

Motorized rope pump

Motor Rope Pump

The motor rope pump is one of the application of the 'rope and washer' pumping principle, powered by an electrical, petrol or small diesel motor. The main application of this pump is as a deepwell irrigation pump for small scale irrigation.

The context

In those parts of the world where the climate has distinct dry periods, many small farmers earn additional income by growing additional crops in the dry season using simple irrigation techniques. When farmers have access to shallow wells with a water table of no more than 7m, pumping is usually done with suction pumps that are powered by a diesel or gasoline engine. For pumping from deeper wells, submersible electrical pumps are often used. However many small farmers in developing countries have no access to electricity and alternatives such as a generator sets with a submersible pumps or long-shaft diesel pumps are expensive and complex to operate and maintain.

The motor rope pump is a low cost alternative for making productive use of water from deeper wells for irrigation.

The technology

The pump part of a motorised rope pump is similar to that of a hand rope pump. Critical parts have been adapted to the higher load and PVC tubing and pistons are larger. The rotating shaft of the pump is connected with the shaft of the engine with V belts or a Polyurethane round belt, using a large pulley transmission to adjust the RPM of the engine to the low RPM of the rope pump. Where there is access to electricity the pump can be driven by an electric motor, or else it can be driven by a small diesel or gasoline engine of 1 to 2HP.

The application

Most motorised rope pumps are used for irrigation purposes; in Nicaragua they are also used for domestic water supply. As in the case of the hand rope pump, the basic model of the motorized pump cannot pump higher than just below the pump shaft, which makes the pump most suitable for low pressure irrigation. To pump to tanks of 3 to 5m high, an additional post must be added. Motorised rope pumps are recommended for depths up to 60m. In Nicaragua however, some pumps are installed on wells with depths exceeding 80m.

Motor rope pumps have been applied in Nicaragua, Senegal and Burkina Faso. The pump is produced locally, using simple techniques and materials that are locally available. The engines are either purchased on the local market or imported.

The facts

Range of depth:	7 - 60m
Yield:	120 Litres/min at 10m 60 Litres/min at 20m 20 Litres/min at 60m
Fuel consumption:	0.4 litres/hour, depending on model and engine
Cost:	€350 - €550 depending on country of implementation
Numbers:	300 produced in Nicaragua (different models) 30 produced in Burkina Faso and Senegal (gasoline model)

Training and introduction

PRACTICA can assist local manufacturers with starting up production. For training of manufacturers, PRACTICA has developed a set of workshop drawings, a production manual, installation manual and maintenance sheets, spare parts, etc. PRACTICA also gives assistance with importing low cost petrol engines for the motor rope pump, as well as assistance with the promotional activities.



the motor rope pump on an open well



the motor rope pump in use



the second generation motor rope pumps

Volanta pump

Volanta pump

The Volanta pump is a flywheel operated deep well piston pump.

The context

In poor (rural) areas, people often rely on unsafe water sources for their drinking water need. By drawing water from (deep) underground aquifers, people can have access to clean drinking water. For this purpose, different water pumps suitable to serve a whole community have been developed. In this context, the Volanta pump has been developed for those situations where water tables are deep.

The technology

The Volanta pump is operated by turning a large flywheel. The special feature of the pump is that the cylinder unit can be extracted for servicing by lifting it through the rising main, whereas for most pumps the whole rising main must be removed before the cylinder can be reached.

This Volanta pump was originally developed as a hand pump for rural water supply but increasingly it is driven by an engine, electric motor or solar power.

The application

Volanta pumps are not always the obvious choice and in many cases cheaper pumps can do the job just as well. In general, the use of Volanta pumps is advised:

- if the use will be intensive
- if intervals between breakdowns must be long
- where corrosion resistance is important
- where the water is deep
- where water needs to be lifted to a higher reservoir
- where future motorization is likely.

To date, Volanta pumps are used in rather large numbers in Burkina Faso, Niger, Cameroon, Angola and Mozambique, and in small numbers in Mali, Ghana, Ivory Coast, Benin, Senegal, Brazil and India.

Higher capacity version

In many regions there is a need for a deep well irrigation pump which can be operated by a diesel engine. For this purpose PRACTICA redesigned the Volanta pump to work with a 6cm piston and a crank throw of 60cm. This pump has a capacity of 2 l/s when lifting water from a depth of 50m. A prototype has been built and is in operation in India since early 2004.

The facts

Pumping depth:	up to 100m
Yield:	18 litres per minute at 30m
Costs:	1300 Euro off factory for 30m 200 Euro for installation at 30m
Numbers:	7000 installed in total, of which some 5000 in Burkina Faso

Training and introduction

PRACTICA can assist with starting up a local production. We can provide a potential manufacturer with a full set of workshop drawings, a production manual, an installation and maintenance manual and spare parts catalogues.

PRACTICA can also help in establishing a supply chain for the raw materials and can provide on the job training.



Volanta pump in use in Cameroon



In business 24/7



Volanta Solar for village water supply

Rope pump

Rope pump

The rope pump (rope and washer pump) is a household level pump for drinking water and small scale productive use in areas with water tables up to 35m.

The context

In many of the rural areas in Africa drinking water is pumped from wells by hand pumps. The piston pump is the most common type used but maintenance is often poor, mainly due to the high cost of (imported) spare parts and limited local expertise. As a result, many pumps remain un-repaired and are out of order.

The rope pump is a pump that can be produced locally and so forms a much cheaper alternative for imported piston pumps. Households can purchase the pump for (extended) family use. When broken, the rope pump is easier and cheaper to repair than a piston pump and the users do the maintenance and regular repairs themselves.

The technology

The rope pump design is based on the ancient chain and washer system and consists of an endless rope with pistons that fit into a PVC pump tube. At the bottom, the rope with pistons is guided into the pump tube. With a wheel the rope is lifted and water elevated to the surface. Unlike the piston pump, the rope pump can be produced with locally available standard materials and local skills. It is simpler to repair, has light and non corrosive parts and is cheaper to produce. Disadvantages are that most rope pump models are not completely sealed, and especially in deep wells it takes some time before the water arrives. Also, the rope pump is not suitable for lifting water to elevated reservoirs.

The underground part of the rope pump is basically the same for all models. For the upper part, different structures can be distinguished, based on locally available materials and local standards.

The application

Rope pumps are used on household wells up to 35m deep. Standard models can be used by extended families up to 10 households for household water and small scale productive use. Rope pumps are suitable for open dug wells and (manually) drilled wells with a pipe diameter of minimum 10cm.

The facts

Pumping depth:	up to 35m
Yield:	30 litres per minute at 10m 20 litres per minute at 20m 10 litres per minute at 30m
Costs:	70 - 150 Euro, depending on depth, local material and labour costs
Numbers:	over 75.000 rope pumps installed world wide

Training and introduction

PRACTICA assists local manufacturers with starting up production. We can provide a full set of workshop drawings, a production manual, installation and maintenance manuals and extensive training on the job.



rope pump in use



rope pump installed on a hand dug well



rope pump installed on a bore hole