

# Rope pump

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A **rope pump** is a kind of pump where a loose hanging rope is lowered down into a well and drawn up through a long pipe with the bottom immersed in water. On the rope, round disks or knots matching the diameter of the pipe are attached which pull the water to the surface. It is commonly used in developing countries for both community supply and self-supply and can be installed on boreholes or hand-dug wells.

## Contents

- 1 Description
- 2 History
- 3 Construction
  - 3.1 Flexible valve rope pumps
  - 3.2 Rigid valve rope pump
  - 3.3 Valveless rope pumps
- 4 Intellectual Property
- 5 See also
- 6 References
- 7 External links



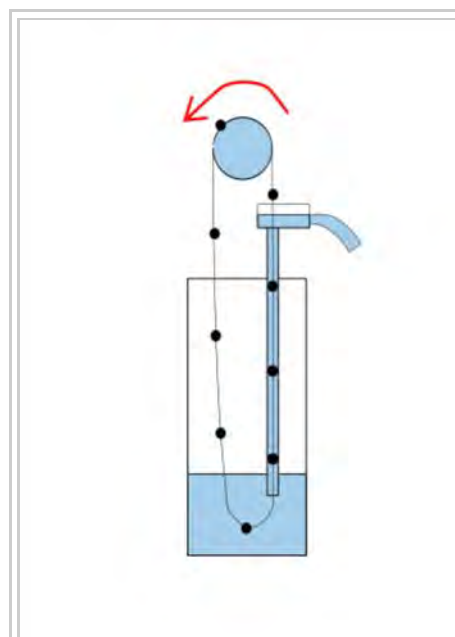
Rigid valve rope pump

## Description

A rope pump is a type of pump of which the main or most visible component is a continuous piece of rope, in which the rope is integral in raising water from a well. Rope pumps are often used in developing areas, the most common design of which uses PVC pipe and a rope with flexible or rigid valves. Rope pumps are cheap to build and easy to maintain. One design of rope pump using a solar-powered rope pump can pump 3,000 litres to 15 meters per day using an 80 watt solar panel .<sup>[1]</sup> Rope pumps can be powered by low speed gasoline/diesel engines, electricity,<sup>[2]</sup> human energy,<sup>[3]</sup> wind<sup>[4]</sup> and solar energy.<sup>[1]</sup>

## History

Chain or washer pumps were used by the Chinese over 1000 years ago.<sup>[5]</sup> In the 1980s Reinder van Tijen an inventor and grass roots activist, with the support of the *Royal Tropical Institute* of Amsterdam, created and began instructing various communities around the world how to make a rope pump from simple available parts using PVC pipes and plastic moldings. He began at Burkina Faso in Africa, continued to



Rope pump schematic

Tunisia, Thailand and Gambia among others.<sup>[6]</sup> In Nicaragua, the technology was rapidly disseminated over the whole country and 25% of the rural population in Nicaragua now use rope pumps. It is also used in other parts of Central America with over 25,000 pumps installed to date.<sup>[5]</sup> In Africa the rope pump is now being used with solar energy.<sup>[1]</sup> By the end of 2009 more than 4 million people in 20 countries worldwide were using rope pumps for domestic and irrigation water.

## Construction

The original rope pumps used knots along the rope length but can be made with flexible or rigid valves on the rope instead of knots. Alternatively they may use only rope, simply relying on the water clinging to the rope as it is quickly pulled to the surface.

### Flexible valve rope pumps

Flexible valves can be made from cut pieces of bicycle wheel tubing. The valves are positioned approximately 20 cm apart on the rope. One disadvantage of flexible valve rope pumps is that they must be appropriately sized and thickness for different types, sizes and length of pipes.<sup>[7]</sup>

### Rigid valve rope pump

Rigid valves using plastic or metal washers that fit tightly into the PVC pipe as the rope is dragged through are also used. If the fit is tight, the washers can be spaced up to half a meter apart. The deeper the well, the smaller the pipe inner diameter must be, given the available power constraints. These rope pumps are often worked with a hand crank<sup>[8]</sup>

Valves can also be made from knots in the rope itself.<sup>[9]</sup>

### Valveless rope pumps

Valveless pumps rely on friction with water clinging to the rope, which is moved at high speed, often using a bicycle to produce the required speed. It is a less efficient design but is simpler to construct than the other rope pumps.<sup>[3]</sup>

## Intellectual Property

Rope pump technology is in the public domain and there are no patents pending on it.<sup>[5]</sup>

## See also

- Chain pump
- Wind pump

## References

1. "Solar powered water pump". Solar Aid. Retrieved 2009-04-10.
2. "Moto Rope pumps". Retrieved 2009-04-10.

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3. "Bicycle Rope Pump". Retrieved 2009-04-10.
4. "The Rope Wind Pump". Retrieved 2009-04-10.
5. "history". Ropepump.com. Retrieved 2009-04-10. Rope pump history including 16th century image of the Chinese chain pump
6. The man outside the box (<http://crossroadsmag.eu/2008/06/demotech/>) On Van Tijen at Crossroads magazine website. The site includes some clear images of the invention and how it works.
7. Bartle, Phil. "Consider the rope pump". Community Empowerment Collective. Retrieved 13 March 2015.
8. "Rope Water Pump". Working Group on Development Technology. Archived from the original on 26 October 2009.
9. Appropedia:Rope pump knots

## External links

- rope pump site (<http://www.ropepumps.org>)
- Rope pump
- Lambdon, Robert (1989). *How to Make a Rope and Washer Pump*. Practical Application Publishing. ISBN 978-1-85339-022-7.

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