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Using Steam

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Using **Steam**

During the seventeenth century, we finally *tumbled* to the fact that gases and *vapours* can *exert* huge forces. People began testing the idea that airy vapour might actually power an engine. Rudimentary steam engines began appearing.

As early as 1606 (or 1601?) an Italian experimenter showed how steam, forced into a closed box of water, could drive the water up a *pipe*. He had made an embryonic steam pump a century before Thomas Newcomen built the first complete working engine in England, and 160 years before James Watt began making steam engine *improvements*.

So think for a moment like a seventeenth-century inventor. You realize steam has a huge potential and you want a machine that can *harness* it. What options do you have? By now we've *settled on* two very different *means*. We can expand steam through a *nozzle* and let the resulting *jet* do work for us. Or we can let steam act upon a *piston*.

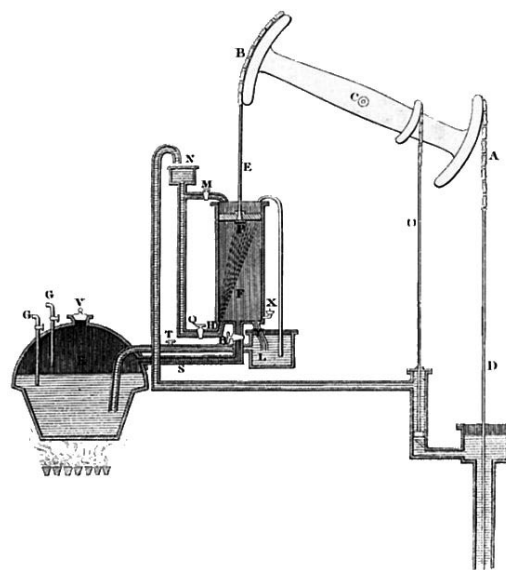
First-century Hellenistic engineers used rear-pointing steam jets to power toys - birds flying on the ends of strings, *whirligig* devices, vehicles. Another Italian inventor described a complete steam turbine system to power *grinding pestles*, in 1629. His jet acted upon a turbine wheel, instead of just blowing backward. And, despite all that, practical steam turbines wouldn't appear until just over a hundred years ago.

The piston/cylinder idea is more complex in principle. But it was easier to make. Consider possibilities: You can seal some water in a cylinder, then alternately heat and cool it. Boil and condense – driving a piston first one way, then the other. Or you can supply steam from an external *boiler*. First the steam pushes the piston one direction. Then we condense the steam and outside air pushes it the other way. Or we can exhaust the spent steam and let it condense outside the cylinder. Lots of possibilities there, and all of them were tried.

Denis Papin, a French Huguenot working in Germany, built the first piston engine in 1690. He heated and condensed the same water over and over. It was slow, and he didn't yet have the mechanical *wherewithal* to make a commercial model. Seventeen years later Papin described another engine. This time he supplied steam from an outside boiler and he *exhausted* the spent steam. After another five years, Thomas Newcomen built his working engine. He used an external boiler, he con-

densed his steam inside the cylinder, and he gave us the beginning of commercial steam engines.

But so many clever people had brought it into being. By the time working engines could take so much weight off our backs, the variants had all been tossed in the air like *wheat* and *chaff*. And one, just right for the time, landed where it could alter life on Planet Earth. So many people; so much fine work! It all makes me want to *weep* when I'm asked, "Who really invented the first steam engine?" ■



<i>boiler</i>	Kessel
<i>chaff</i>	Spreu
<i>exert, to</i>	ausüben, anwenden
<i>exhaust, to</i>	ausströmen, entweichen
<i>grinde, to</i>	mahlen
<i>harness, to</i>	etw. nutzbar machen
<i>improvement</i>	Verbesserung
<i>jet</i>	Strahl
<i>mean</i>	hier: Weg
<i>nozzle</i>	Düse
<i>pestle</i>	Stößel, Mörserkeule
<i>pipe</i>	Rohr
<i>piston</i>	Kolben
<i>settle on sth., to</i>	sich für etw. entscheiden
<i>tumble, to</i>	purzeln
<i>vapour</i>	Dampf
<i>weep, to</i>	weinen
<i>wheat</i>	Weizen
<i>wherewithal</i>	nötige Mittel
<i>whirligig</i>	Kreisel, Karussell

Wer hat die Dampfmaschine erfunden? Und was genau ist eine Dampfmaschine? Eine Geschichte, die bei den Griechen beginnt und mit James Watt noch lange nicht endet.

Dieser Text von Prof. Dr. John Lienhard ist Teil der Radioserie „Engines of Our Ingenuity“ und wird hier mit freundlicher Genehmigung des Autors und der Radiostation KUHF wiedergegeben. Den Originaltext und weitere 1900 Kurzberichte über die Geschichte der Technik finden Sie unter www.uh.edu/engines