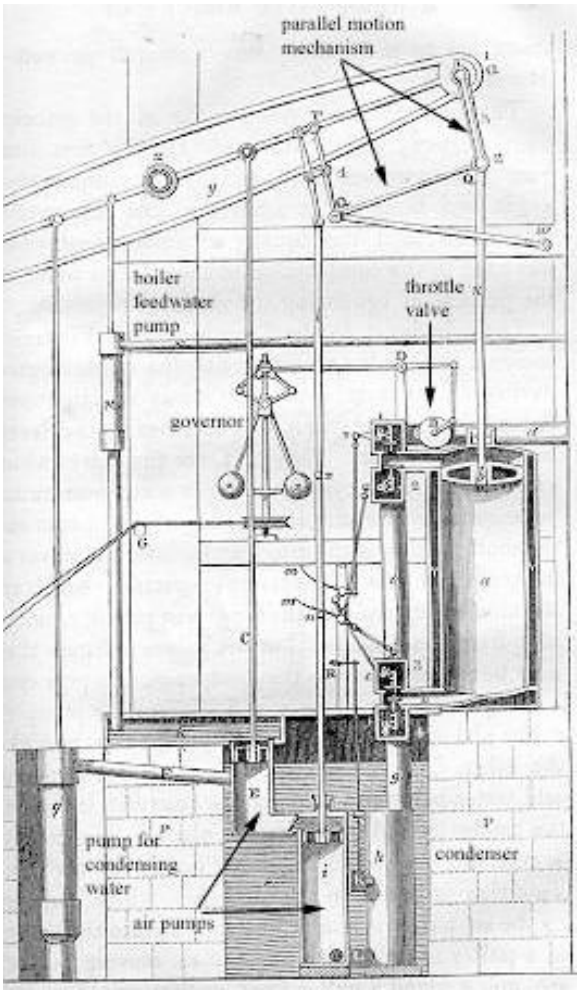
This was achieved by using a gland around the cylinder rod to provide the second chamber.

To be of any use the chain connecting the beam to the piston rod had to be replaced by a rod which could push the beam up and pull it down.

This arrangement effectively doubled the amount of work that the piston could do, and better still it offered higher speeds and the prospect of smooth shaft rotation.

The hard bit was how to connect the piston rod which moved up and down in a straight line with the beam end pivot which rotated in an arc.

To solve this problem Watts invented his Pantograph based four link Parallel Motion which provided linear motion for the piston rod without the need for a slide.



Watts formed a partnership with Mathew Boulton who financed the building of a prototype and provided the skilled craftsmen needed.

With the invention of Wilkinson's boring machine in 1774, Boulton wrote in 1776 that *"Mr. Wilkinson has bored us several cylinders almost without error; that of 50 inches diameter, which we have put up at Tipton, does not err on the thickness of an old shilling in any part".*

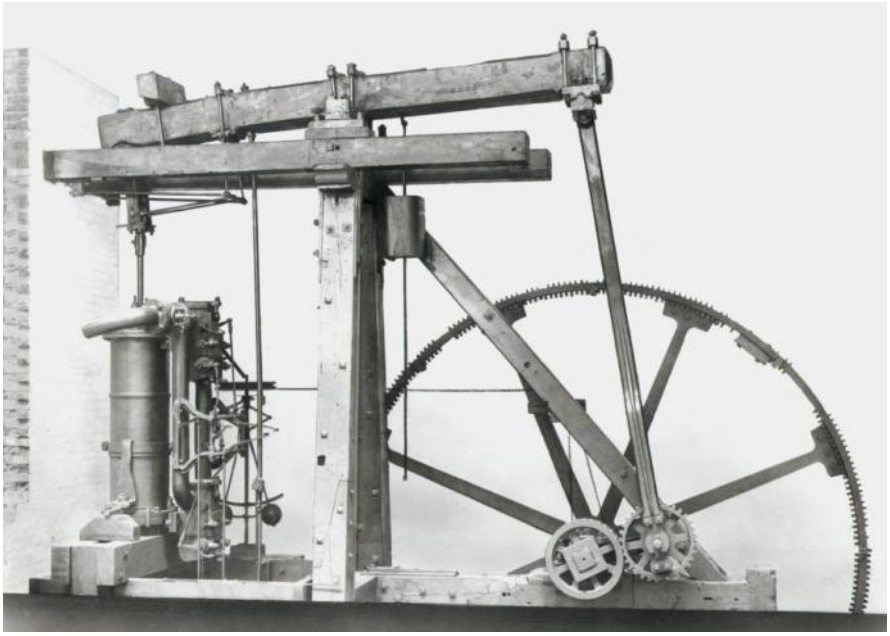
By 1776 the engine used 75% less coal than Newcomen's and machines were installed at various mines to pump water.

Boulton wrote to his partner, "I don't mean to hurry you, but I think in the course of a month or two, we should determine to take out a patent for certain methods of producing rotative motion…There is no other Cornwall to be found, and the most likely line for the consumption of our engines is the application of them to mills which is certainly an extensive field."

The mechanism was now altered to drive a crankshaft. The conventional conrod and bearing

was patented by others, so an interim arrangement was to use a Sun and Planet gear arrangement until the paten expired. This device was suggested by Boultons employee William Murdoch (he also invented the oscillating steam cylinder and steam "D" slide valve)

Rotary motion, with the addition of a Flywheel added new opportunities for the engine as its consistent smooth performance allowed mills and other industries which depended on Water wheels or wind to operate at any time, unaffected by drought or calm winds.



Science Museum Group Collection © The Board of Trustees of the Science Museum

A Boulton and Watt Rotative Beam Engine. This is the oldest essentially unaltered rotative engine in the world and was built by Watt himself in

The flyball governor used on windmills was adapted to control the steam supply to the engine and provide a constant speed. Watt also introduced the Horsepower as a unit determine to describe the performance. He observed that a horse could raise 150 pounds almost 4 feet in one second (550 foot pounds per second), and the metric Watt was named in his honour.

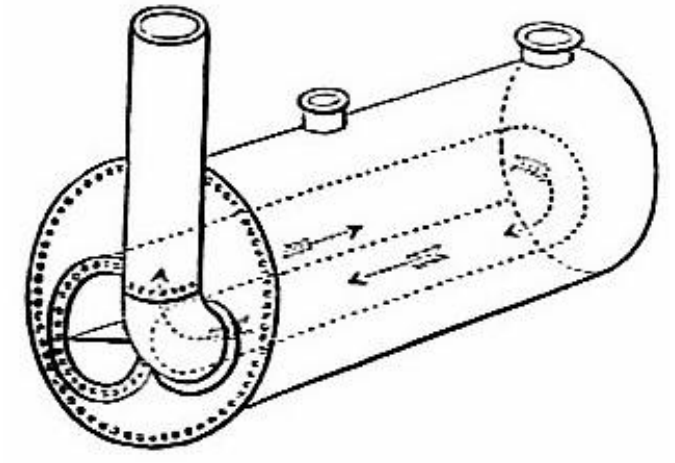
Boulton & Watt built about 500 of these engines by 1800.

It was 1776 and our single cylinder was now precisely machined in a machine that could be used for rotary or linear motion.

This continuously available power, irrespective of location, or the variations of wind or water were the basis of the Industrial revolution.

Richard Trevithick, a mining engineer from Cornwall in England realised that developments in Boiler design would allow them to operate at pressures above atmospheric pressure. (William Murdoch had demonstrated a high pressure(30PSI) engine in a model powered carriage in 1794). If this could be achieved, great improvements would be possible.

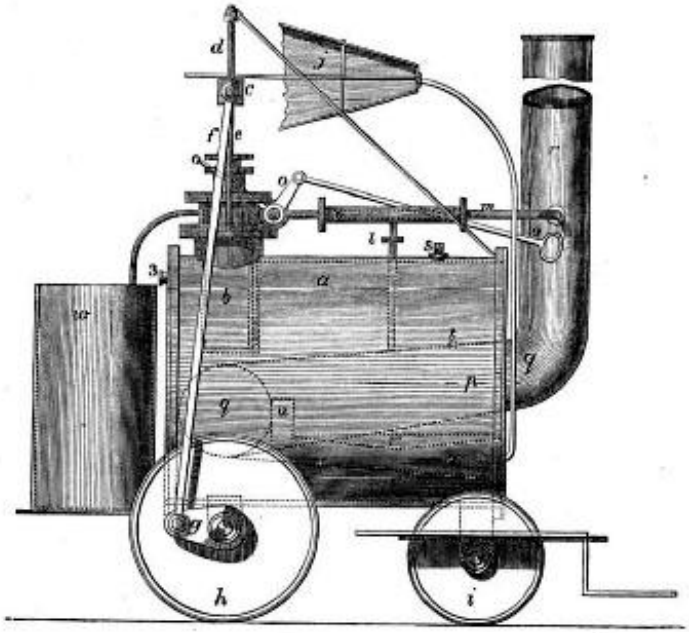
Watts Condenser would not be needed as there was no need to create a vacuum. This would bypass Watts patent, and the higher pressure would allow smaller diameter cylinders of less weight and cost.

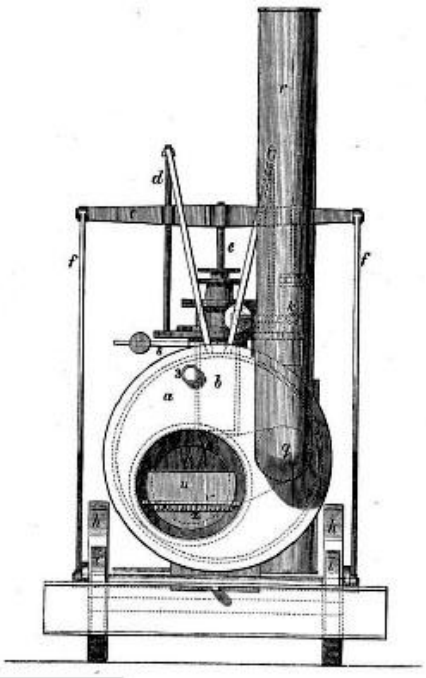


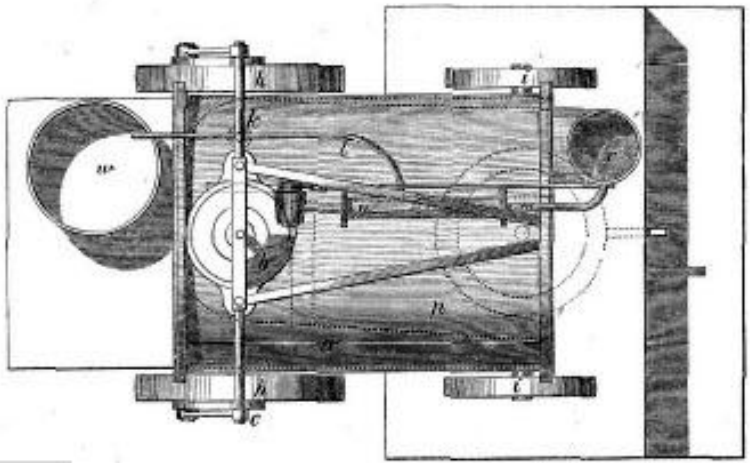
In 1801 Trevithick built a full size High Pressure Road Locomotive.

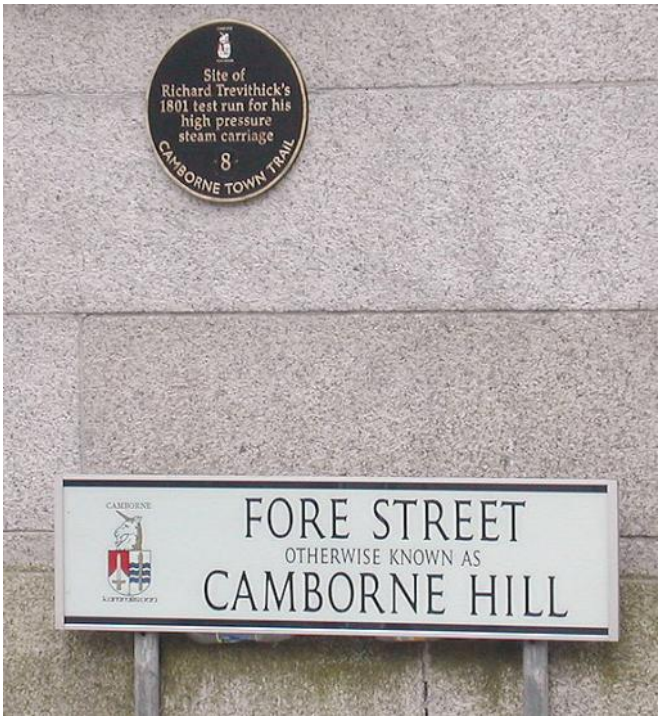
<u>The embryo Traction Engine had arrived</u>

In a demonstration on Christmas eve the "Puffing Devil" carried six passengers on a public road and up a hill at Camborne near Beacon in Cornwall. This was the first demonstration of high pressure steam transportation. During tests a few days later









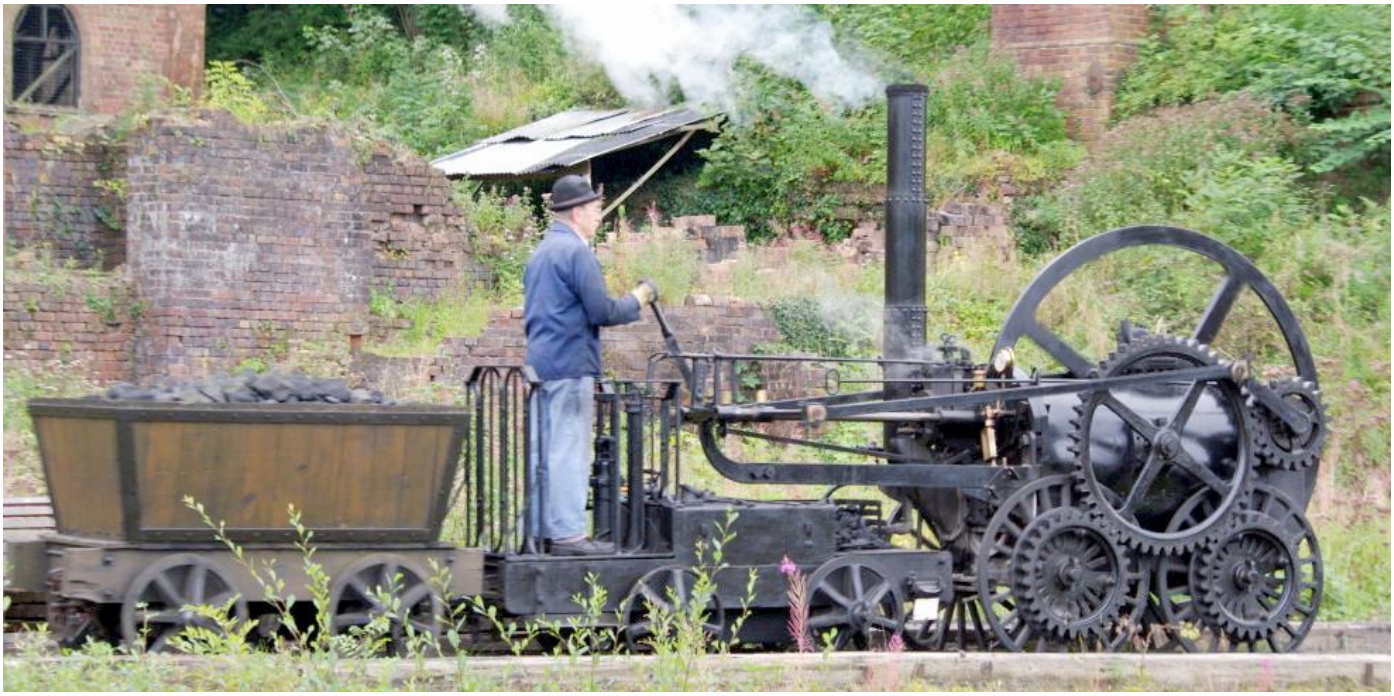
Plaque to mark Trevithick's 1801 Road run and a replica of the Puffing Devil. This is believed to be the first demonstration of a powered road vehicle

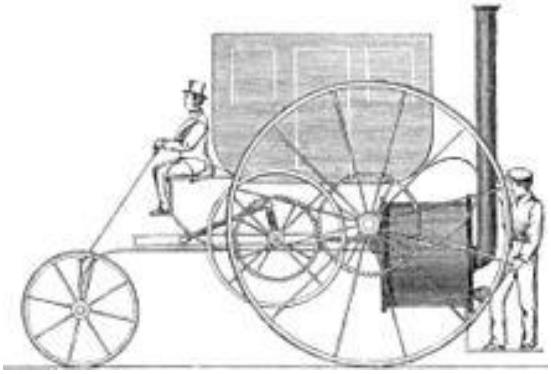
there was a breakdown.
Left unattended while the crew had a meal at a nearby public house, a fire broke out and it was destroyed.

Trevithick built a railway locomotive using a steam engine that he designed for powering forging hammers. The locomotive won a bet for 500Guineas when it hauled 5 carriages each loaded with 10 tons of iron and 70 workers over the 9 Mile track used by the horse drawn mine carts. It travelled at about 5mph and demonstrated that friction alone would allow it to drive uphill.

Some track plates broke and the engine was put back to its stationary task.

Like the Puffing Devil the wheels were flangeless, so they could run on hard ground as the horse drawn ones did, which probably





also lets them qualify as early powered tractors, or at least a road Locomotive.

Trevithick's London Steam Carriage carried passengers in London for about 10miles at speeds of 4 to 9 mph. Unfortunately it crashed and due to lack of interest it was wrecked and the engines was used in a plant to roll of all things, steel hoops for barrels.

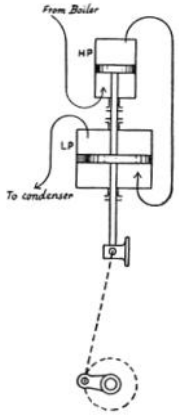
Trevithick's development of the much smaller return flue boiler, which increased heating area, weight and size made these carriages possible. He later developed the single pass "Cornish" boiler.

The very low pressure kettles were superseded.

With the failure of the rail track plates Trevithick moved away from powered transport and used his steam engines in Industry.

A major design feature was to improve on Watts steam cutoff and make use of the expansive properties of steam which was possible using high pressure steam.

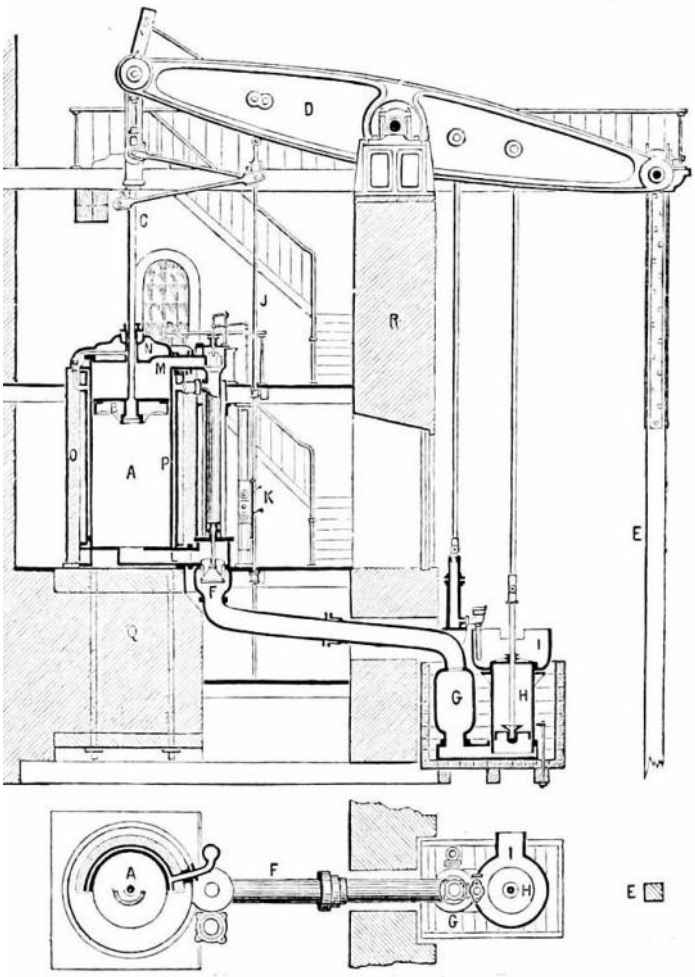
Trevithick went on to convert many of Watts engines to high pressure which improved their performance by halving the fuel consumption. This was a major win in Cornwall where there was no natural coal, and railways were still in the future. They became known as Cornish Engines. Simms took over Trevithick's work when he moved to South America, and Arthur Woolf improved them further with his newly invented Tandem Compound Cylinders.



Our single cylinder had now been successfully operated at high pressure and by using both ends it is now double acting, and the piston is connected to a crankshaft by a connecting rod guided in an early crosshead, or slide to stabilise the piston rod.

Trevithick used the boiler shell as the frame for his Locomotives. The Cylinder, Motion and wheels were directly connected and the operator and consumables were carried with the driver, and the combination was a proven success on Road and rail, and compounds had arrived.

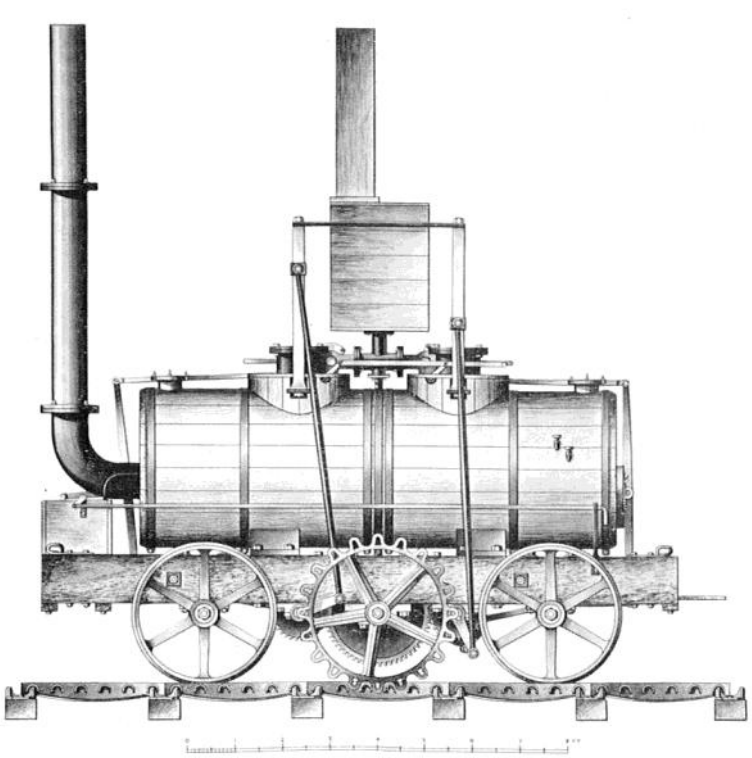
Unfortunately no one seemed to want one at the time



Left above, a Cornish engine with exhaust condenser to speed up cylinder emptying and recover energy. Right above 4 story Cornish engine preserved at Poole. UK

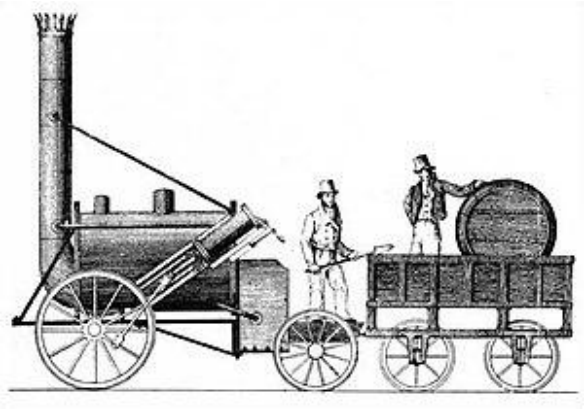
The next relevant stage came in 1812 when Matthew Murray built Salamanca, a twin cylinder Cog railway Locomotive for a railway in Middleton that ran for 20 years. From our point the cylinders have sliding cross-heads that are connected to the drive wheel via shafts that have the bigend journals phased 90º apart.

That is when one cylinder is at the end of its stroke the other is at mid stroke. This engine can self start as the single cylinder neutral dead centre point has been eliminated.



Steam Engine development

concentrated on railways during the early 1800's to service mine cartage of materials to Ports and Canals. The Steam Locomotive developed rapidly after 1825 when the Stockton and Darlington Railway opened as the first steam powered railway for mine work. Prior to 1833 passengers travelled in horse drawn carriages. The Railway ran until the 1860's



In 1830 the Liverpool and Manchester Railway was the first double track Steam Locomotive only railway. The Raintree Trials had compared Locomotives by various makers in 1929 and George Stephenson's Rocket (left) was declared the winner.

Steam was on the move

The Turnpike Trusts were responsible for maintaining roads in their areas. Funds came from Tolls raised. By the 1830's there were over 1000 trusts in Britain maintaining 30 000 miles of Road.

Tolls did not encourage road transport, and the rapid rise of the railways diminished their incomes, and their ability to maintain the roads which the Industrial revolution needed.

From 1835 road travel was still predominately local, and Parishes had to maintain their roads from local rates. It was not until 1888 that road maintenance was the responsibility of the newly created Councils. By 1909 taxes on registered vehicles provided funds for road maintenance.

Draft animals were still king of the road

The roads were not suitable for heavy loads. In the 1840's steam engines were put on wheels, particularly for use by farmers to thresh grain. Flour mills which had depended on Windmills and water wheels were quick to adopt steam power to provide continuous operation in their mills. Portable steam engines allowed threshing in the field.

Horses were still needed to move the engine and the thresher separately.

The logical solution was to use the Portable engine to propel itself and tow the thresher and use the horses to carry the grain.

The big unknown was transporting heavy machines over soft ground and poor roads. Solving the Traction and load bearing unknowns would bring on the Traction engine and tractor.

They were nearly there.

Railways had an advantage in that timber, and later cast iron plates with a kerbed edge

had been in use for some time, particularly in mines. These "Rails" provided a hard smooth surface which allowed horses to pull heavier loads. The flanged edges or kerbs guided conventional flat rimmed wheels along the same hard path and provided a central walkway for the horse.

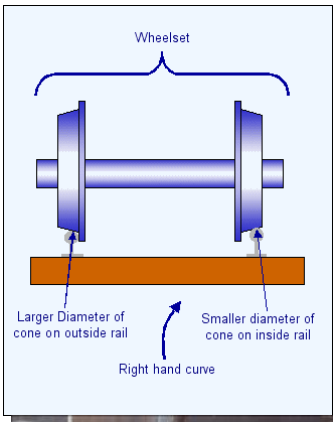
In mines where elevated wooden rails were used, flanged wheels had been used.

Rail from the Merthyr Tydfil to Abercynon track used by Trevithick

The tracks were also laid at gentle grades so that horses could pull heavy loads, and wheels rotated on fixed axles which allowed different wheel speeds on curves.

Trevithick's Locomotive only drove on one side, and Salamanca only drove I cog-wheel on one side.

Stephenson's Rocket had a rotating drive axle with fixed drive wheels to keep cylinder phase at 90º. Stephenson had discovered very early that coning the wheel running face allowed fixed wheelsets (wheels and axle as 1 unit) to negotiate a curved railway naturally. This tapper varies from 1:20 to 1:40. The steeper the cone the sharper curve can be negotiated provided the running face is wide enough.



Coning was in use in America from the earliest use of steam locomotives as the following extract from the "Catskill Archive" demonstrates.

"On Saturday, the 28th of August last, 1830, the first railroad car propelled by steam proceeded the whole distance from Baltimore to Ellicott's Mills, and tested a most important principle—that curvatures of 400 feet radius offer no material impediment to the use of steam-power on railroads, when the wheels are constructed with a cone, on the principle ascertained by Mr. Knight, chief engineer of the Baltimore and Ohio Railroad company to be applicable to such curvatures. The engineers in England have been so decidedly of opinion that locomotive steam-engines could not be used on curved rails, that it was much doubted whether the many curvatures on the Baltimore and Ohio Railroad would not exclude the use of steam-power. To congratulate our fellow-citizens on the conclusive proof, which removes forever all doubt on this subject, and establishes the fact that steam-power may be used on our road with as much facility and effect as that of horses, at a very reduced expense.

Outer wheel on curve

Straight Running Wheel

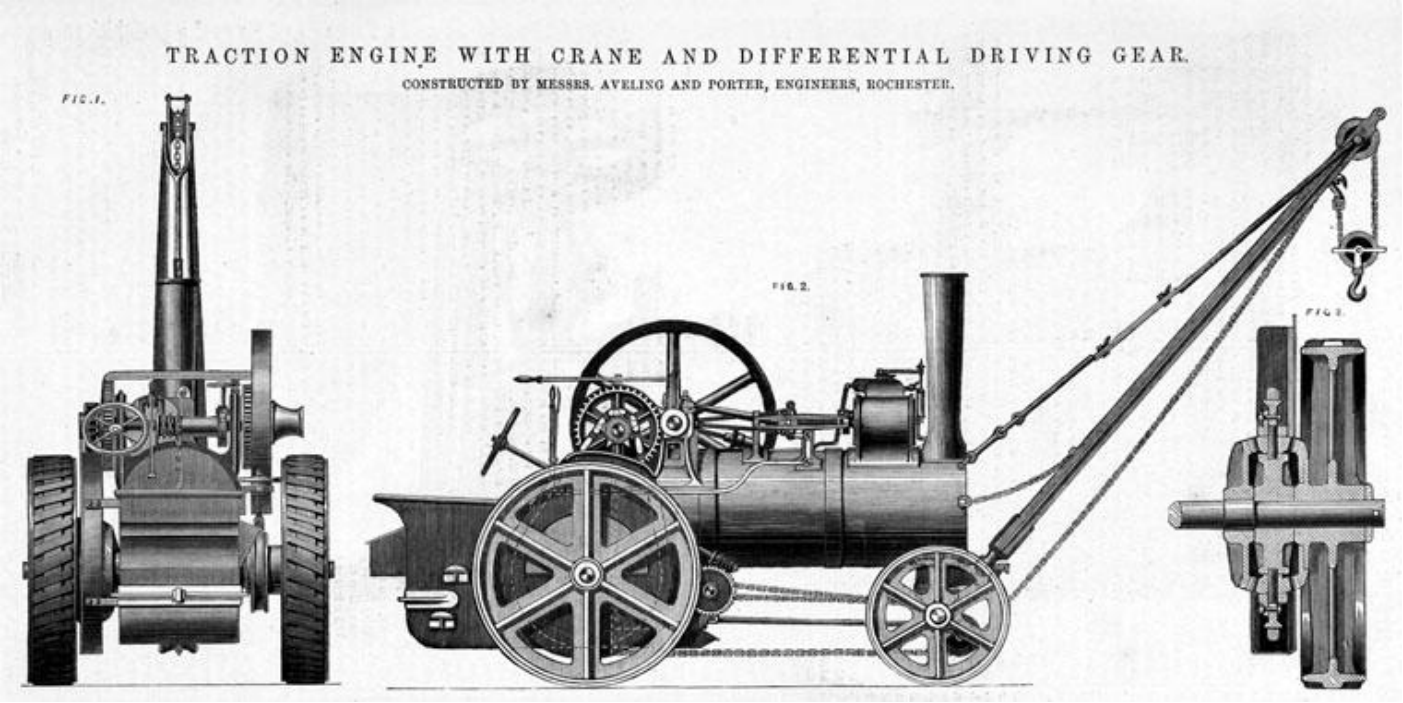
Railway wheels still have flanges but their function is a safety backup for sections of of spec track, and negotiating points or tight sections of curve.

This almost magic effect of railway Locomotives, carriages and Bogies to steer their way around curves without any other control did not transfer itself to heavy vehicles on dirt roads. There was a bit more development to go before our now well established cylinders could parade themselves around for all to see.

Differential action across 2 road wheels was a bit more difficult than coning the

wheels. In 1827 Onesiphore Pecqueur patented a differential for a steam wagon, and in 1832 Richard Roberts patented a gear of compensation for Road Locomotives. So far I have not found any leads on the differentials or the vehicles.

In 1868 Aveling and Porter published an add for a Traction Engine with Crane and

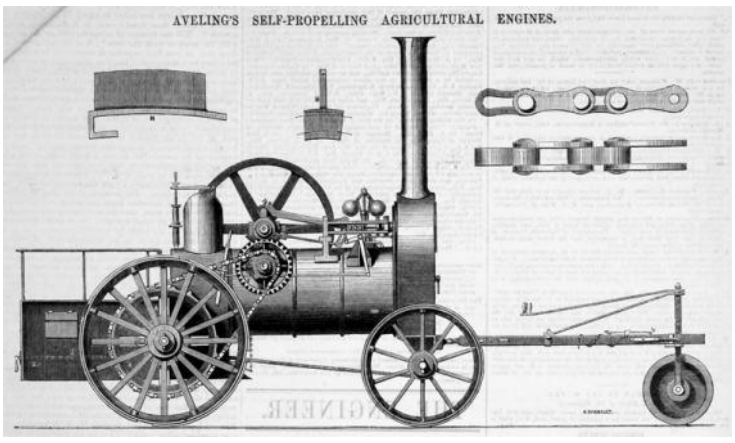


Differential Driving Gear, although they may well have had it available earlier.

Aveling is reputed to be the father of the traction Engine which he built in 1858 by modifying a Clayton & Schuttleworth Portable steam engine to use its own engine to propel it by connecting a drive chain from the crankshaft to the rear wheel.

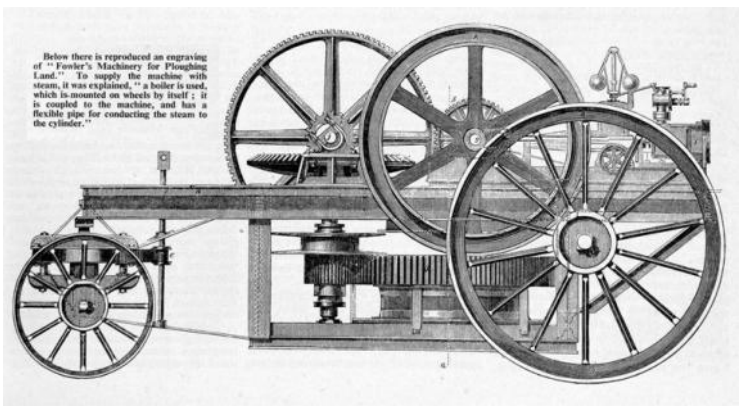
Initially it still needed a horse in the shafts to steer it.

In 1860 the steering was modified by adding a leading front dolly with a steersman on a seat working a tiller. In 1862 Porter joined the company and they displayed their own machine, the Agricultural Locomotive at Battersea in 1862.



Aveling invented the Steam Plough in 1856 and by 1860 he was the sole agent for Fowlers steam plough.

The Fowler ploughing engine (below right) did not have its own boiler, so a separate boiler was piped up before operation.



Aveling and Porter built the first steam roller in 1867, and ultimately they became the largest producer of steam and IC rollers which they continued to manufacture well after World War 2.

By the 1860's steam traction was here.

Our 1 and 2 cylinder steam engines had now proved themselves reliable enough to power vehicles on road and

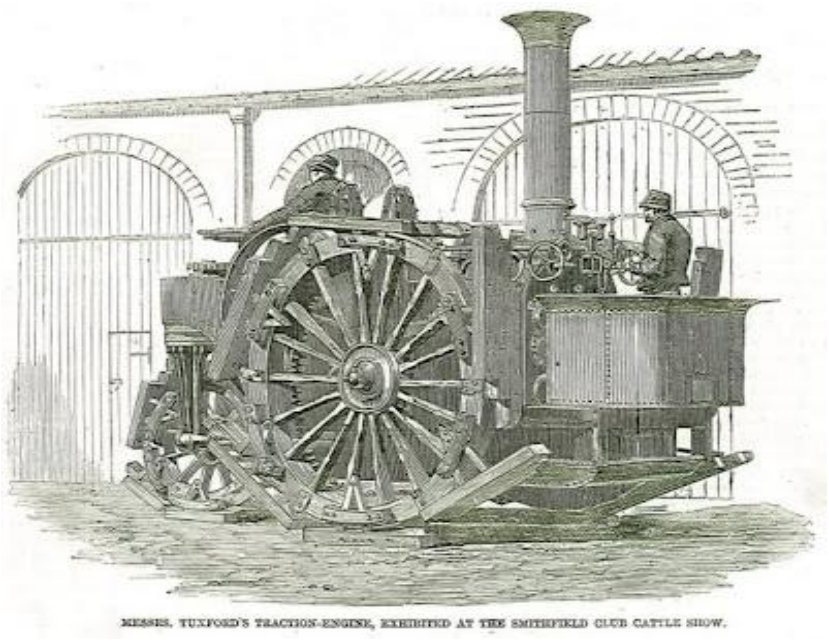
In 1858 the Ag. show was at Chester, and Tuxford had 15 entries on display, 9 of which were steam engines. Boiler plates were still wrought iron from Low Moore and a new supplier Lord Ward who had set up in 1857 to produce high quality wrought iron.

A 6 and 8 nhp engine with horizontal cylinders were introduced with 8" and 9 ¼" bore cylinders and a 12" stroke. A 12hp portable with twin jacketed cylinders and expansive valves suitable for ploughing and fixed works or for "exportation to distant colonies", was on offer for £355 on wooden wheels, or £350 on iron.

A 7nhp Patent Portable Steam Steeple engine, with vertical cylinders, Governors, Force pump and suction hose. This was the first mention of a "Steeple" to describe the engine.

Item 15, listed as a (New Implement) was:-
Tuxford and Son's Steam Traction Engine
With Boydell's Endless Railway
Known as the "Walking Engine" or The Steam Horse"
Invented by Weston Tuxford

"This engine overcomes the difficulty in making turns to either side: each impelling wheel is furnished with driving gear complete, to which the power from the two cylinders can be given off equally, or a greater power to one, and less to the other, or either of the wheels can be detached from the power instantaneously, and without the least shock or jar."



Tuxford Traction Engine at the 1857 Smithfield Club Cattle Show

Image from "Illustrated London News" Alamy Picture

Price, 20 horsepower £550. 24 horsepower £750, 28 horsepower £900, 32 horsepower £1020, exclusive of the patentee's royalty for the "Endless Railway:" if driven from one wheel only, £100 less."

The engraving on the left originated in the "Illustrated London times". It depicts the Traction Engine at the 1857 "Smithfield Club Cattle Show"

This event ran from 1799 and ran until the 1960'S or thereabouts when lack of interest from rural equipment suppliers dried up.

From 1839 to 1862 the show was held at the "Horse Bazaar" in Baker Street in Islington near London.

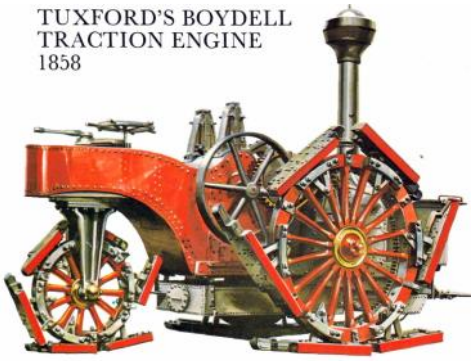
If this self contained, self propelled and self steered machine was on show in 1857, and if it was available for purchase in 4 engine sizes in 1858 it must challenge the reputed claim which nominates Aveling as the farher of Traction Engine by converting a portable engine to self propulsion with a long chain, and still using a horse to steer it.

It is difficult to find information on everything made in this era, so hopefully as more information comes to light the "Father of practical powered road travel." will come to light. The Tuxford is a pretty complete machine. The company must have been happy with their prototypes performance to be offering 4 different models by 1858.

The lead time to develop the first prototype of what appears to be a radical and well thought out design for its day, and debug it to have the confidence to design 4 variants and offer them for sale implies that they may well have had a working model in 1856 or earlier. The drawing office would certainly have been busy, and they soon started designing and producing improved models.

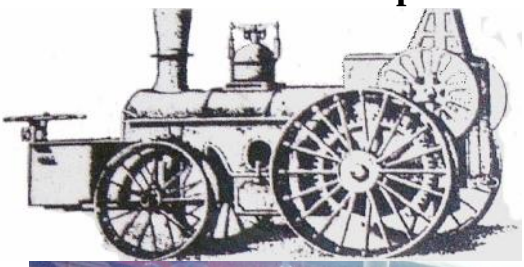
rail . They started out nearly 2 centuries ago and it took about 100 years to develop them and the machines that could manufacture them so that they would be suitable for use in compact road vehicles.

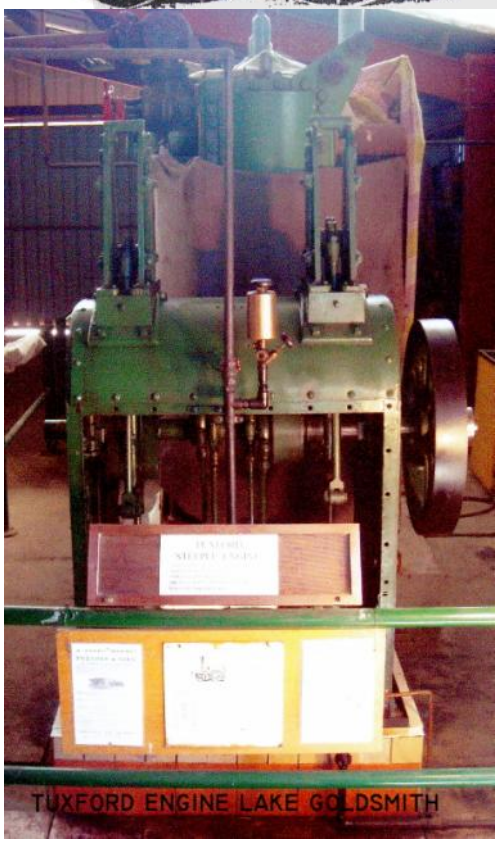
They also had to develop procedures to maintain them and train operators to use them safely. One and two cylinder engines were common on road and commercial tractors until more power was needed than could be produced by an engine fitted in a tractor frame They are still with us in low power applications, and they are produced in their millions.

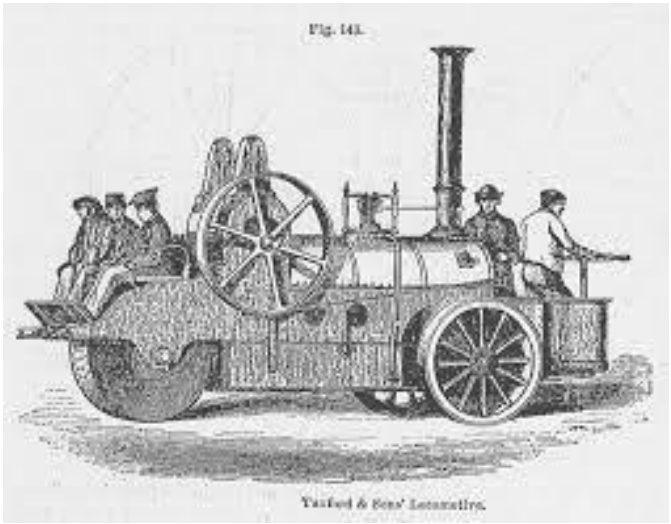


Man power and draft animals were the work horses before powered traction and it took about a hundred years before draft animals and tractors were around in equal numbers in the western world during World War 2 and by the 1960's the tractor was dominant on the land and in industry.

When William Tuxford put wheels under a boiler at their Boston & Skirbeck Ironworks in Boston Lincolnshire England in 1839 agricultures dependence on draft animals was to change forever. By 1842 they had exhibited them at Bristol. By 1858 they had developed a steam powered Traction Engine for rural use. The design of this engine developed rapidly from a 3 wheeled wooden wheeled machine to a steel wheeled design with Ackerman Steering, forward control and a single or double drive with an efficient double pass boiler and a vertical twin cylinder enclosed engine.







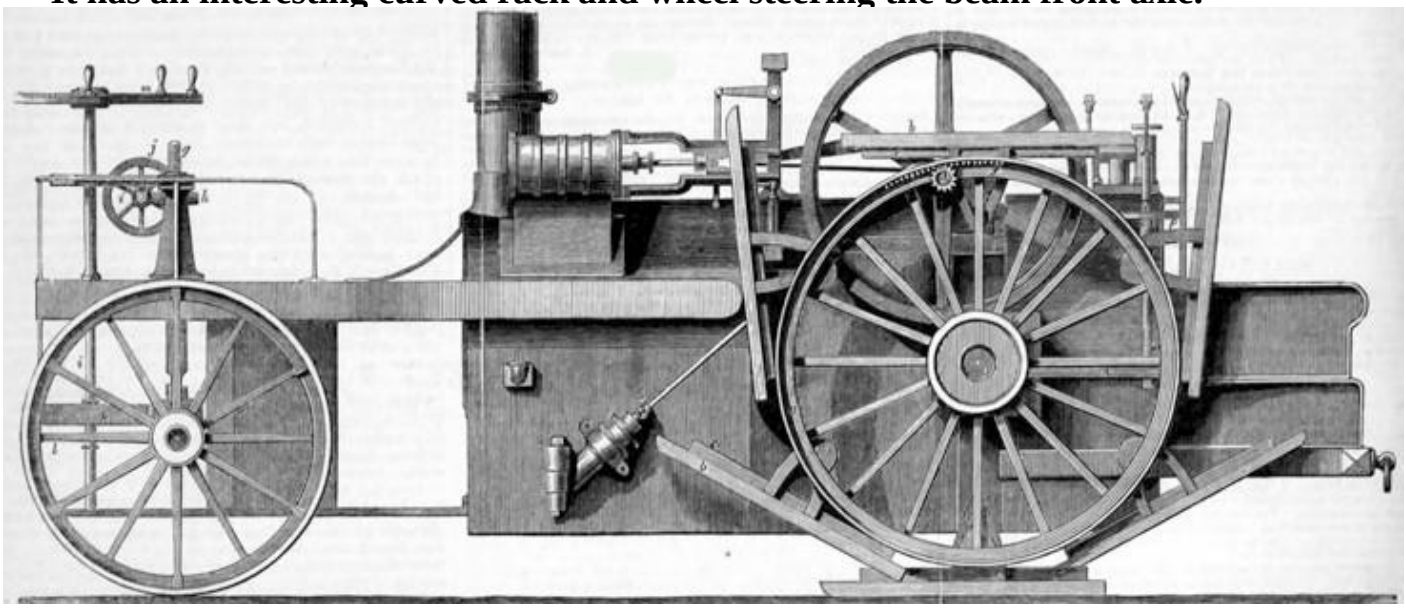
These were expected to be used for towing on the road or farm with a belt drive to double as a portable engine. What is thought to be the worlds oldest surviving Traction Engine or Tractor is in a Museum in Sweden. This single wheel drive machine was built by Tuxford in the early 1860's. A twin cylinder steeple engine similar to the engine in this traction engine can be seen at the Lake Goldsmith Steam Preservation Associations Rally Grounds. These Steeple engines had the advantage of keeping the Centre of gravity of the cylinders low and having a lower wear rate on the cylinder walls. These engines stayed in production until the 1880's

The Tuxford Family established a sales branch in South Australia.

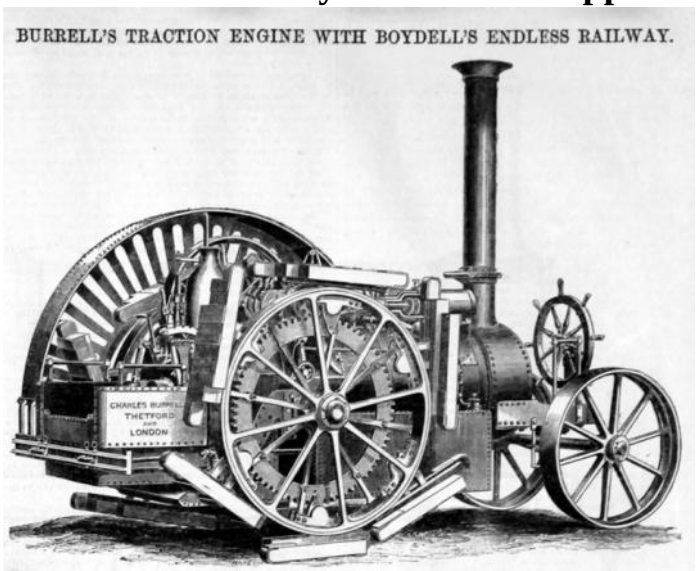
Charles Burrell was another manufacturer of portable steam engines in the late 1840's who demonstrated a self propelled model in 1856. He was the first to use the Boydell Patent "Endless Railway" feet attached to the wheels. These wheels were developed in an attempt to carry heavy vehicles on the extremely poor roads of the day. They had limited success, although many manufacturers tried them.

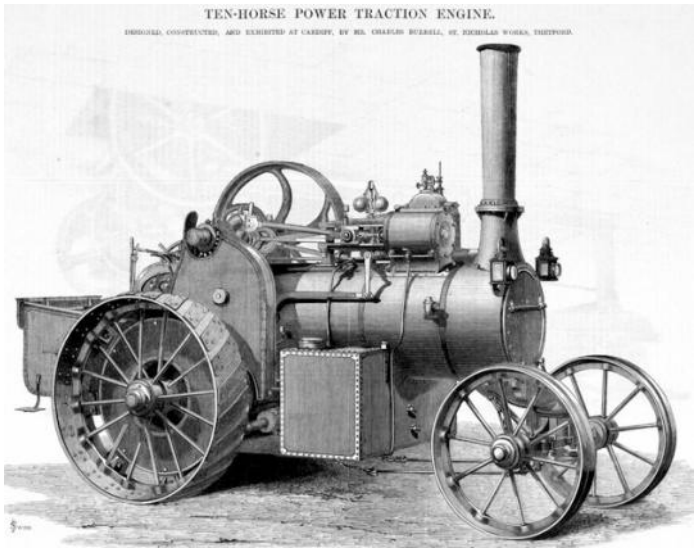
Burrell's 1858 patent drawing shown above, thanks to Graces Guide, shows the general layout of this early traction engine which was expected to haul loads on the road.

It has an interesting curved rack and wheel steering the beam front axle.



Like the Tuxford it has forward control, but the engine and fireman are at the rear. It has 2 horizontal cylinders It also appears to have a direct drive to each wheel pinion.





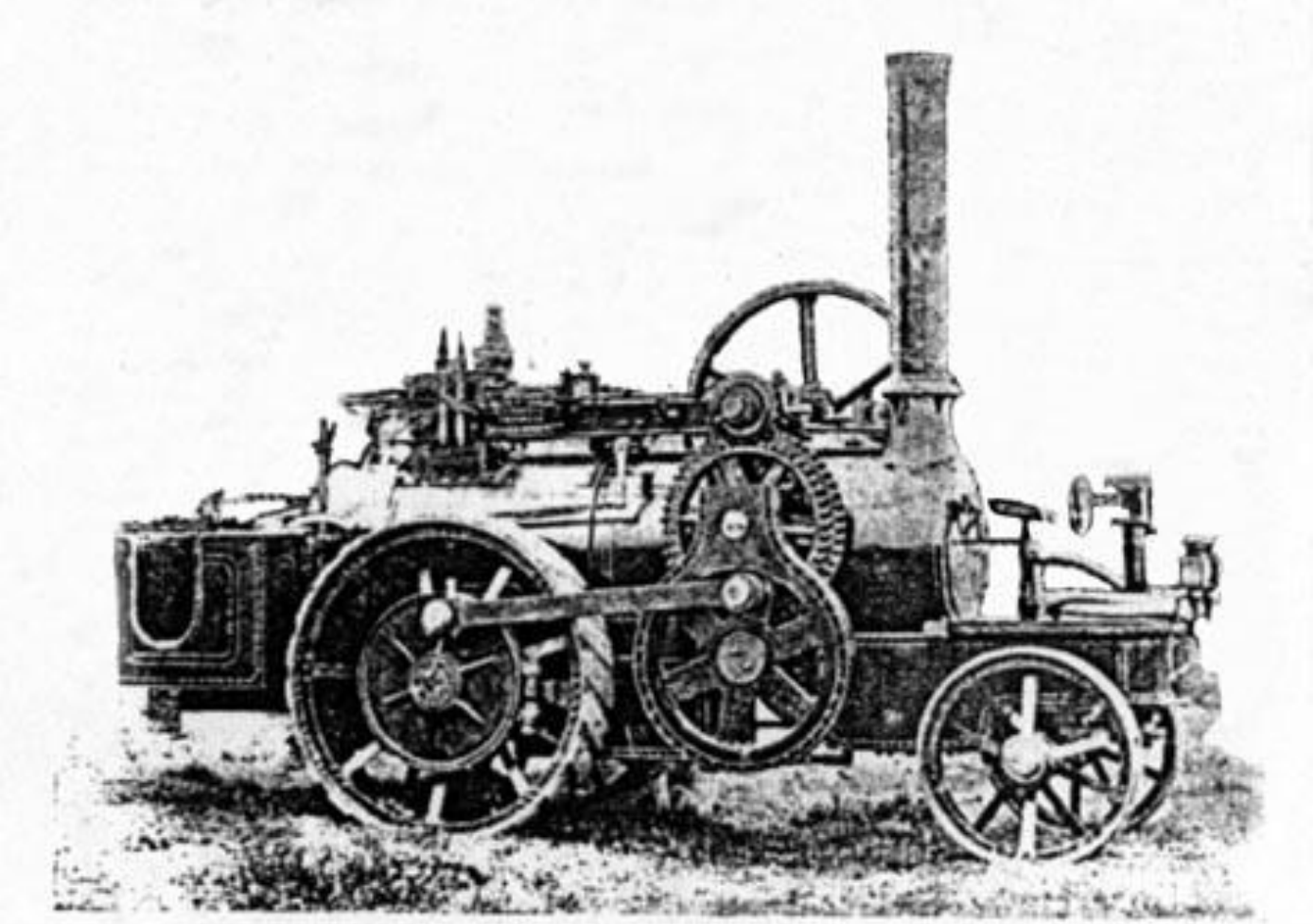
By 1862 (left) the forward cab had taken a nautical look. The flywheel and winch seem to be well shielded, and an external gear ring was used. By 1871 the traction engine layout had evolved with Driver and fireman in a rear tub with a chain steered front axle with a single pass boiler

This machines were able to pull heavy loads using trailers. They became the prime movers of the day with their 1 and 2 cylinder high torque engines.

With draft animals as the only other option, use of these machines grew and specialised models were developed to construct the roads that allowed ever heavier loads.

George Fowell of St Ives had been a designer for Burrels at nearby Thetford for around 40 years when he left and started an agricultural repair business and built Traction Engines from the mid 1870's to keep his workforce employed during slack times.

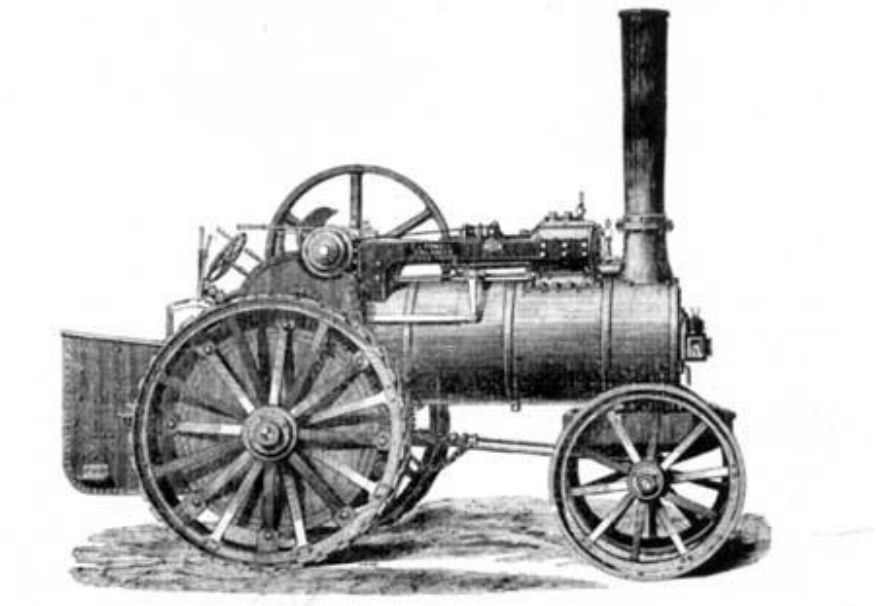
A problem with traction engines at the time was a lack of springing which caused



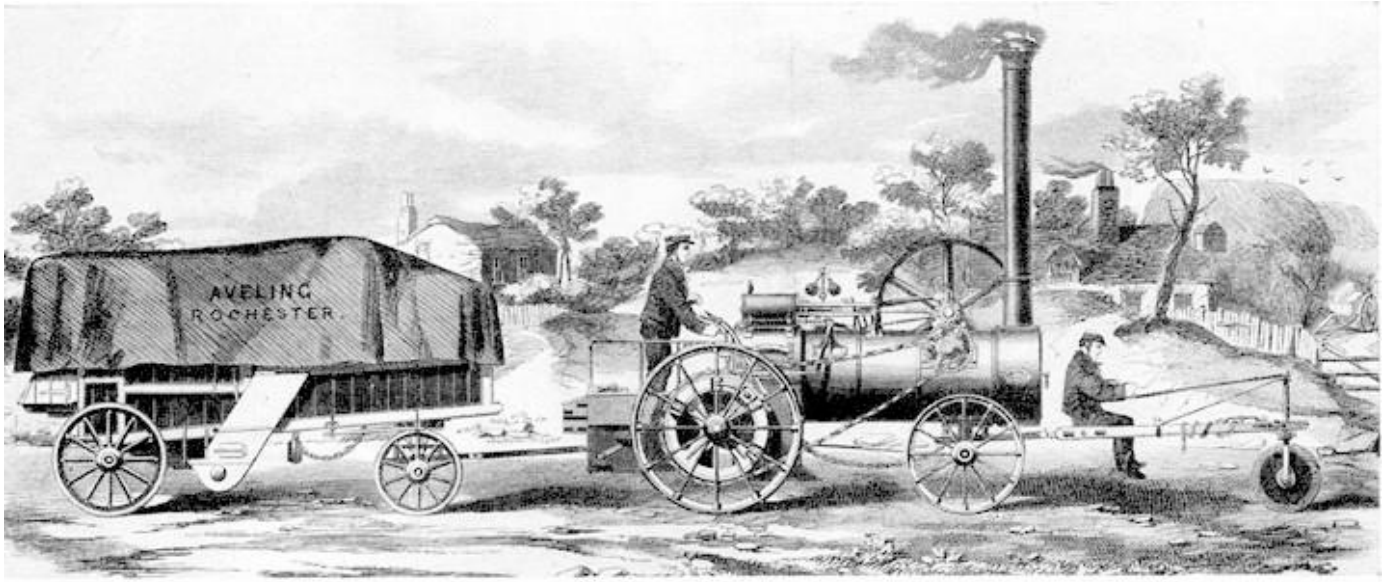
Fowell No. 2 (8 h.p.), built 1877

damage to fragile loads on the poor roads in use at the time.

The first Traction Engine built was to the design of William Box who used a system of coupling rods to allow the drive wheels to move vertical on springs in a manner similar to a railway locomotive. Friction bands on each wheel allowed steering by disengaging one wheel as the 90º offset of the coupling rod drives was fixed. This machine had forward control but most engines were similar to the ones that he had designed at Burrell's with rear control.



Thomas Aveling is referred to as "The father of the Traction Engine" after he converted a horse drawn Clayton and Shuttleworth portable engine for self propulsion by connecting the crankshaft to the rear axle with a disengageable drive chain c 1860

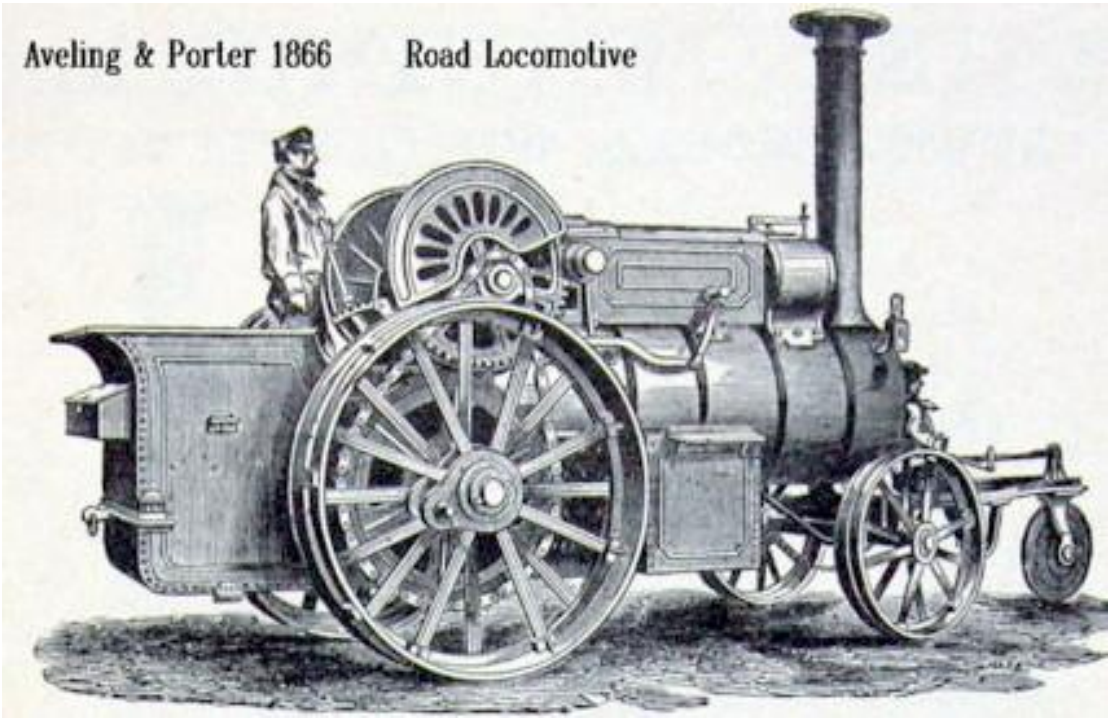


AVELING'S PATENT LOCOMOTIVE STEAM THRASHING TRAIN,
To Travel on ordinary Roads without Horses.

The next stage was to provide a steering mechanism which would allow the horse (that was still needed to steer the engine as it moved), to be eliminated

With this combination a self propelled Traction was created. The work was done by Claytons as his own workshop could not handle the project.

Aveling used his own design in 1861



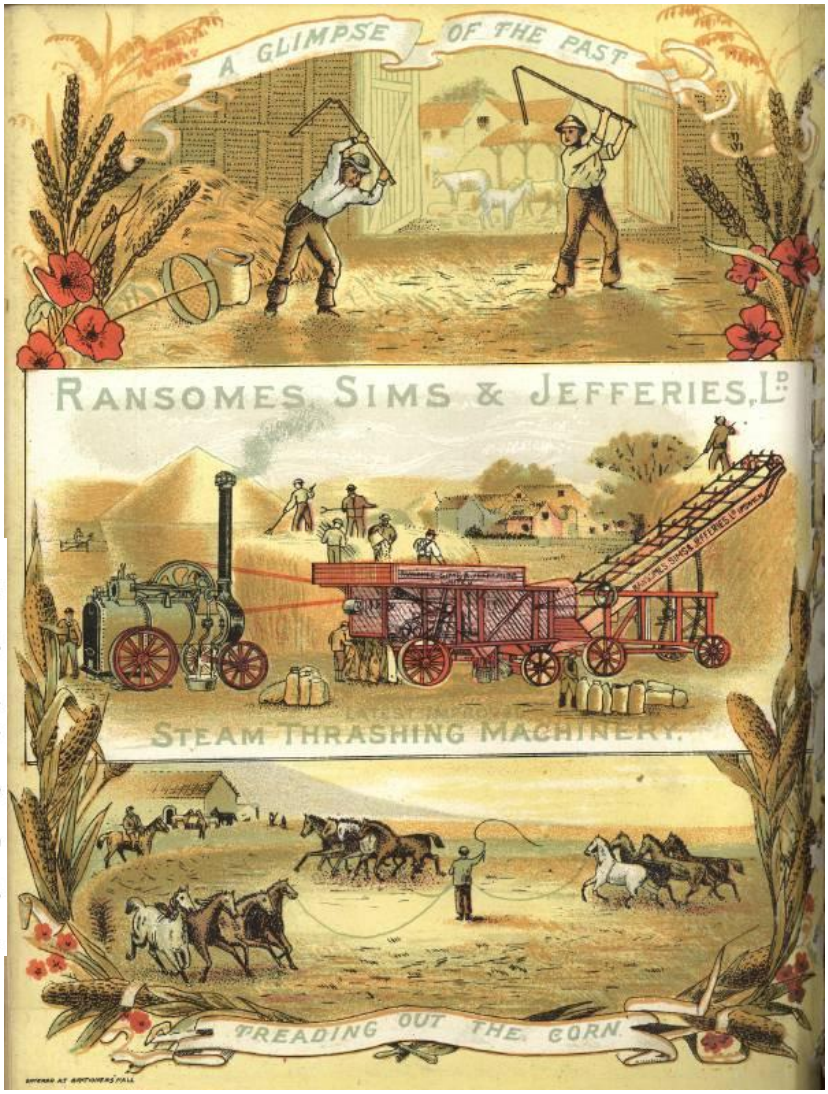
By 1862 Aveling had enclosed the cylinder and valve gear in a steam jacket, and the long chain had given way to gears and by 1863 he had introduced 2 speed gears.

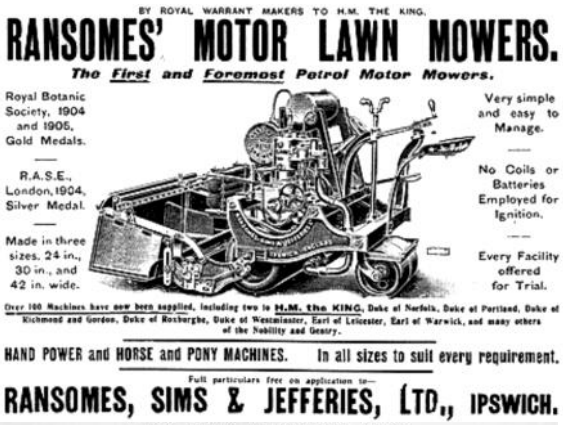
In 1865 Locomotive Act restricted road speeds for mechanical machines to 2MPH in town and 4MPH on the highway. This affected all manufactures who look for overseas markets for their faster machines, and in Aveling and Porter's case to developing Road Rollers, producing the first prototype machine in 1865.

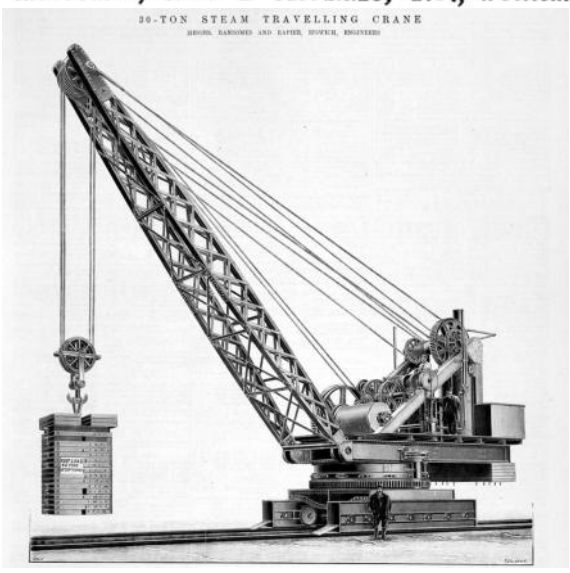
In 1870 Aveling and Porter introduced horn plates which were extensions from the outer firebox water wall plates to carry the motion and gears which reduced stresses on the boiler plates and in 1878 the overhung gears were eliminated.

Ransome's Simms & Jefferies Ltd are another company that can trace their origins back to the late 1700,s, when Ransome's patented "Chilled Cast Iron and made hard plough shares and grew into a large scale manufacturer of agri-cultural equipment.

They were building lawn mowers in the 1870's, and in 1902 pro-duced the first commercial IC powered law mower.

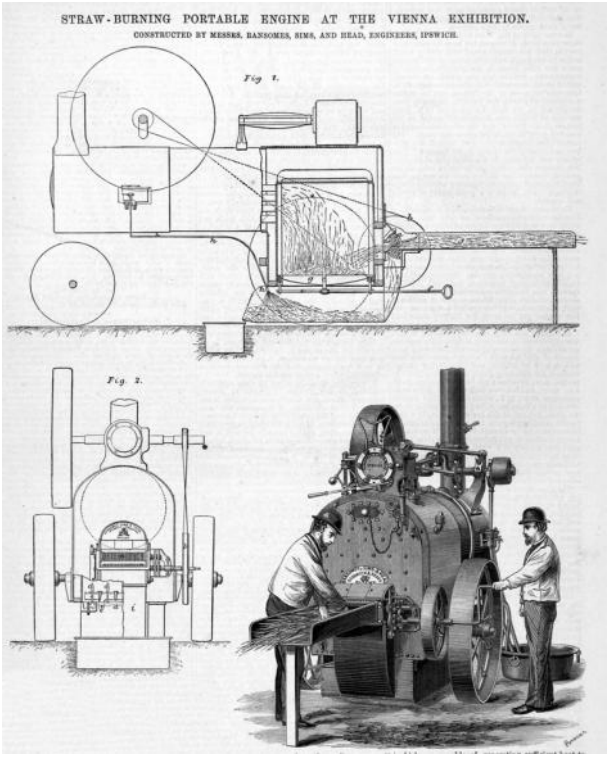


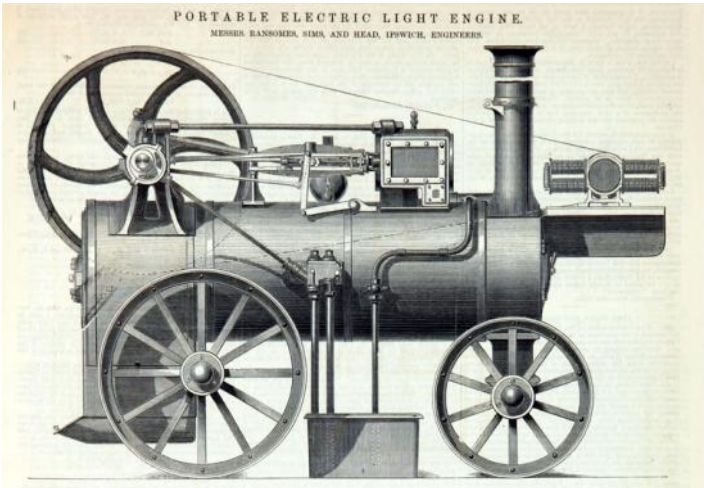


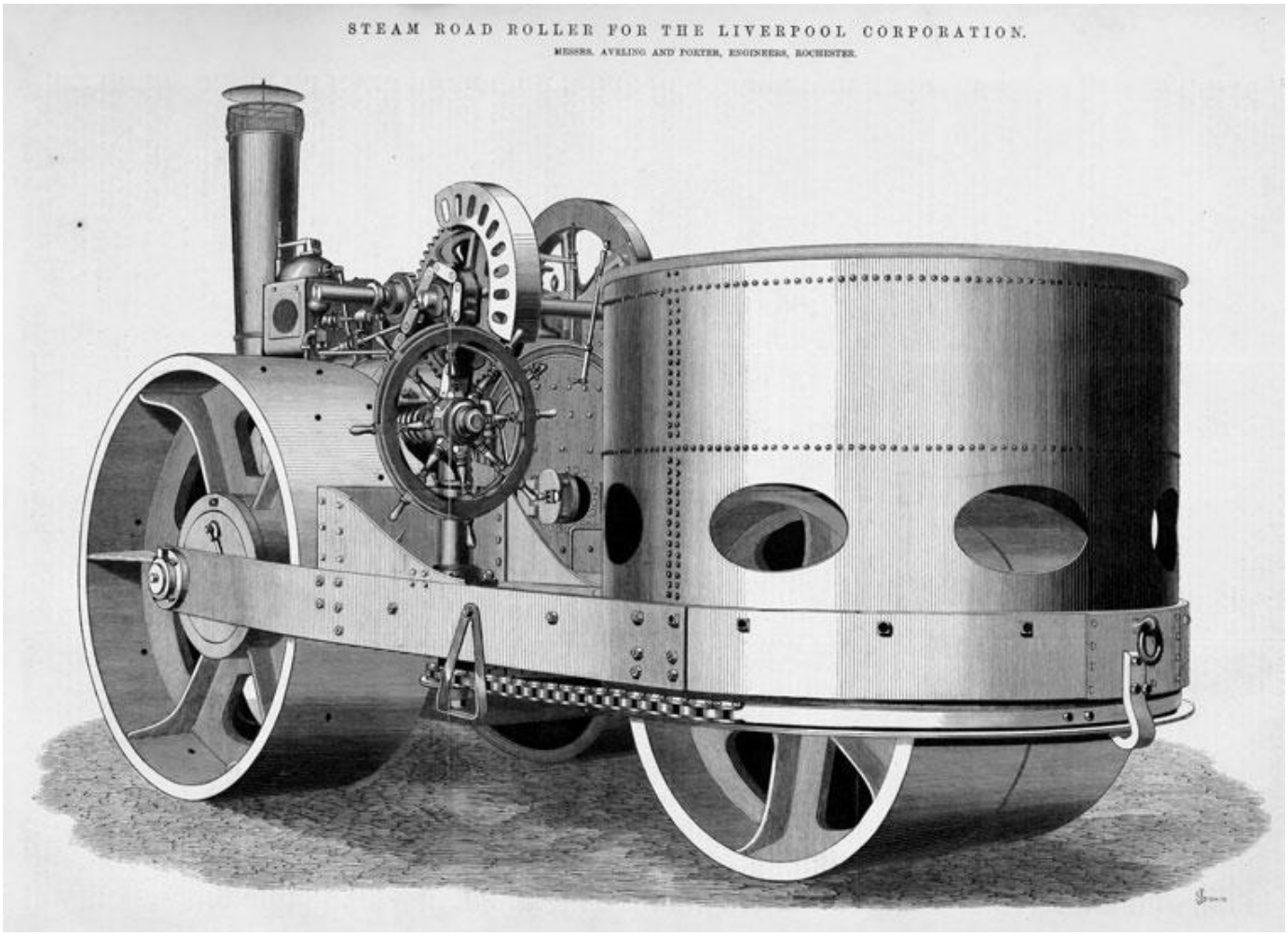


Left,1897 Ransome & Rapier travelling Crane.

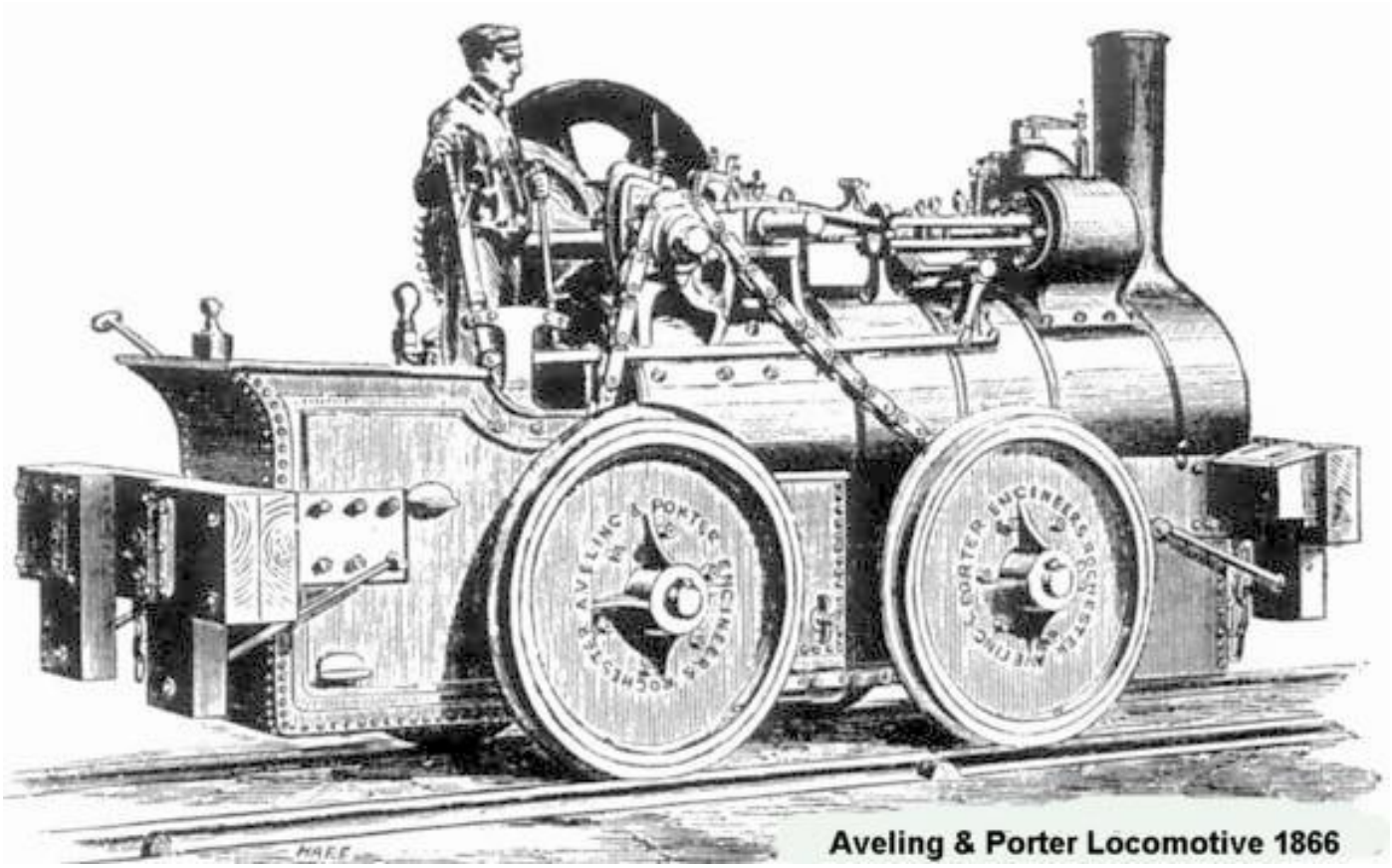
Ransome's had a lot of associated companies. In 1868 they had a straw burning portable and a portable electric DC generator. They made DC motors very early on.





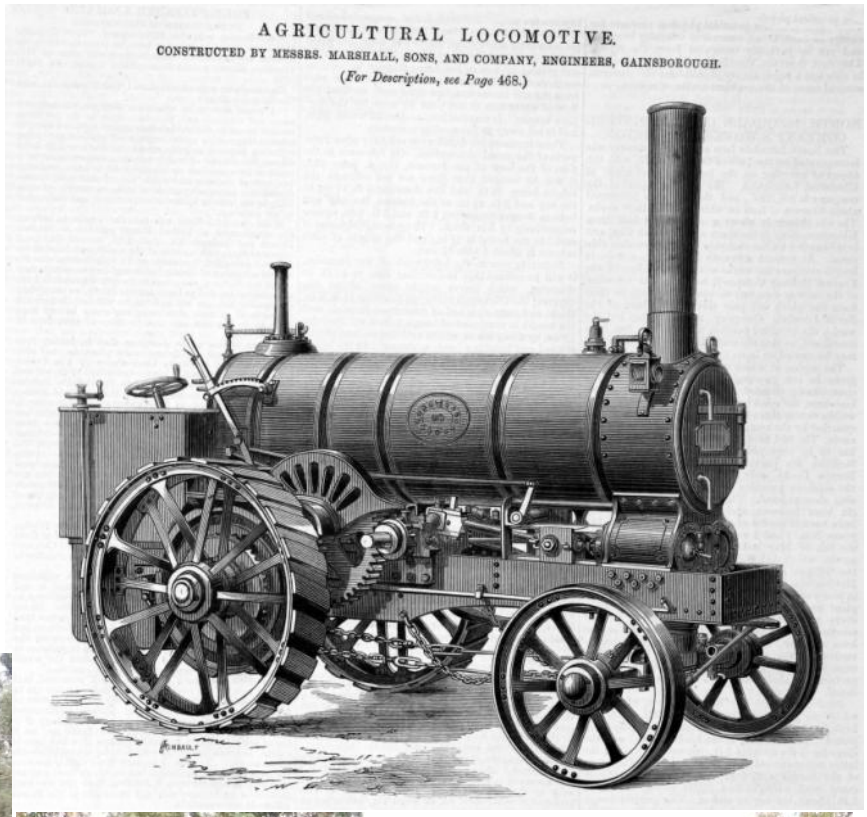


1867 Aveling & Porters 30 ton steam road roller was a success.



Marshall and Sons were another company who started in steam in the 1840's and in 1876 produced their first Traction Engine in Lincolnshire England.

The company produced other steam vehicles, and in the 1930's they produced the popular Field Marshall single cylinder Tractor. They took over Clayton and Shuttleworth in 1929, and Fowlers in 1947. The Fowler Marshall was a track version of the Field Marshall. These machines are popular at rallies.



Above Lloyd family Compound Marshall Road Locomotive and right a Field Marshall Tractor alongside a Fowler Marshall crawler at Lake Goldsmith.

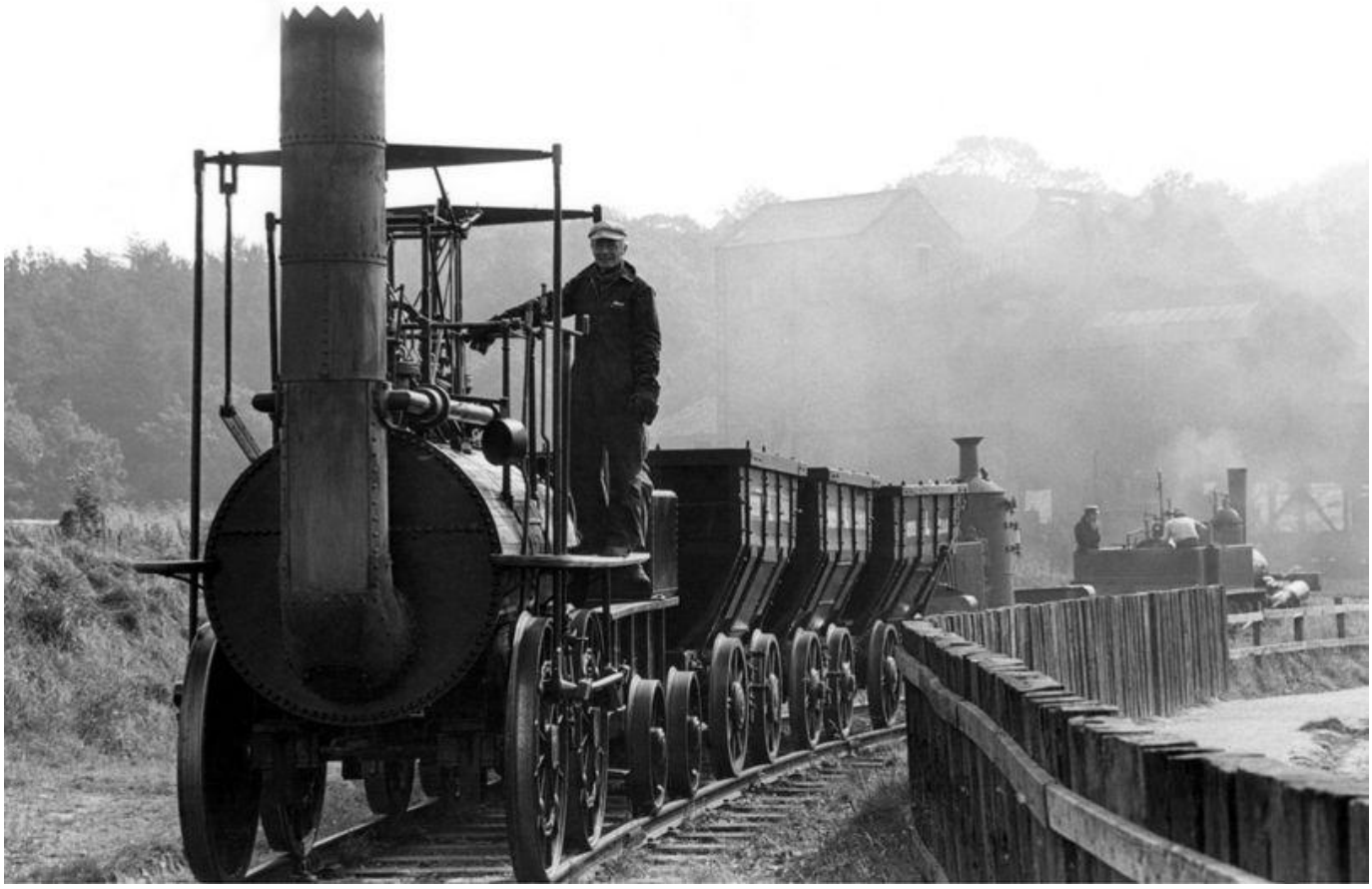
Lanz started manufacturing single cylinder hot bulb engined tractors in 1921. these tractors were popular and over 220 000 were made before production ceased in the 1960's. Kelly & Lewis, a Melbourne based engineering company produced over 800 K & L Bulldog Tractors in 1948 when Australia was desperately short of Tractors. They also produced a stationary engine using the engine to elevate grain in silos.

International Harvester produced a single cylinder Mogul Tractor and a twin cylinder Titan tractor and they also imported single and twin Cylinder Buffalo Pitts Portable steam engines and Traction Engines which they sold throughout Australia.

John Deere have produced twin cylinder tractors since their acquisition of Waterloo

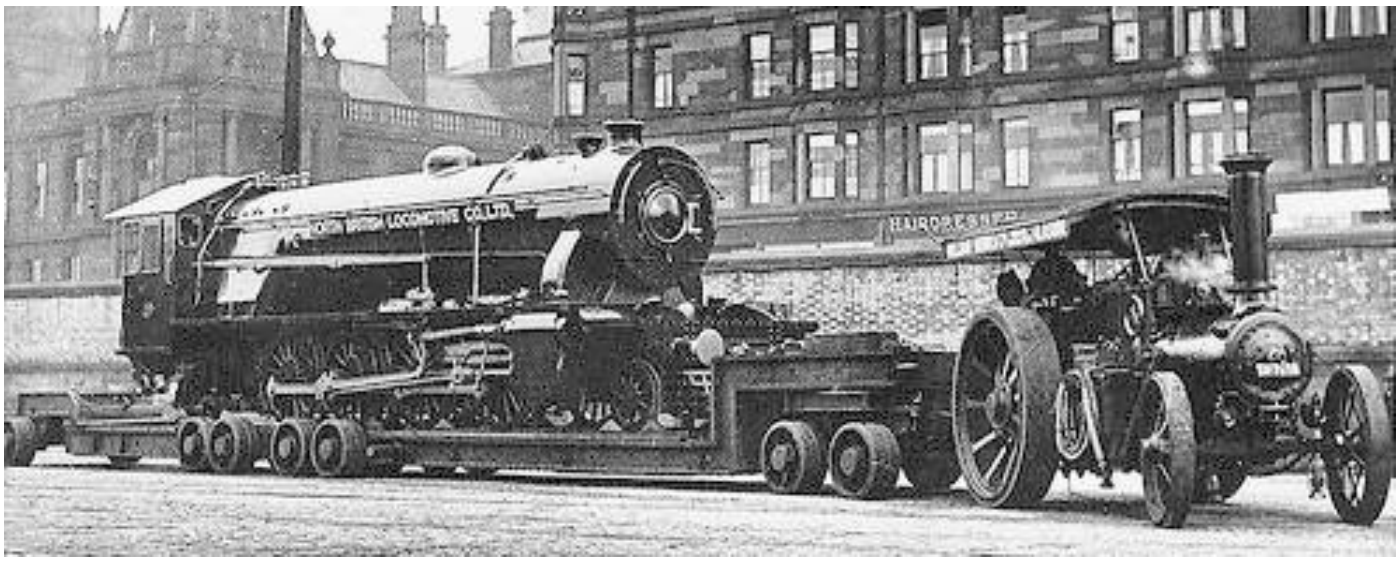
Boy, and the introduction of a model in their own name in 1923. They were produced until the mid 1960's when the need for more power forced the use of a conventional 4 cylinder engine along the frame. These Green and Gold tractors are an impressive and popular sight at rallies with their distinctive exhaust note.

Edition 143 and 144 have some John Deere background information.



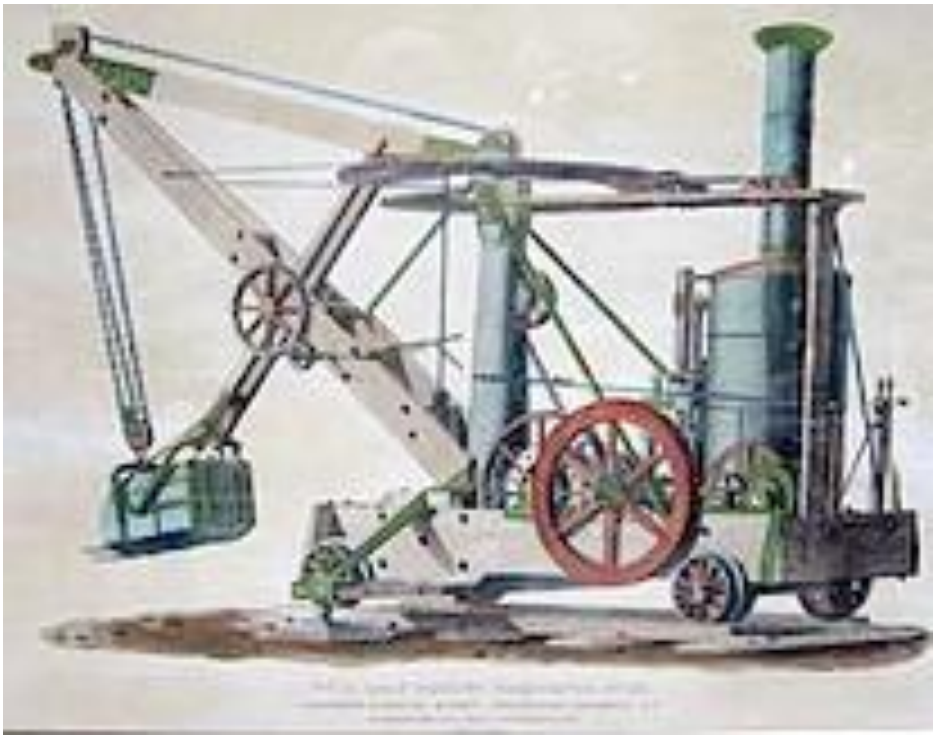
Replica of Stephenson's Locomotion 1 built in 1824 to haul passengers on the Stockton and Darlington. It is believed to be the first Locomotive to use Coupling Rods between the Drive Wheels. The Original Locomotive still survives, having been preserved in 1857. It is thought to be the first to be preserved. It is remembered as the first Locomotive to haul passengers on a train in 1825.

Road Trains were in use very early. This set of 4 towed carriages makes a great sight in a bush setting. Horses could not compete with Traction Engines which only needed 2 operators compared to 4 who would have been needed to man the wagons.



There was a time when the railways here tried to limit what could be transport by road to try and cover its own limitations. This picture demonstrated the transport of some pretty massive roads. This early float and dolly move well behind this traction engine, it would certainly look great at a Rally for 2 Cylinder Tractors.

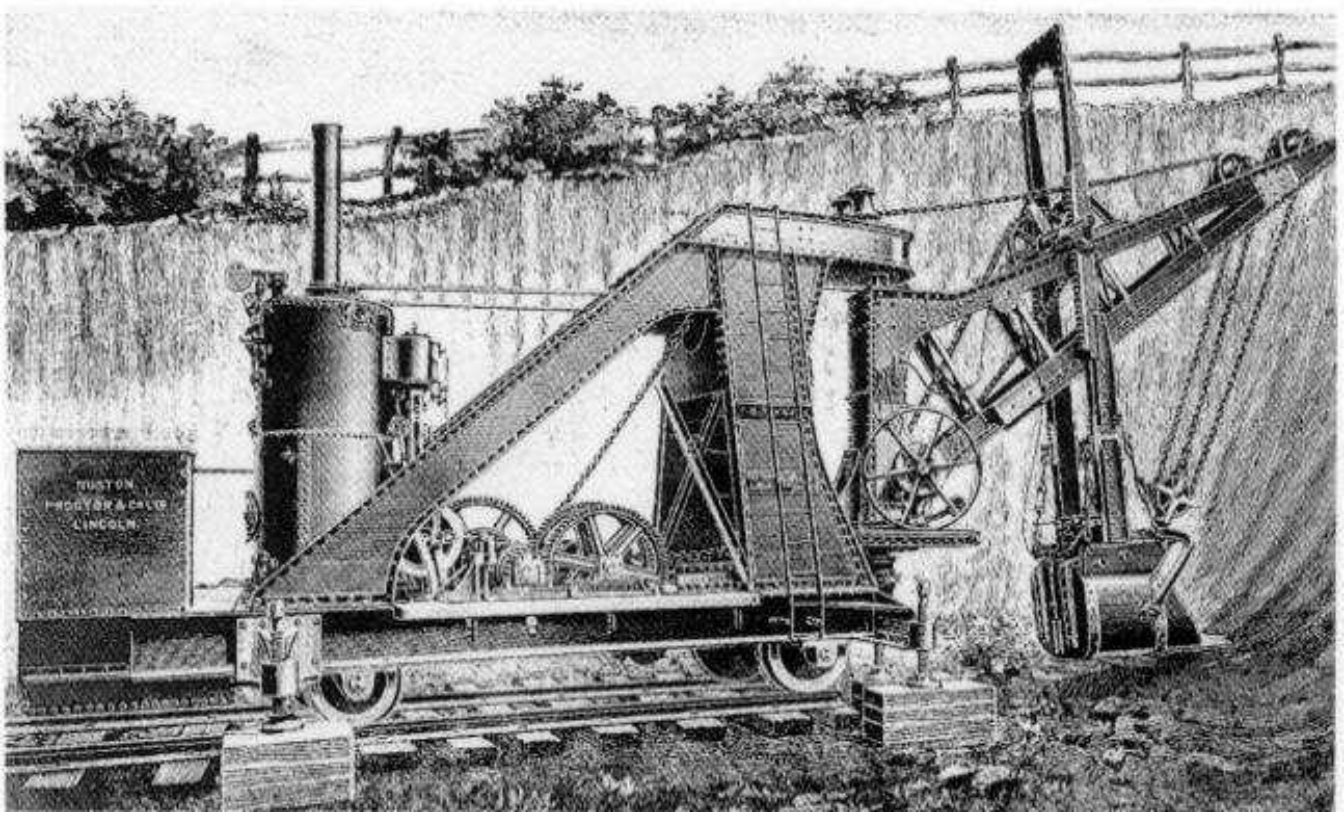
The age of steam created a need for new and better roads, and it also provided the solution.



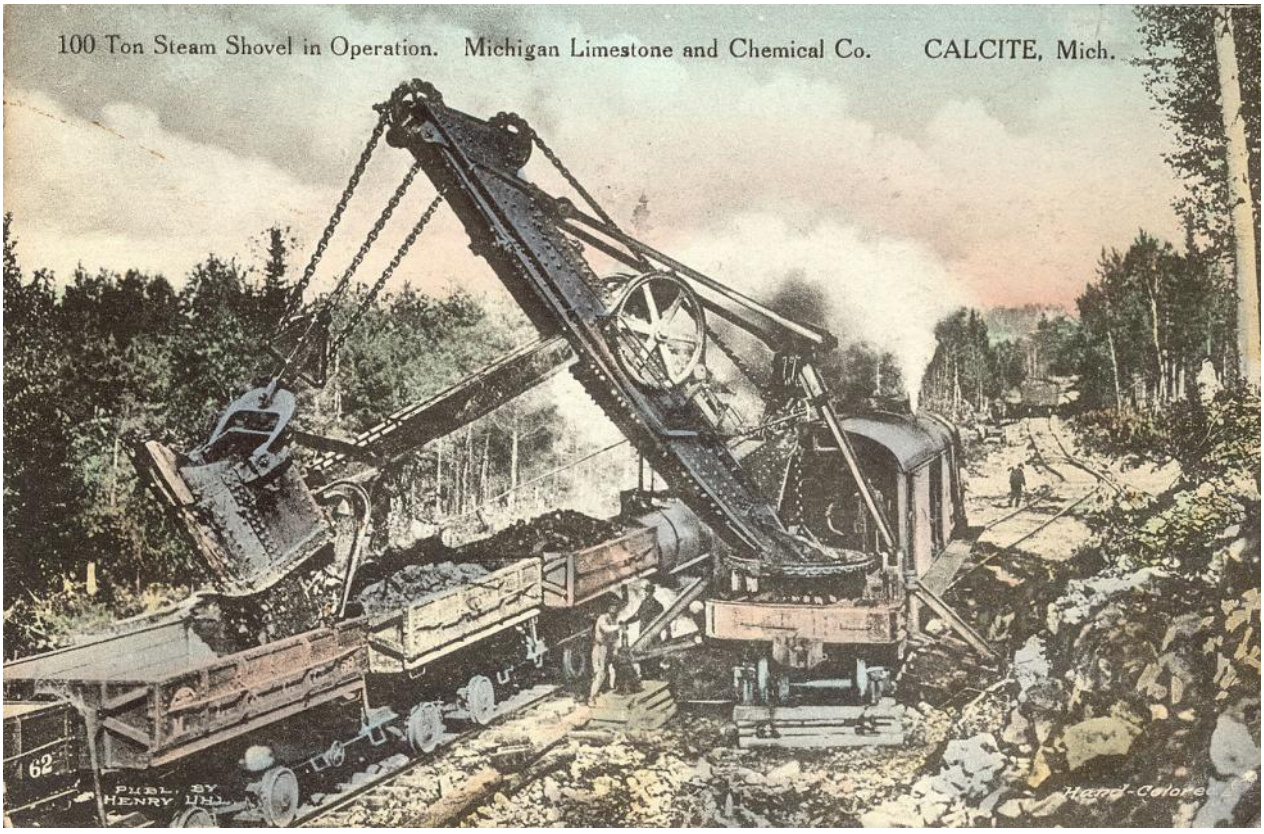
William Otis patented his Crane Excavator for removing Earth in 1839. It rode on rails and the powered bucket could slew from side to side to work up against a face on one side and load a railway wagon on the other.

Prior to mechanisation excavation for Canals and railways used draft animals with scoops or Navvies with pick and shovel. The name came from the navigable canals that they dug and the name hung on with the Ruston Navvy, a steam powered face shovel.

The picture on the right was taken in Ruston's Excavator test area.
(Lincolnshire Records)



Ruston Proctor produced this Dunbar & Ruston Steam Navvy Excavator in 1877. This machine designed by James Dunbar is similar to the American Otis design . It is believed that the drive wheels were powered. 71 were used on the Liverpool to Manchester Ship Canal



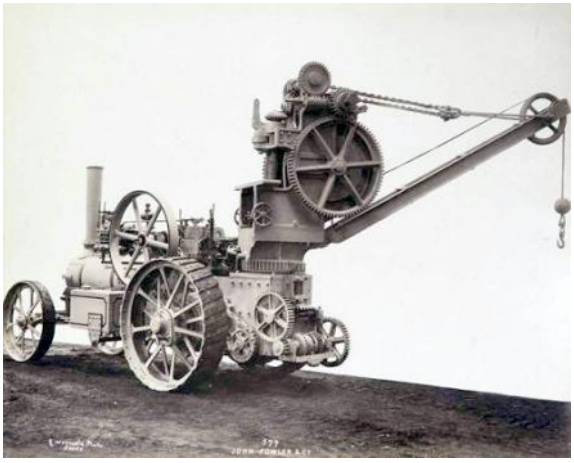
Rail Mounted face shovels became massive. They used multiple twin cylinder engines for trail traction, slewing lifting and crowding (moving the bucket dipper arm).

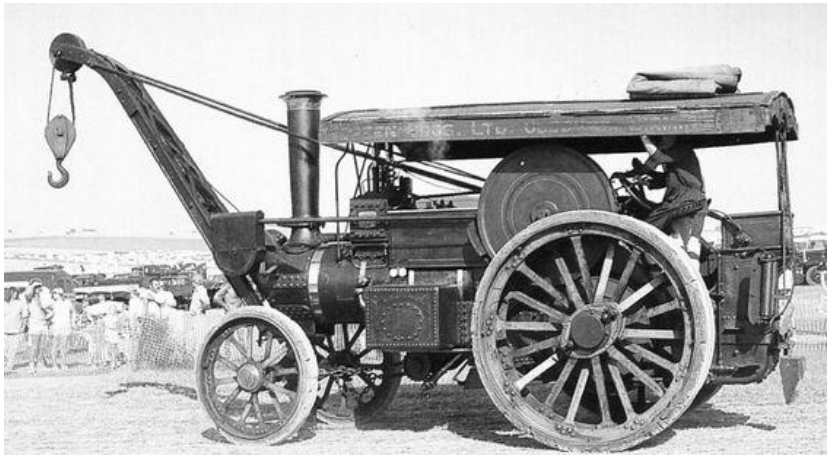
The Bucyrus and Ruston Steam Shovels will be in action at the 1 & 2 Cylinder tractor Rally on May4 and 5 2019 at the Lake Goldsmith Rally grounds.

This Fowler Traction Engine was hard at work in 1925 forming the Roads in Canberra pulling a self elevating grader to fill horse drawn wagons.
Still just 2 cylinders but it appears to be a compound.

These American Traction Engines were used to direct ploughing the hard Prairie soil.

In the softer ground of Britain and Europe indirect ploughing was done by a cable between two ploughing Engines. About 100 of these engines are thought to have come to Australia. The Scienceworks Fowler Ploughing engine will be at the rally in May.





Cranes seemed to be a natural for Traction Engines. With a choice of ends.

The Military made good use of Steam traction, they were an ideal Gun tractor.

LAKE GOLDSMITH

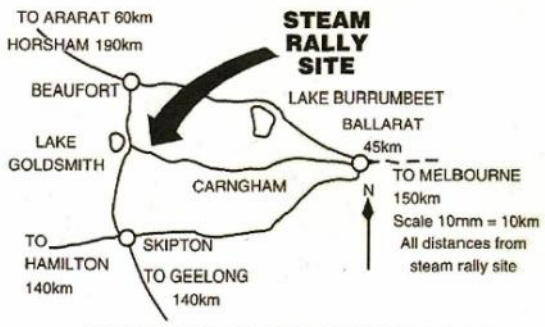
113TH STEAM AND VINTAGE RALLY

4TH & 5TH MAY, 2019

Regular attractions include:

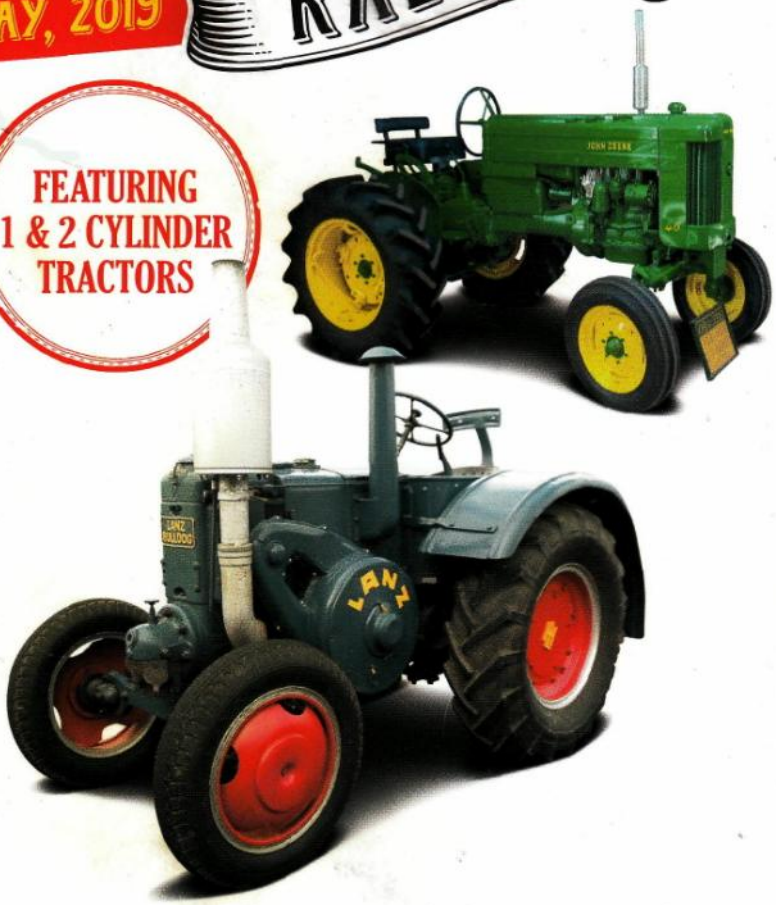
- 65 Display Sheds
- Steam & Oil Engines
- Steam Powered Shovels & Saw Mill
- Displays of Earthmoving, Cars, Motorcycles, Tractors & Trucks
- Radio Controlled Model Boats
- Attractions for Ladies & Children
- Blacksmithing
- Threshing
- On-site Catering

CAMPING FOR EXHIBITORS ONLY | FREE, NON-POWERED



VIC ROADS DIRECTORY MAP 75 G5 2.4

FEATURING 1 & 2 CYLINDER TRACTORS



ADMISSION PRICE: • Adults $15.00 • Children aged 5-16 $5.00 • Exhibitors and Children under 5 free

For rally information contact: Trevor Ph: 0407 539 041 or Graeme Ph: (03) 9723 3310 Mob: 0418 388 149

www.lakegoldsmithsteamrally.org.au • PO Box 21 Beaufort 3373

If you a looking for a pleasant drive through tall timber and you like Narrow Gauge trains a trip to Alexandra will fill in a pleasant day with Nostalgia and steam. Just try It.

Back Road to Beaufort

I guess that everyone has caught up with the ABC Back Roads series which featured Beaufort and some features from the surrounding area.

The show is estimated to have been seen by over 600 000 viewers on TV and Iview.

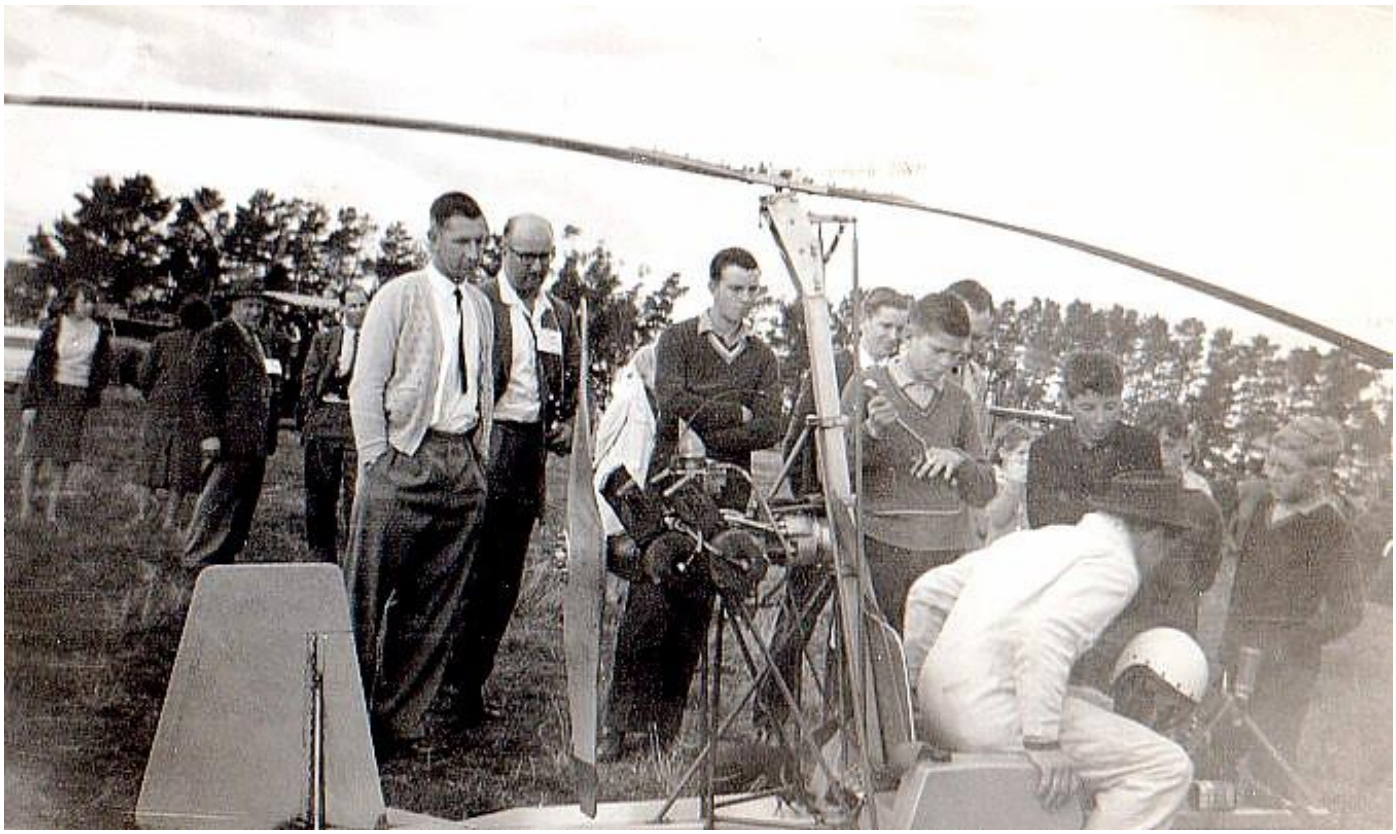
Our website picked up over a thousand hits above the baseline average after the main show, and 600 more after the rerun

John and Josh Franc featured well driving the Aveling and Porter Steam Roller up Cheesemans Road.

The show drew some attention in Adelaide, which led to a contact with Liza Robinson of the Beaufort Progress Association, who forwarded the following:-

About 6 weeks ago a lady named Lauren called us from Adelaide, her 7 year old son Freddie, just LOVED the segment on the Rally, she asked that if they came to Beaufort, could the Beaufort Progress Assoc arrange a meet with John & Josh Franc. So we co-ordinated this, and last Friday Freddie met his hero's John & Josh Franc, it was such a heart felt experience, this little boy knows SO MUCH about engines, steam its amazing, even John Franc was gob smacked. We took lots of photos and some video, whilst not great. It is still useable and hence we thought it would be a great story for your social media and pre May Rally marketing (website etc etc). We also contacted ABC Back Roads and they were also so excited at this lovely story. Little Freddie has watched the Beaufort special (10 times !!!!).

Freddie arrived and caught up with John and Josh and had a personalised tour and an initiation into the nostalgic world of steam and sat on the Jelbart Roller. Hopefully we will see more of Freddie and his family in the future. Thanks to John and Josh Franc and the Beaufort Progress Association for their interest and to Lauren for the support and effort that she has provided for Freddie's interests in an active hobby. Ed.



Recently Clive Phillips received this picture and a note from Gordon Wilson, the son of founding member Joe Wilson pictured above the rudder in the above picture.

Joe will be remembered for his association with the Dendy Steam Engine in the Founders Building, the story is on the info board with the Engine.

Gordon Wrote:-

"Hi Clive , on a recent visit to a friend some old photos he had been left came to light and this one stood out. It is at Lake Gold smith in the early sixty's the pilot of the gyro is Lyn Bruty and he had just landed in front of what is now the founders shed . The chap in the left background with the hat is my father Joe Wilson and the young fellow in the black jumper leaning over the pilots shoulder is me. I spotted dad in the pic first and told my friend I would not have been far away and on closer examination there I am. Like bringing up Ghosts from the past. Hope you are keeping well and keeping the Wedlake and Dendy turning over . Cheers Gordon Wilson.

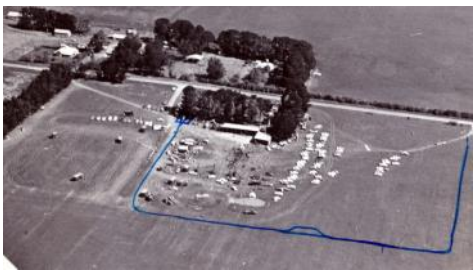
Clive asks if anyone can recognise others in the picture. Gordon and his family will be at the next Rally to renew their acquaintance with the engines in the Founders Building.

The Pilot Lyn Bruty was also a founding member, who unfortunately was later to perish in a Gyro plane accident.

This Gyrocopter was an impressive sight as it flew around the Rally Ground on my first visit to a rally at Lake Goldsmith. So many things have changed since then, it was great then and better now.

Thanks to Clive and Gordon for this nostalgic look into the past.

If anyone else has some photo's of early rallys and members and their exhibits I would be pleased to include a story and pictures of our past. With over 50 years of Rallies we are beginning to create a history of our own, and it is important that we preserve as many memories as possible for the interest of future members and visitors.



Left, early aerial view from the 60's or before, and on the right a more recent view.

50 Years of Change

Another moment of local

TRAWALLA WW1

SOLDIER SETTLEMENT

(In the parishes of Trawalla, Brewster, Lillirie, Yangerahwill & Chepstowe)

Beaufort Historical Society is producing a book on the Trawalla WW1 Soldier Settlement Scheme.

For further information contact

Lois Spenceley. 0428 928 318, email davidandlois@ncable.net.au

or Shirley Boyle on 5339 8272.

This book is to be launched at Scullin Park, Trawalla on the 28th Apr 2019.

Keep an eye out for further information on the above date.

history from a bit further back in time is being put together in book form by the:-

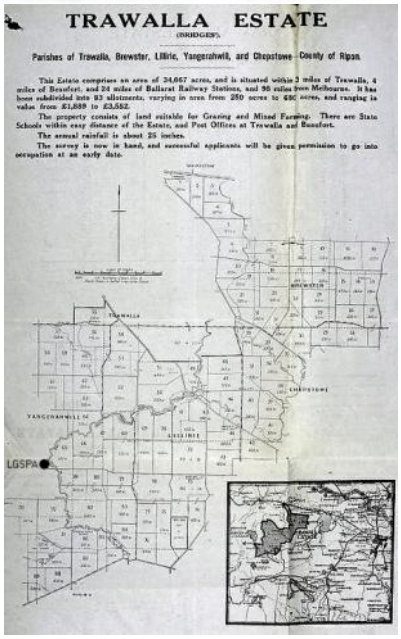
Beaufort Historical Society

About 35 000 acres of the Trawalla Estate was subdivided into 93 lots which were made available to Soldier Settlers after World War 1. This book follows on from the sale.

Trawalla was first settled in 1839 and the Trawalla name was taken from the aboriginal work for flood.

In 1841 theTrawalla lease was taken over by Adolphus Goldsmith from whom our District Lake & Club took their name.Goldsmith was a member of the Victorian Legislative Council in 1851 and resigned in 1853 to retire to Paris.

Thanks to Shirley Boyle from Beaufort Historical Society.



Steam Fest 2019 at Scoresby

Steamfest 2019 got under way in March with good weather, terrific crowds and a great display with plenty of variety from the Ransome's Rapier Dragline to hand tools.

The 12" railway track was in demand for the 3 days of the Rally. Phil Hayes Steam Loco and 2 IC locomotives took the train around the new Eastern track embankment and cutting to add more interest to the trip.

(My apologies, there were some tricks with the new camera that I had not mastered

Donald Healy made some of the best looking sports cars, and this 100 6 is one of his best.

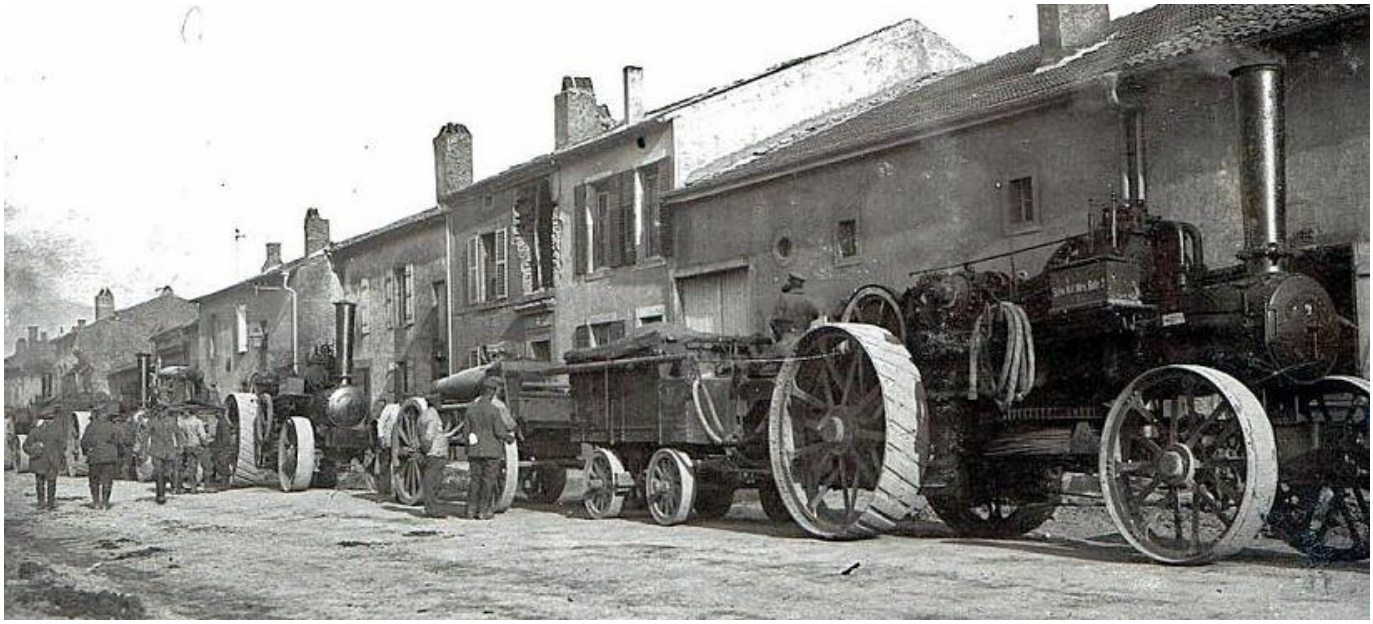
The Buffalo Pitts Portable earned its keep crushing bricks, while there were more portables down the line

Dave Mickle takes a moment to catch up with the Yorkshire Steam Wagon and Fowler Steam Roller.

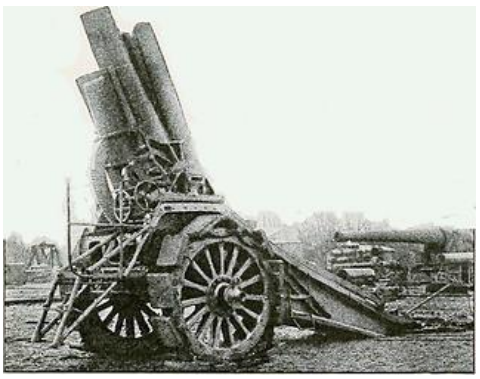
While a couple of steam boats sit high and dry.

The Blacksmiths forge heats the steel and the power hammer finishes it off.
Below, John Sparks tends the Family Steam Miniatures display.

Krupp 280cm Haubitze L/14 Siege Canon 1913/18.



This Howitzer fired a 283mm (11")ϕ projectile weighing 285KG for 9.7KM @ 346m/s. The Carriage, Barrel and " extras" all travelled behind their own Traction Engine. At least one appears to be a K7 Fowler or similar ploughing engine with a winch below. The recoil system used a 2 Hydro pneumatic cylinders which sneaks the Gun into the Tractor Theme. This Gun was used in Russia early in the war and them moved to Verdun in France. The convoy would have been an impressive sight on the road.



Beaufort Open Weekend
June 8 & 9 2019

Expressions of interest are invited to run an open weekend with steam and IC engines, tractors, trucks and cars at the upcoming Queens Birthday Weekend on Saturday and Sunday at the Lake Goldsmith Goods Shed Museum.

The Lake Goldsmith People Mover will be towed around town by a Traction Engine for rides to attract attention and draw a crowd to the goods shed.

Enquiries to shed 10 at the May Rally or via email to:- scss@vic.australis.com.au