



## The Hydraulic Ram pump

The water powered water pump!

Water supply and distribution is essential to all living things. Moving water from one area to another for irrigation, domestic supply or sanitation has always been one of the most important founding principals on which any civilisation is built.

We do not naturally associate the water coming out of the tap with climate change. In the UK vast amounts of energy are used to supply water to every home and business. In remote locations worldwide, generators or hand pumps are used to extract and distribute water at either great cost or effort.

In the right location the hydraulic ram is able to pump water, autonomously, for free and lasts indefinitely, with barely any maintenance.

Since the first pump was first built in 1796 by James Mongolfier, the inventor of the hot air balloon, this remarkable technology has been installed in almost every country in the world from Nottingham's Newstead abbey to the Taj Mahal.

Every pump is guaranteed forever. Most hydraulic rams, installed prior to 1800, are still working as well as the day they were installed, and suppliers still maintain a stock of all parts on the shelf!

This is simply the most remarkable, resilient, simple and sustainable renewable energy technology there is.

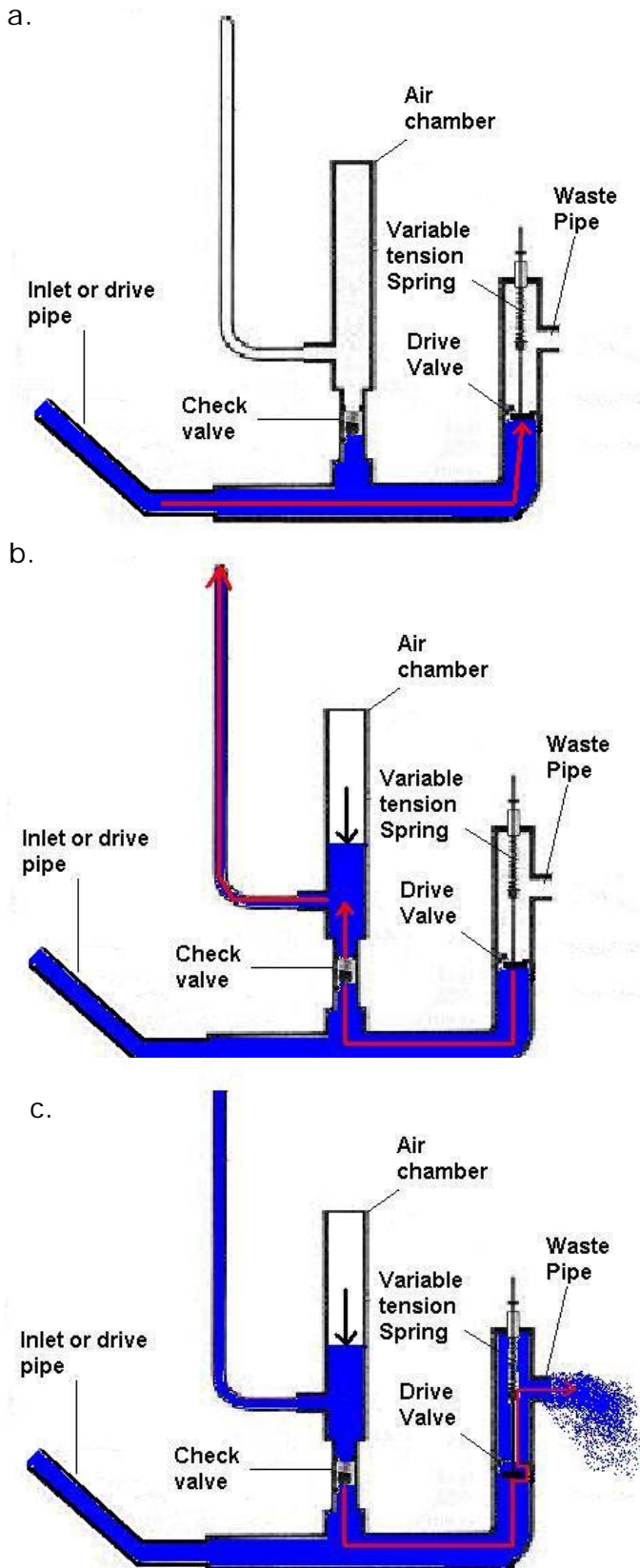
Single pumps cost between £700 and £15,000 depending on size and are able to pump water up to 300m elevation depending on the site.



Images, thanks to Green and Carter.

[www.greenandcarter.com](http://www.greenandcarter.com)

## How the pump works.



1. A large amount of water travels down the wide inlet or drive pipe and forces the drive valve closed. (diag.a)

2. The sudden closure of the drive valve sends a wave of pressure back up the pipe. This is similar to the effect when you turn of a tap suddenly. (diag.b)

3. This back pressure forces water through the check valve into the air chamber. (diag.b)

4. You compressed air acts like a spring, pushing a small amount of water up a thin delivery pipe. (diag.b)

5. With the back pressure released, the drive valve opens again allowing water to rush out of the waste pipe. (diag.c)

6. This water rushing past the drive valve forces it closed again starting the cycle once again. (diag.a)

### Basically

The pump uses the energy from a large amount of water falling a short distance to pump a smaller volume of water to a great height.

The water coming out of the waste pipe is not actually wasted. It has just had most of its energy removed, however this water can then be used for irrigation at points below the pump.

The hydraulic ram pump can work with a fall of water as low as 50cm and still pump water to a height of 18m. With falls from 2-7m water can be pumped to a height of over 300m and to distances exceeding 5km.