# Hero's Steam Turbine

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**Hero's Aeolipile by J Swan of Hereford MES**

*After 77 days of lockdown, we may wish to challenge the sanity of model engineers before, during or after but take stock, it appears this lunacy has been going on for more than 2000 years - take heart fellow engineers (Ed.).*

A n Aeolipile (or aeolipyle, or eolipile), also known as a Hero's engine, is a simple, bladeless engine radial steam turbine which spins when the central water container is heated. Torque is produced by steam jets exiting the turbine, much like a tip jet or rocket engine. In the 1st century AD, Hero of Alexandria described the device in Roman Egypt, and many sources give him the credit for its invention.

*J Swan's masterpiece is on display at Hereford MES for your enjoyment.*

The aeolipile which Hero described is considered to be the first recorded steam engine or reaction steam turbine. The name – derived from the Greek word Aἴολος and Latin word pila – translates to "the ball of Aeolus", Aeolus being the Greek god of the air and wind.

Predating Hero's writings, a device called an aeolipile was described in the 1st century BC by Vitruvius in his treatise De architectura; however, it is unclear if it is the same device or a predecessor, as he does not mention rotating parts.

Both Hero and Vitruvius draw on the much earlier work by Ctesibius (285–222 BCE), Ctesibius or Ktesibios or Tesibius was an inventor and mathematician in Alexandria, Ptolemaic Egypt. He wrote the first treatises on the science of compressed air and its uses in pumps.

It is not known whether the aeolipile was put to any practical use in ancient times, and if it was seen as a pragmatic device, a whimsical novelty, an object of reverence, or some other thing. A source described it as a mere curiosity for the ancient Greeks, or a 'party trick'. Hero's drawing shows a standalone device, and was presumably intended as a 'temple wonder', like many of the other devices described in Pneumatica.

Vitruvius, on the other hand, mentions use of the aeolipile for demonstrating the physical properties of the weather. He describes the aeolipile as*, "a scientific invention [to] discover a divine truth lurking in the laws of the heavens."*

After describing the device's construction, he concludes*: "Thus from this slight and very short experiment we may understand and judge the mighty and wonderful laws of the heavens and the nature of winds*."

In 1543, Blasco de Garay, a scientist and a captain in the Spanish navy, allegedly demonstrated before the Holy Roman Emperor, Charles V and a committee of high officials an invention he claimed could propel large ships in the absence of wind using an apparatus consisted of copper boiler and moving wheels on either side of the ship. This account was preserved by the royal Spanish archives at Simancas. It is proposed that de Garay used Hero's aeolipile and combined it with the technology used in Roman boats and late medieval galleys. Here, de Garay's invention introduced an innovation where the aeolipile had practical usage, which was to generate motion to the paddlewheels, demonstrating the feasibility of steam-driven boats, a claim denied by Spanish authorities.