

Written Design Review-Team 16  
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The goal of team 16 is to develop and manufacture a human powered water pump for use in third world countries, that can pump water a minimum of eight vertical feet. This pump should meet design /performance specifications outlined in Table 1.

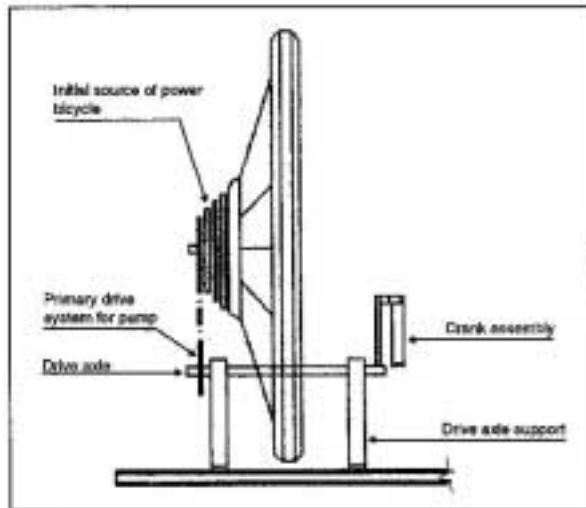
Our team has broken the pump down into four assemblies.

- 1) Primary drive system
- 2) Crank conversion system
- 3) Piston pump assembly
- 4) Frame mount.

**TABLE 1- SPECIFICATIONS**

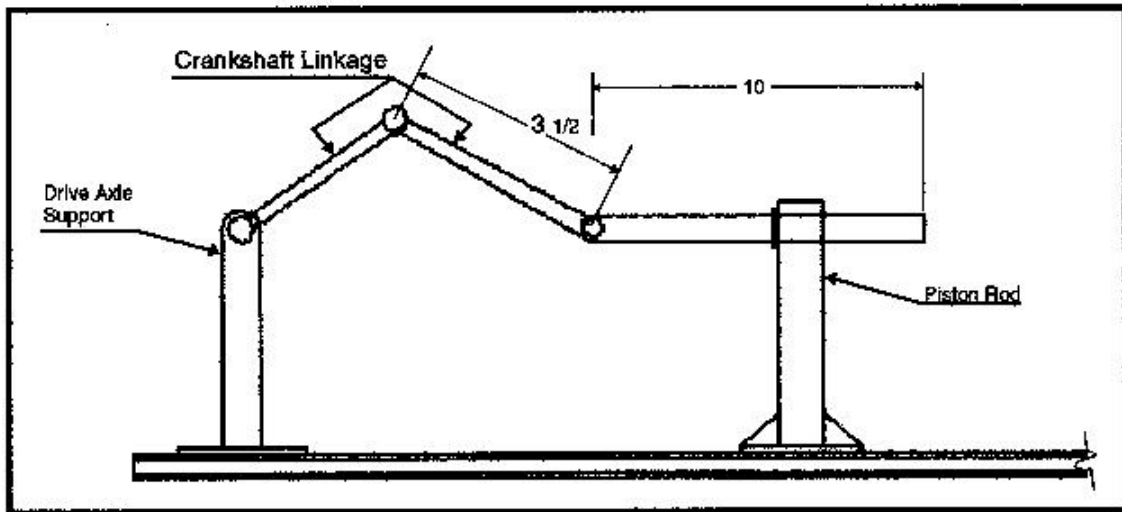
CHARACTERISTICS	SPECIFICATIONS
Performance	11.42 GPM at a rate of 30 cycles per minute
Max Flow rate	2638.93 in <sup>3</sup> /min
Min leakage	1% Aproximate
Measurement Method	Bourdin Pressure gage
Cost	Less than \$100.00
Design Innovation	Portability and ease of use
Kit size	20 in <sup>3</sup>
Assembly time	15 minutes
Disassembly time	10 minutes

The primary drive system is the main power to the pump assembly. Using the power generated by pedaling the bike, we will transfer the torque from the multi-gear sprocket via a secondary chain to a gear mounted directly to the drive shaft . The drive shaft will be held in two supports which have self lubricating bearings.

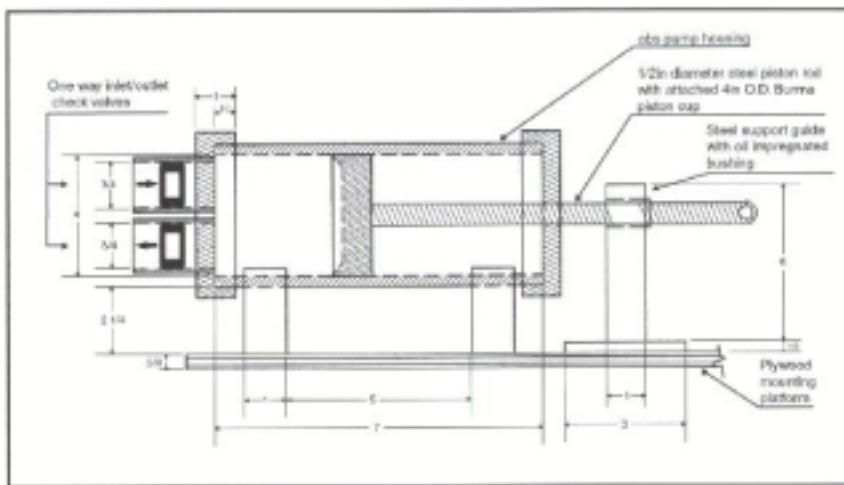


The cam conversion system converts the rotary power provided by the primary drive into the linear power required to operate the piston pump.

The cam conversion system consists of an arm attached to drive shaft and a second linkage arm. The cam arm has a length of  $3\frac{1}{2}$  inches to facilitate the 7 inch stroke of the piston pump. The linkage arm is of the same length and is attached at one end to the pump piston rod, and at the other end to the cam arm.

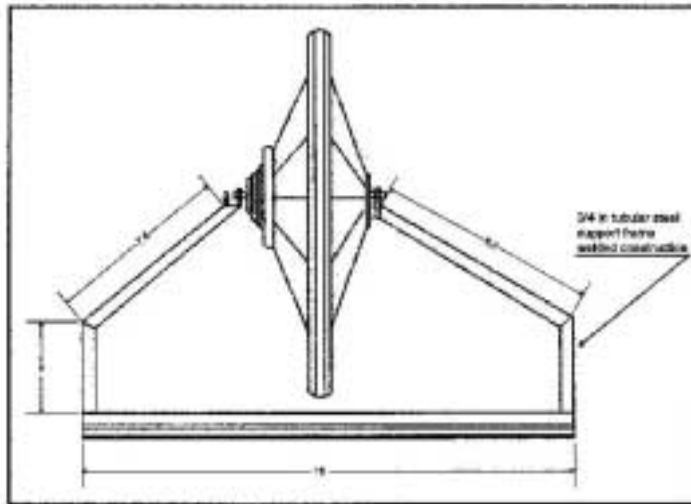


The piston pump assembly consists of a 4in. I.D. abs plastic tube 7 inches long , 2 end caps, 2 one way valves (one intake, one output), and a piston rod with a 4 in. O.D. cup seal. The piston cup provides a seal with the inside of the abs housing and draws in water through the inlet valve. When the piston travel is reversed the water is expelled through the outlet valve to the desired location.



The frame mount assembly allows the other components of the pump to be mounted in proper alignment with one another. It consists mainly of a 5/8 in. plywood platform 24 x 15 inches, and a 3/4 in. tubular steel frame with tabs to mount to the bicycle.

The frame assembly is mounted to the bicycle in such a manner that it may be swung up over the rear tire and secured to the bike frame to allow the system to be transported from location to location.



**TABLE 3- PARTS LIST**

NAME	DESCRIPTION	QTY
Bicycle	Multigear	1
4" Tube	Abs pump housing	1
Check valve	One way check valve	2
4" Cap	Abs pump housing cap	2
1/2" Rod	Steel piston rod	1
Piston cup	4" O.D. Burma piston cup	1
Cradle	Pump housing mount	2
Support	Steel piston rod support/guide	1
Support	3/4" Steel tubular bike's support frame	1
Plataform	5/8" Plywood platform	1
Sproket	Bicycle gear sproket	1
Chain	16" Chain assembly	1
Drive axle	? " Drive axle tube	1
Crank	? " Crank asembly tube	1
Axle support	Drive axle support	2
Gauge	Pressure gauge	1
Hose	3/4" *15 ft plastic hose	1
Miselaneous	Bolts, nuts, etc	?

In conclusion to our Pedal Power Piston Pump, we have a lot of work and we are going to start shoping and building the Pedal Piston Pump, our goal is to have it before the dead line.

