



GRESSENHALL
FARM AND WORKHOUSE
MUSEUM OF NORFOLK LIFE



Norfolk
Museums

Behind the Scenes Full Steam Ahead

Gressenhall Farm and Workhouse



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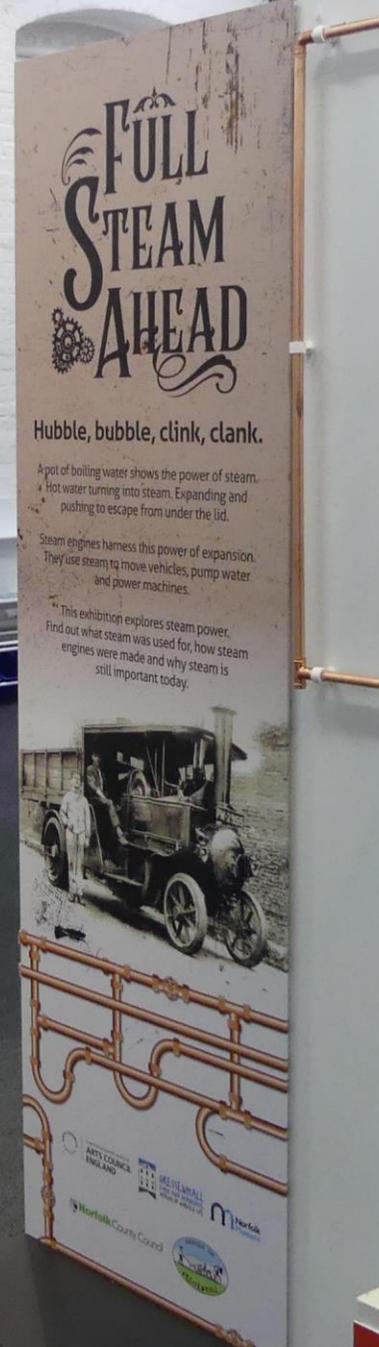
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BEHIND THE SCENES FULL STEAM AHEAD

Gressenhall Farm and Workhouse's temporary exhibition for 2020 is Full Steam Ahead.

Which part of the exhibition do you want to explore?

- [Introduction](#)
- [What did steam power?](#)
- [How does steam work?](#)
- [How to make a steam engine](#)
- [Steam and the Empire](#)
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INTRODUCTION



Hubble, bubble, clink, clank.

A pot of boiling water shows the power of steam. Hot water turning into steam. Expanding and pushing to escape from under the lid.

Steam engines harness this power of expansion. They use steam to move vehicles, pump water and power machines.

This exhibition explores steam power. Find out what steam was used for, how steam engines were made and why steam is still important today.

- [What did steam power?](#)
- [Explore another area](#)
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WHAT DID STEAM POWER?



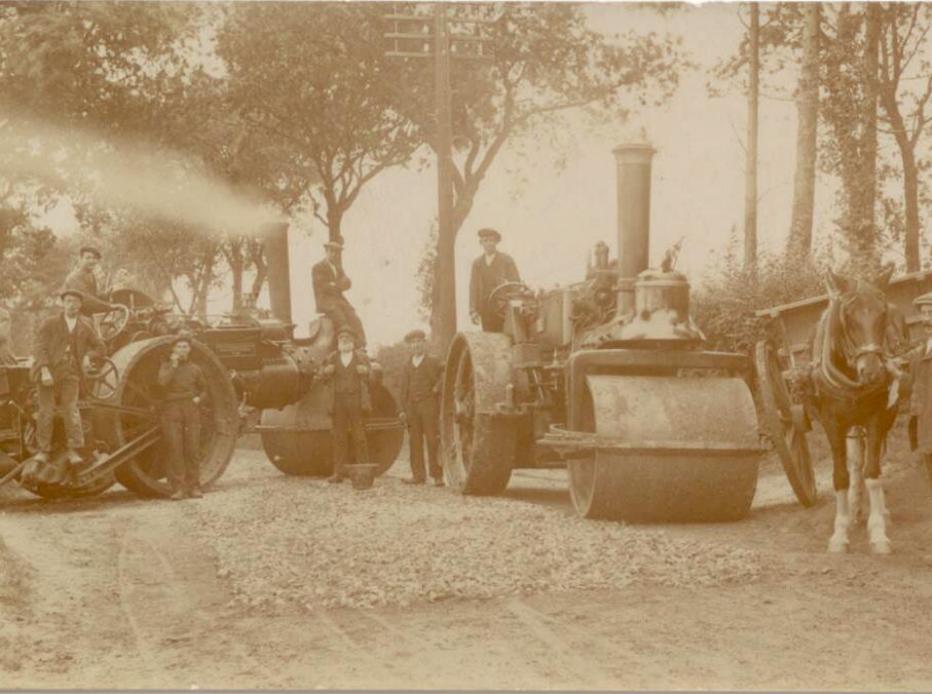
Steam was used to power all sorts of different machines. Click on the links below to find out more.

- [On the road](#)
- [By the railways](#)
- [All the fun of the fair](#)
- [In the fields](#)
- [Powering the factories](#)
- [On the waves](#)

Or explore other areas of the exhibition:

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ON THE ROAD

Steam power drove different types of vehicle on the road. From 1850 steam cars, lorries and even buses were sold. Road workers used steam power to repair the highways. The internal combustion engine replaced steam power after World War Two.

Toy steam road roller. Made by Dinky Toys around 1968.
NWHCM : 1983.175.10

Photograph of road workers with two steam rollers and a horse and cart. GRSRM : 2007.43

- [By the railways](#)
- [Explore another area](#)
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BY THE RAILWAYS

Steam trains were first developed in Britain in the early 1800s. Electric and diesel power began to be adopted from the 1930s and the last steam trains were used on mainlines in the 1980s. There are still many heritage railways where you can take a trip on a steam train.

Model of a Claud Hamilton 4-4-0 locomotive number 1880 and tender. These trains were the flagship of the Great Eastern mainline and were used on passenger and goods services from 1900 until 1960. Do you remember seeing one? This model features the London North Eastern Railway livery of apple green. This means the model must have been made after 1923 when the Great Eastern Railway joined this group. NWHCM : 1952.37

Cover from a book of luggage labels. L&NER on the train stands for London and North-Eastern Railway. GRSRM : 2001.34.1



- [All the fun of the fair](#)
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ALL THE FUN OF THE FAIR



Steam power was fun! Steam powered roundabouts were first developed in the 1860s. Frederick Savage of King's Lynn became famous for producing steam velocipedes (bicycles), dobbies (horses that go round and round) and gallopers (horses that went up and down as well as round and round). In 1880 Savages went one step further and created the Sea-On-Land ride – with models of boats going round and round but also being pitched and tossed as if they were at sea.

Postcard advertising Frederick Savage & Co., manufacturers of Hand & Steam Power Roundabouts. KILLM : 2011.21.101

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IN THE FIELDS



Steam engines were used on farms as early as the 1790s. These large engines were built in barns and used to drive threshing machines. These threshers separated grains from the chaff.

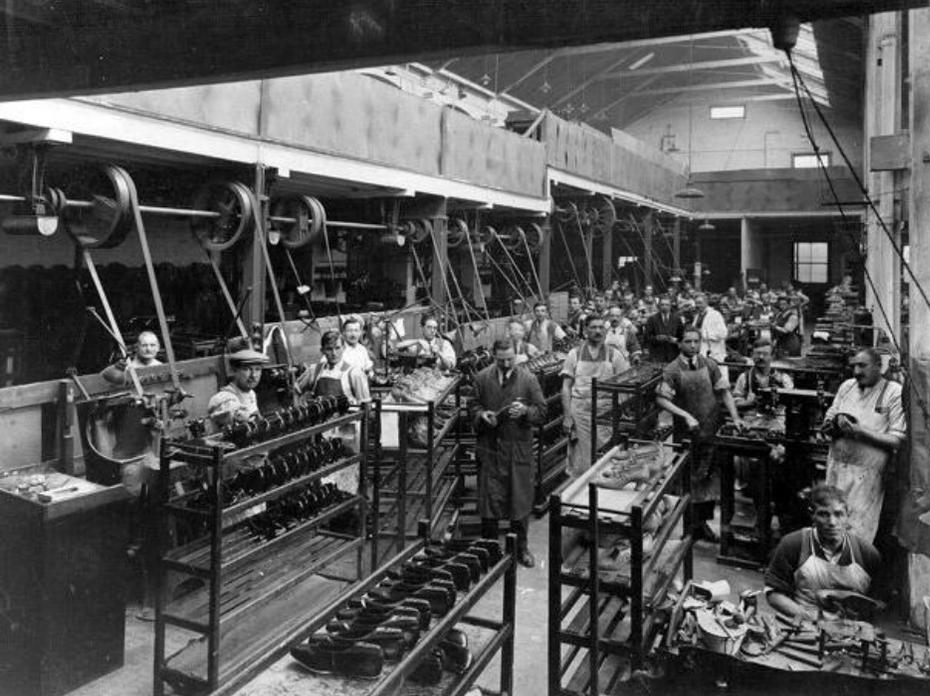
Portable engines which could be moved from one farm to another were introduced in the 1830s and proved very popular. A horse would tow a portable engine between farms. Traction engines were introduced in the 1850s. They could travel under their own steam without a horse to pull them making them cheaper. Both portables and traction engines were mainly used for threshing.

Steam was used to plough on some farms. Twin engines would be set up on each side of the field. These would pull a plough between them across the field. Steam engines could pull larger ploughs than horses – five or six furrows at a time. But steam ploughs were expensive and couldn't be used on small and irregularly shaped fields. Horses continued to be used on the majority of British farms.

Photograph of a Burrell traction engine built in 1910 threshing barley at Injun Farm, Bunwell in 1959. GRSRM : CP.CP827

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POWERING THE FACTORIES

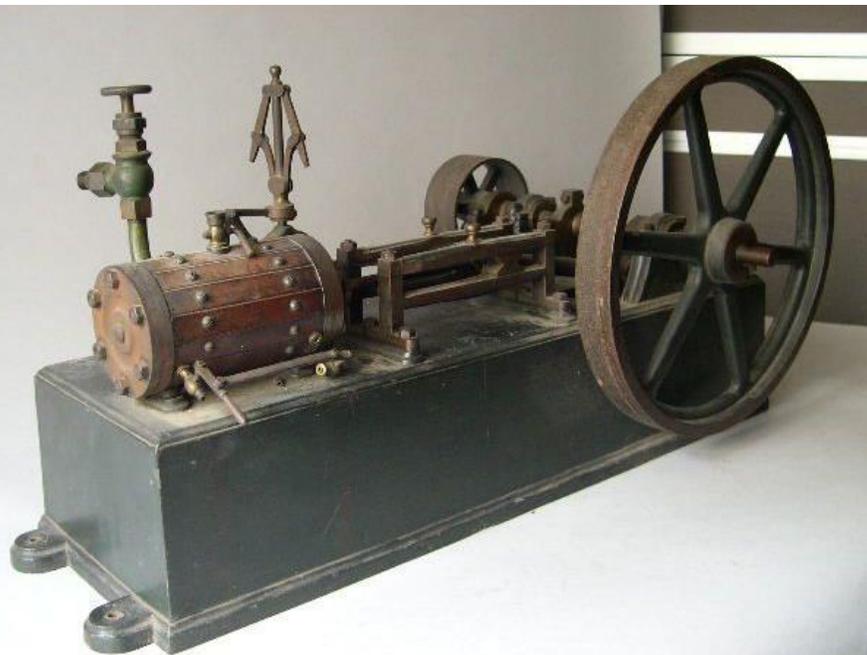
The steam engine helped to power the Industrial Revolution. Before steam power, most factories and mills were powered by water, wind, horse, or man. These were unreliable and meant factories had to be located close to the source of power.

Steam power allowed for factories to be located anywhere. It provided reliable power and could be used to power larger machines. Many factories used steam engines to turn a drive shaft. Many smaller machines could then be driven using a belt connected to the drive shaft.

Model of a single horizontal cylinder steam engine used to pump water.
NWHCM : 2015.57.36

Photograph of the Finishing Room at the Co-operative Shoe Factory, Mountergate, Norwich taken in 1930. Notice the smaller machines driven by belts off the axle which runs the length of the factory. NWHCM : 2008.295

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ON THE WAVES

Steam power revolutionised travel and transport on the water. The first steam powered boats were developed in the early 1800s. Steam engines drove paddles, screws or propellers that pushed the boats along. This gave rise to the tradition of naming boats PS (paddle steamer) or SS (screw steamer).

Steam was used on smaller river boats and ocean-going ships. Many steam ships were sunk during World War Two. In the 1900s diesel engines have become cheaper to run. No steam ships have been built since the 1960s.

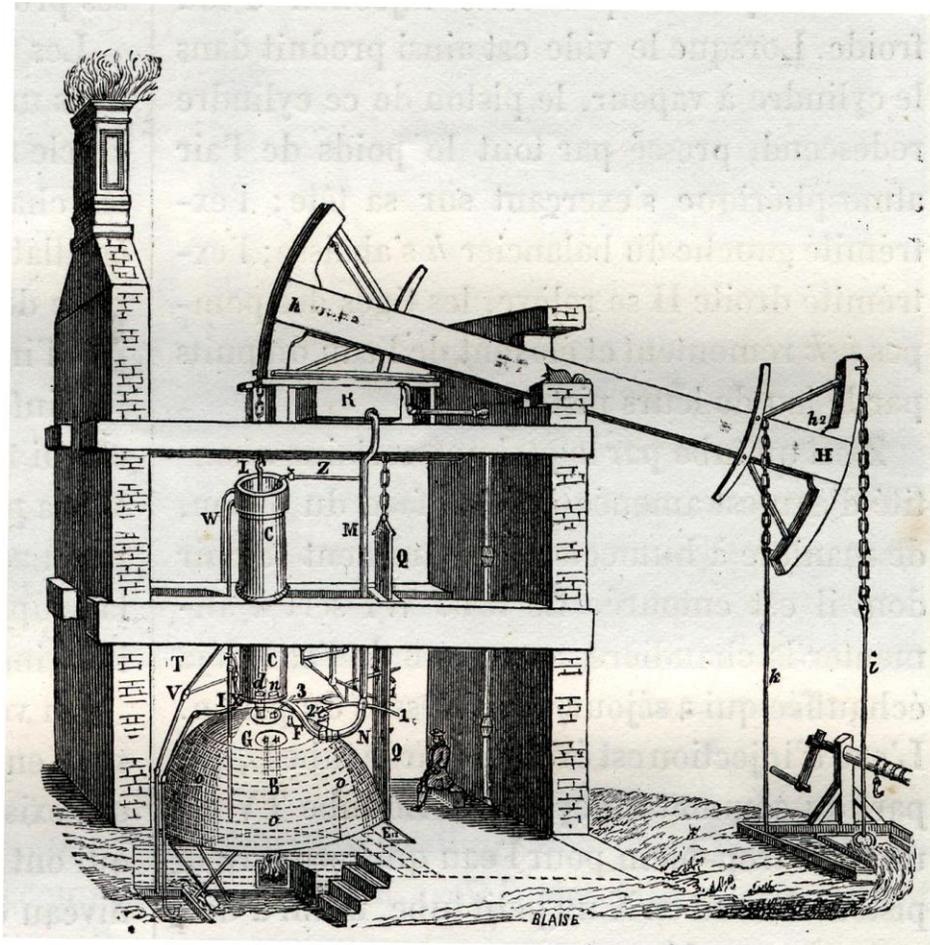
Model of the paddle steamer Cruiser of Yarmouth. GRYEH : 1967.401



- [How does steam work?](#)
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HOW DOES STEAM WORK?



Steam engines were developed from early water pumps into amazing machines that could power a whole factory. Click on the links below to find out more.

- [The Newcomen engine](#)
- [The horizontal engine](#)
- [The line shaft](#)

Or explore other areas of the exhibition:

- [How to make a steam engine](#)
- [Explore another area](#)
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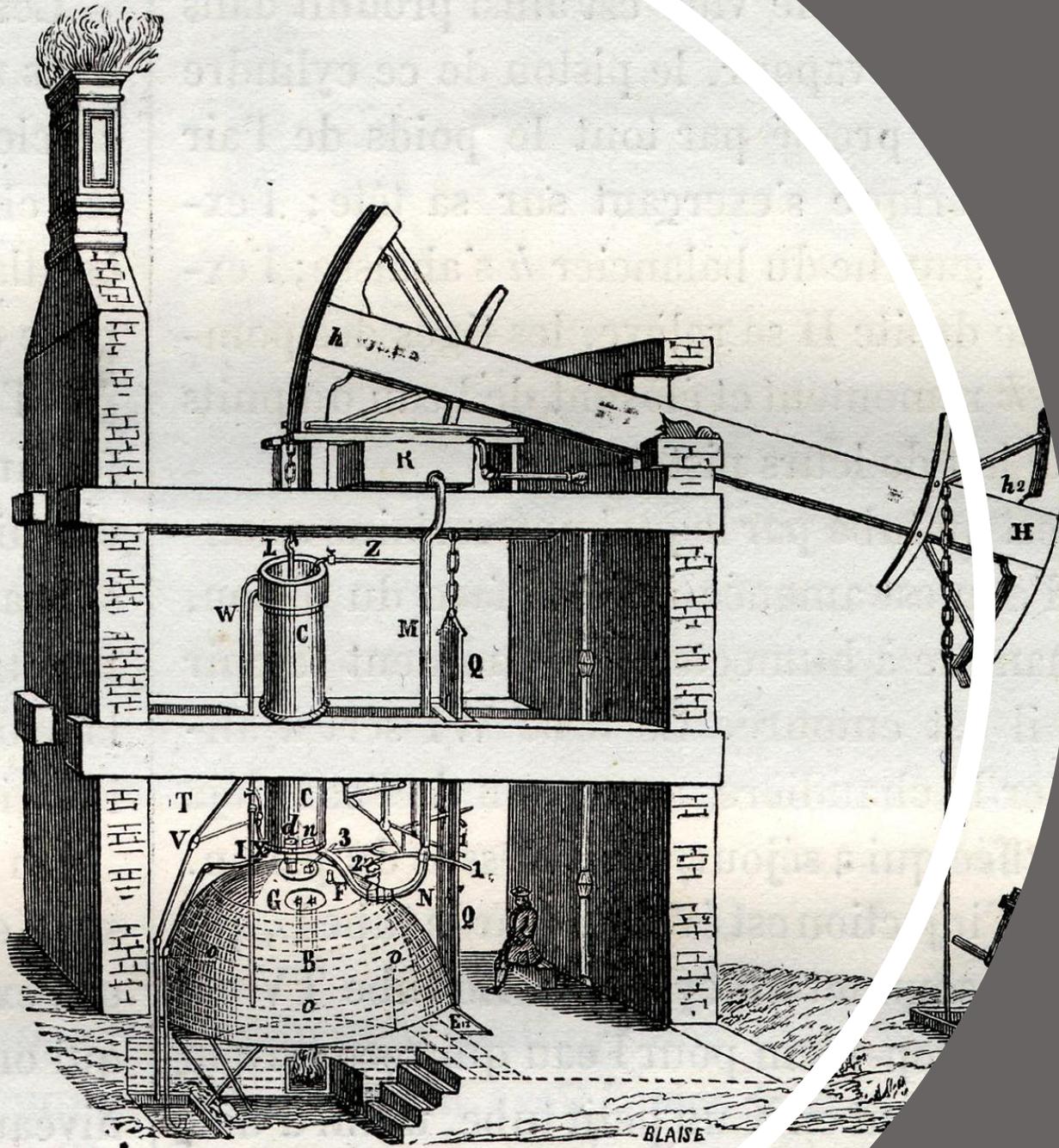
THE NEWCOMEN ENGINE

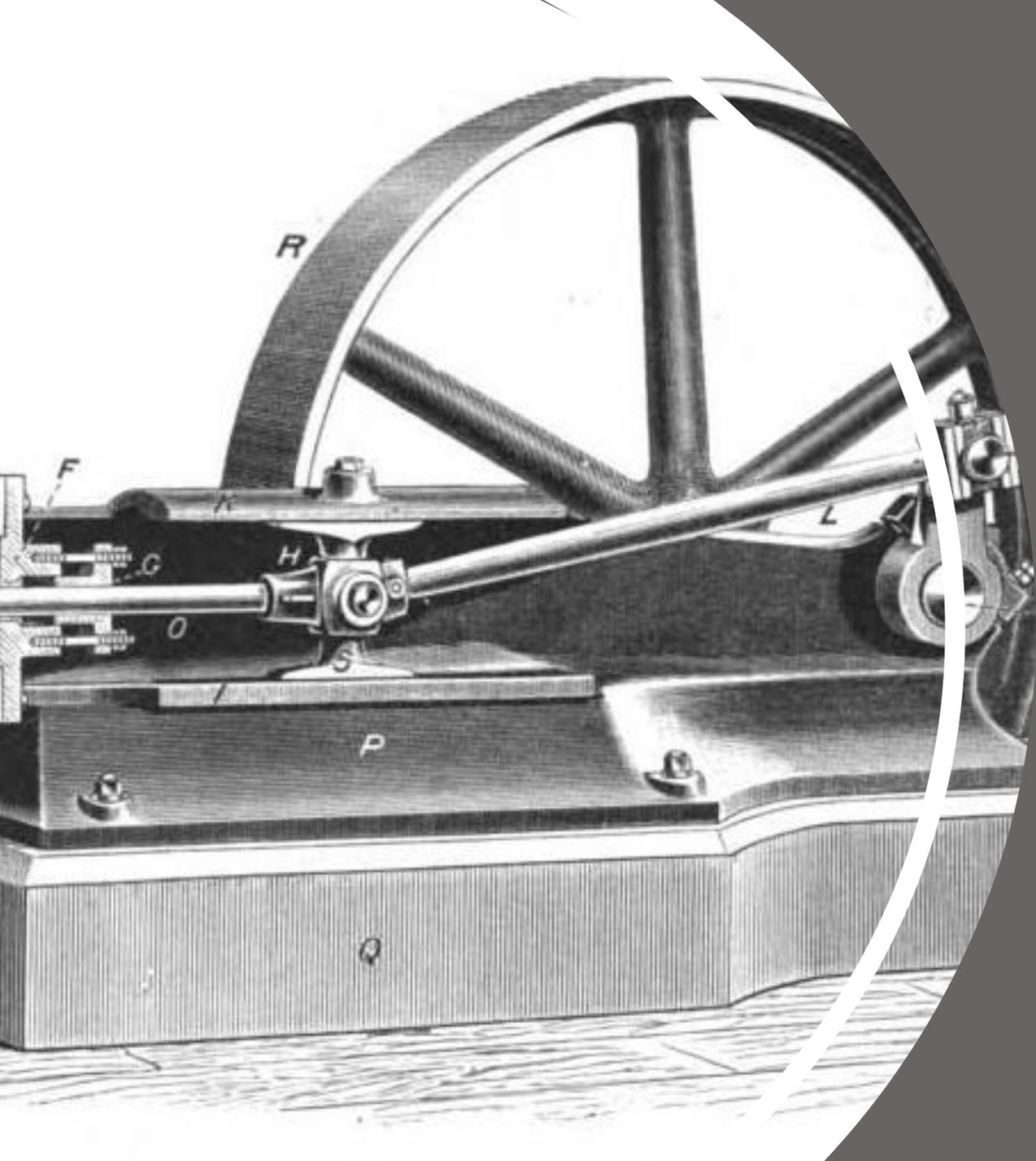
The simplest steam engine is called the Newcomen steam engine. It was named after Thomas Newcomen who invented it in 1712.

Water is heated to produce steam. This steam pushes a piston up. The steam is then condensed into water. The water takes up less room than the steam leaving a vacuum which pulls the piston back down. The water is then turned back into steam to push the piston up again.

Newcomen's engine was developed to pump water out of mines. It was widely used across Europe.

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THE HORIZONTAL ENGINE

In the horizontal steam engine the piston and cylinder are arranged horizontally. Steam pushes the piston backwards and forwards inside the cylinder. A connecting rod and flywheel change this backwards and forwards motion into a circular motion.

The horizontal engine was frequently used in factories.

- [The line shaft](#)
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THE LINE SHAFT

A steam engine flywheel can be connected to an enormous range of different machines.

Steam engines powered hammers, threshers, ploughs and even merry-go-rounds.

They turned line shafts which ran lots of machines.

Line shafts were used in factories, mills and anywhere more than one machine needed to be run at the same time. Have you seen the line shaft in the laundry?

In this factory a steam engine runs the line shafts. The shafts are connected to individual printing presses by thick belts.

- [How to make a steam engine](#)
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HOW TO MAKE A STEAM ENGINE



In every part of the country local iron foundries made large agricultural tools like ploughs, harrows and harvesters. Many of these local foundries began making steam engines and other specialised machinery in the 1800s. Some of them became well-known and award winning like Savages of King's Lynn or Burrells of Thetford.

Click [here](#) to see what life was like within these foundries. Thanks to Iron Bridge Museums for allowing us to link to this film.

- [Working in a foundry](#)
- [Moulds and patterns](#)
- [Foundry patterns](#)
- [Cleaning the moulds](#)
- [Making an impression](#)
- [Letting metal in and gases out](#)

Or explore other areas of the exhibition:

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WORKING IN A FOUNDRY

Working in these foundries was hot, dangerous work. Each piece of the steam engine had to be made in wood (called a pattern). The pattern would be pushed into a box of damp sand. The pattern would then be removed, leaving an impression in the sand. This impression was then filled with molten iron. Once cooled the iron was removed from the mould and finished. The separate parts were put together to create the steam engine.

Hector Middleton worked at The Farmers Foundry Co in Great Ryburgh. He used a range of different tools to make steam engines:

Smelting scrap iron at Farmers Foundry Co in Great Ryburgh , 1902.
Photograph by L.D. Hoare. GRSRM : 2005.113

Photograph of Hector Middleton, a moulder at the Farmers Foundry Co. Photograph taken by Rod Rowlings

Photograph of workmen at the Farmers Foundry Co in 1949.
Photograph Archant Library.



- [Moulds and patterns](#)
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MOULDS AND PATTERNS

Moulds and patterns come in all shapes and sizes. The iron foundry could cast anything from a small decorative railing to large steam engine parts. They just needed moulds and patterns of the right size.

Hector Middleton stored all his moulding tools in this small wooden box. GRSRM : 1976.97.13

Patterns, mould and box. NWHCM : 1972.583.24

- [Foundry patterns](#)
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FOUNDRY PATTERNS

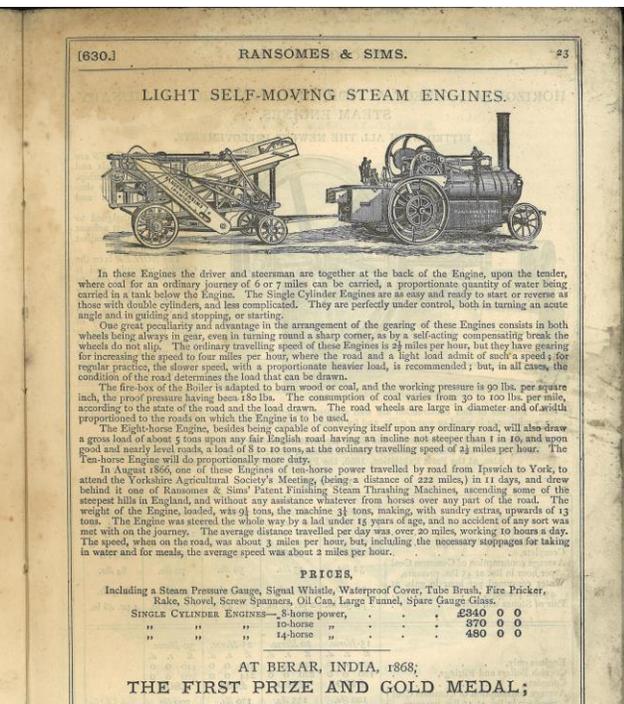
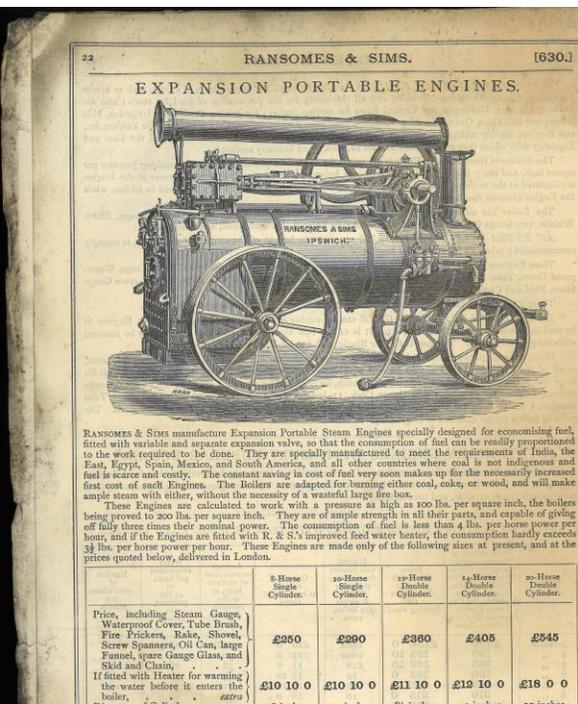
These wooden gears were used as patterns. They are wooden versions of the metal gears used in steam engines. They come from the Old Buckenham and Saxthorpe foundries and Plowright and Sons of Swaffham.

Gears allowed steam engines to transmit their power. As the engine moved one gear, its' teeth would push other gears along.

Gears came in different shapes and sizes. From simple cogwheels to more advanced designs with cone shapes or intricate intermeshing teeth. Depending on a gear's design, it could move faster or slower than the gear pushing it, allowing for precise speed settings.

Expansion portable engine made by Ransome and Sims. Each part was made from a wooden pattern. GRSRM : 1977.37.63e

- [Cleaning the moulds](#)
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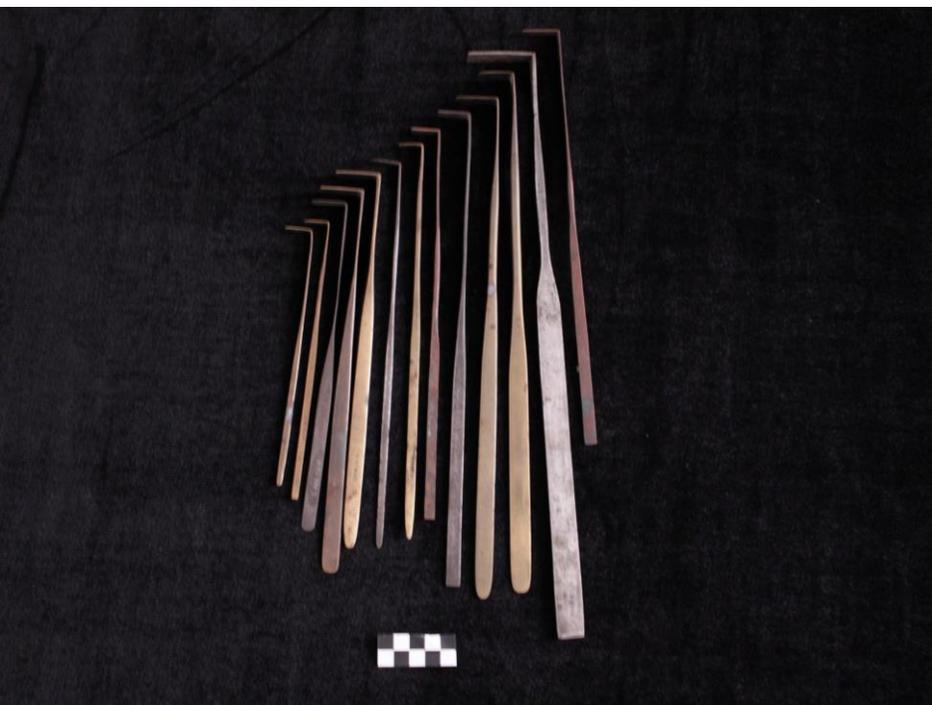


CLEANING THE MOULDS

First you need to clean the moulds. Hector would use these cleaners and trowels to ensure all the old sand was completely removed from the mould.

L-shaped brass cleaners. GRSRM : 1976.97.5.1 and 2

Trowels. GRSRM : 1976.97.7 and 8



- Making an impression
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MAKING AN IMPRESSION

These brass tools would be used to shape the sand mould to create runners, gullies and ditches that the molten iron could run down. The metal would then solidify, forming a replica of the pattern.

Boss tools. GRSRM : 1976.97.2

Weirs and beaders. GRSRM : 1976.97.3

- [Letting metal in and gases out](#)
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LETTING METAL IN AND GASES OUT

The ventilators were used to allow air to escape from the mould and prevent the formation of bubbles within the metal item. Runners and sticks were used to make gates and paths for the molten metal to fill the mould quickly and easily.

Ventilators. You can see how hot the foundry was – this plastic handle has melted. GRSRM : 1976.97.4

Runners and sticks. GRSRM : 1976.97.6

Rods and spikes. GRSRM : 1976.97.1

Peg and nails. GRSRM : 1976.97.9 and 10

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STEAM AND THE EMPIRE



The invention of new steam power machines in the 1800s led to massive industrial growth in Britain. Railways were built across the country. Steam boats made international trading easier and quicker. The expanding British Empire in the 19th century was powered by steam.

Framed print produced by the Empire Marketing Board. Called 'The Suez Canal' it shows a large British steam ship sailing down the canal whilst local people watch sitting in the sand with their camels. GRSRM : 1980.32.4

This plate celebrated Queen Victoria's Golden Jubilee. It shows Britannia, a personification of Britain, in the centre of the plate surrounded by people of the different nations of the Empire. GRSRM : 2013.6

- [Cataloguing steam](#)

Or explore other areas of the exhibition:

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CATALOGUING STEAM

Steam was seen as a technological advance brought to the people of the Empire by the British. Portable steam engines were exported throughout the empire. British companies created steam engines adapted for use in colonial countries which won awards at international competitions. The way these machines were advertised and illustrated in catalogues was racist.

The patent portable steam engine was adapted for burning straw, reeds, cotton, maize, mustard stalks, sugar cane, indigo refuse, trees, furze and bushes. These engines were designed for use in countries where coal and wood are not easily obtained.

R.D. Garrett and Sons, Agricultural Engineering and Machinists catalogue cover. It displays many international awards. GRSRM : 1977.37.62b

Catalogue entry for Howards Patent Portable Railway and Rolling Stock. GRSRM : 1977.37.44g



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- [Explore another area](#)
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THE NOSTALGIA OF STEAM



Who doesn't like a ride in a steam train, a traction engine threshing or a traditional old merry-go-round powered by a portable engine. Steam has become part of our TV viewing: Great Steam Journeys, Steam Train Britain and even Thomas the Tank Engine.

Why is steam so evocative? Why do we find it so enticing?

Perhaps it is about nostalgia for a simpler time. It does not matter if we are too young to remember it. It doesn't matter that it never actually existed. We wished it did and that is why we enjoy steam today.

Can you remember steam? Have you been on a steam railway or visited a steam event? What did it smell like? What did it sound like?

Steam engine transporting logged trees at Weeting Steam Rally in the 1990s. GRSRM : CP.CP1108

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- [Steam events](#)

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SOUVENIRS

A selection of souvenirs from the Weeting Steam Rally featuring Charles Burrell and Sons' steam engines. Burrells' company was based in Thetford and made steam engines between 1848 and 1932.

Souvenir mug with a colour print of the Burrell Showman's Locomotive 'Quo-Vadis' 1922. THEHM : 1977.201

Metal pin badge with a Burrell Showman's Road Locomotive. THEHM : 1977.202

Notebook with cover of Burrell engine 'Daemon' at a rally. THEHM : 1978.7

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STEAM EVENTS

Mr Daws of Mileham with a model traction engine.
GRSRM : 1979.119.1



Steam engine being oiled by its' owner at Weeting
Steam Rally in the 1990s. GRSRM : CP.CP1106

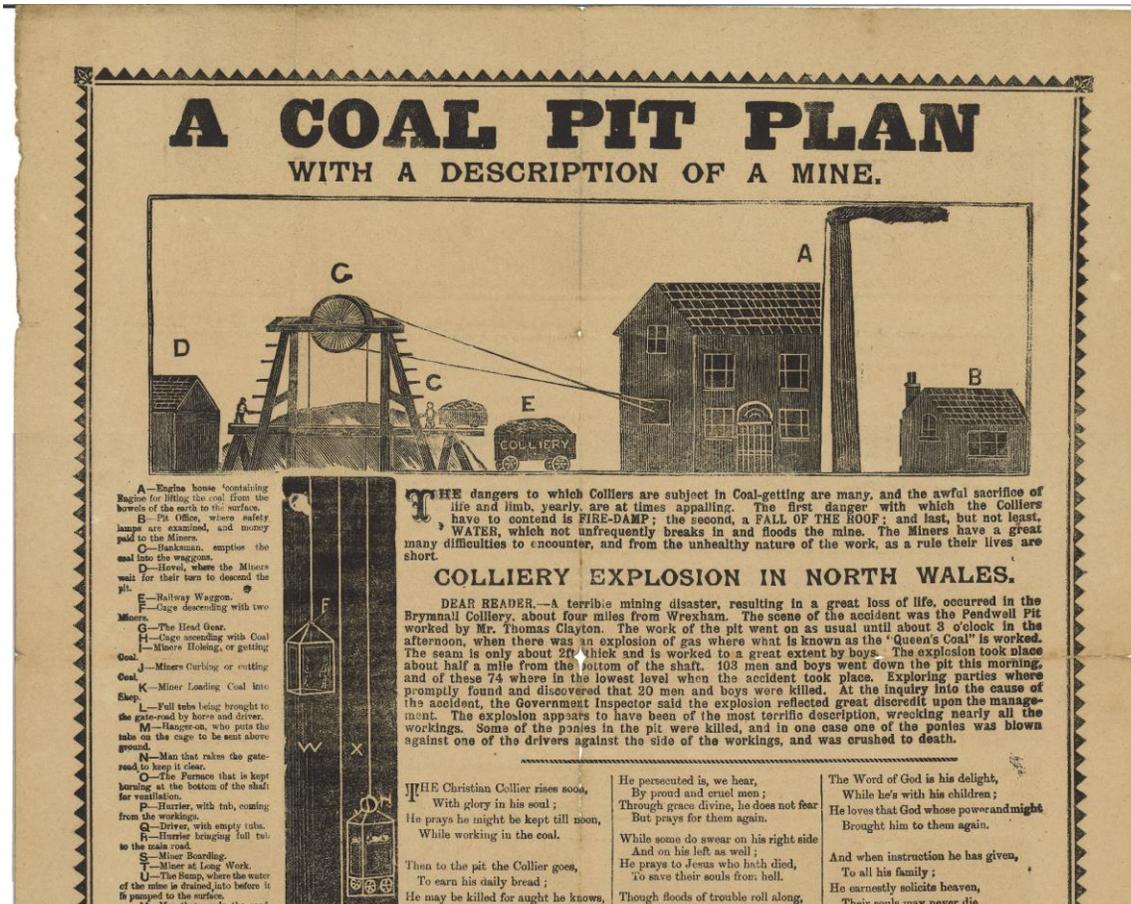
Steam traction engine crane belonging to Richard
Parrott, Fen Farm, Weeting demonstrating at Weeting
Steam Rally in July 1991. GRSRM : CP.CP824



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THE COST OF STEAM



The growth of steam power led to an increased demand for coal. New coal mines and pits were dug to provide coal for the new machines. The new steam technologies meant pits could be dug deeper. Between 1860 and 1900 the amount of coal extracted in Britain went from 80 million tonnes to 225 million tonnes.

Burning the coal produced carbon dioxide that went into the atmosphere. This carbon dioxide is now contributing to the climate emergency the globe faces today.

Replacing workers with machines also meant that lots of people no longer had a job or a way to support their families. In Norfolk workers rioted and broke steam powered machines in protest. Was steam worth it?

Coal mining was a hard job. This broadside shows some of the new mining equipment that was developed in the 1800s to enable miners to dig deeper and remove higher quality coal. GRSRM : 1981.151.4b

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STEAM POWER TODAY



Steam power is still important today. In power stations water is heated to create steam. This steam is used to drive massive turbines to generate electricity.

In Norfolk, a gas-fired power station at Great Yarmouth burns gas to heat the water. In Snetterton a smaller power station burns biomass (straw and other waste from farms) to drive their steam turbines.

Most of our electricity still comes from steam power.

The new power station at Snetterton burns straw and other farm waste to create steam and make electricity.

Photo © Evelyn Simak (cc-by-sa/2.0)

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