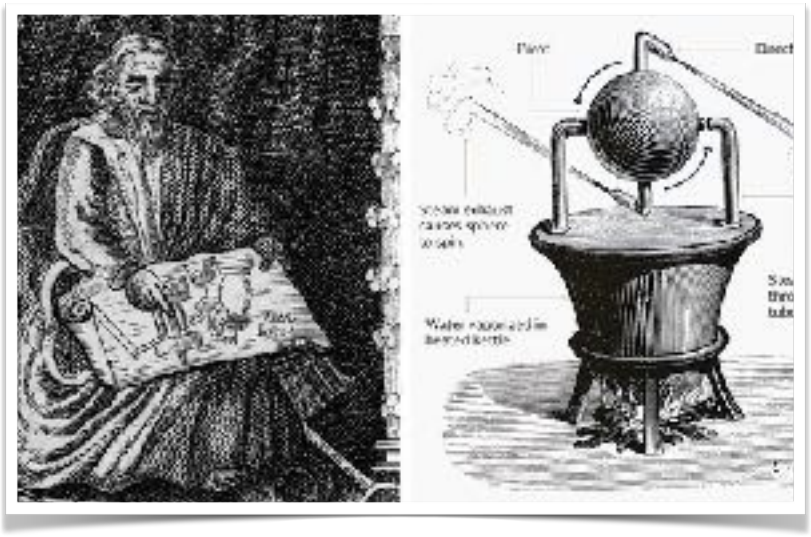
INVENTIONS

AND HOW THEY MADE HISTORY

The Science

In order to understand steam, we have to first talk about energy. What is energy? It is simply the ability to do work. When you push a cart in a grocery, your body is using and transferring energy to the cart, causing it to move.

In order to create steam, you have to transfer a lot of energy very quickly into the water with fire, whether you are burning coal, wood, or gas. That energy causes the water to boil and be released in the form of steam. That steam still carries a lot of that energy and when it is captured and harnessed, that steam can move anything.



The Steam Engine

Few inventions have made such a worldwide impact as the steam engine. Exactly as it sounds, a steam engine harnesses the pressure of steam rising off of boiling water in order to power machinery. While the first successful steam locomotive did not come around until the early 1800's, there's almost a 2000 year-old history leading up to it.

Hero's Aeolipile

The earliest attempt at using steam to power or move was in the 1st Century AD by the Greek engineer named Hero from Alexandria. This was the earliest form of a steam engine, made so in a very simple fashion. A metal ball was filled with water, with tiny nozzles sticking out of it and each facing one direction. When the ball was heated with fire, the water came to boiling and the steam shooting out of the nozzles caused the ball to rotate very quickly. Over a little time, it was made in the same

Experiment

To better understand Steam Engines, here are a couple of things to try, with the help of mom or dad:

Steam Engine

This one doesn't take much! Just bring a pot of water to boil at home and place the lid on it. Notice that when it comes to a really high boil, the lid starts to move a little! You can also see this at work if you have a whistling kettle at home and when it comes to a boil, the steam moves through the top nozzle really, really quickly, causing it to whistle louder and louder.

Atmospheric Steam Engine

This one is even cooler. Set up a few things: a dinner plate with some water poured in, a simple drinking glass, and a pot of boiling water. Hold the drinking glass just over the boiling water for 5-10 seconds. Notice all the steam building up inside. Then set the glass upside down onto the plate of water and watch what happens. The water gets pulled inside! A vacuum gets created, which is cause by the energy from the rapidly cooling steam inside the glass. In an atmospheric steam engine, that vacuum is powerful enough to pull on anything. Try it!

way in the picture above, with water in a kettle and then venting only steam into the ball. This did not progress much further for hundreds of years but it was still the start of something very important in human history.

Papin's Steam Cooker

The steam cooker was the next step in steam engines, which was of all things, motivated by people's love of food. In the 1670's, a Frenchman named Denis Papin created a cooking vessel that traps steam inside. However, he needed to create a way to keep it from exploding! And so, he conceived of a piston and cylinder attachment that would seal gradually from the pressure of the steam. Some of you might have some version of this steam cooker in your homes to this day.

Thomas Newcomen

A British engineer, he built in 1712 AD something known as the Atmospheric Steam Engine. It was the earliest form of a powered pump, made to pump water out of the bottom of coal mines. Without too much explanation, it was a reversal on the power of steam by using rapidly *cooling* steam to create a vacuum, PULLING on a piston instead of pushing on it. More easily understood by watching tutorials, Thomas is credited with being responsible for beginning what was called the Industrial Revolution. James Watt would perfect this design in 1775 AD.

The Steam Locomotive

While it was Nicholas Cugnot who created the earliest self-propelled vehicle in 1769 AD, the first to move under its own power...even if it didn't do it very well. It was largely inefficient and required had to stop every 15 minutes to build up steam power again but nonetheless, a very important step in the development of the steam engine. It was George Stephenson in 1814 AD who built the first steam locomotive to run on rails, which carried as much as 30 tons of coal uphill. Stephenson would go on to construct the world's first public railways, spurring on a worldwide revolution in transportation and economics.