

Pedal Powered Water Pumping and Purification

Netradip Kene, Ayush Tingne, Sushant Sambhe, Gaurav Ghane, Shantanu Metkar

Department of Mechanical Engineering

Dr. Rajendra Gode Institute of Technology & Research, Amravati, Maharashtra, India

Abstract: This paper presents fabrication and experimentally investigates the working of Pedal Powered Water Pump (PPWP) along with its purification which had used for pure drinking water supply and garden irrigation. PPWP will consist of a centrifugal pump operated by pedal power. The centrifugal pump is positioned on its stand in such a way that driven shaft of the centrifugal pump was butted to the bicycle wheel. By pedaling the bicycle, the bicycle wheel rotates, thereby rotating the centrifugal pump which in turns discharges water from the sump. PPWP provides drinking water and irrigation in remote areas "here electricity is not available. PPWP is not only free from pollution but also provide healthy exercise. PPWP reduces the rising energy costs. PPWP will design as a portable one which can be use Wrigation in various places. The experimental investigation was eæcute and performance ofthe PPWP had carried out at different rpm. The results indicate that the PPWP will give a considerable amount of discharge and head. The PPWP requires only manual power thereby reducing the utility bill considerably. Experimental result shows that discharge of about 0.0025m can be obtained around 14(h-pm).

Keywords: centrifugal pump, pedaling, pre-purifier, r.p.m

I. INTRODUCTION

Pedal Powered Water Pump along with water purification(PPWPWP)is an eco friendly system. The PPWPWP works only on mechanical energy without electricity. PPWPWP provides drinking water and irrigation in remote areas where electricity is still a major problem .along with providing eco friendly environment it also helps to regulate a good health while pedaling WWP is not only free from pollution but also provide healthy exercise. PPWPWP Produces the rising energy costs. PPWPWP was designed as a portable one which can be used irrigation in various places. PPWPWP consists of a centrifugal pump operated by pedal power. The centrifugal pump is positioned on its stand in such a way that driven shaft of the centrifugal pump has butted to the bicycle wheel. By pedaling the bicycle, the bicycle wheel rotates, thereby rotating the centrifugal pump which in turns discharges water from the sump and transmitted to pre filter which purify the water simultaneously.

II. PROBLEM STATEMENT

- Use of chain drives increasing human effort.
- Centering of the axis of the driver to the driven causing whirling.
- Effort getting waste to overcome the friction.

III. PROBLEM DEFINITION

To overcome the above said problems belt drive is used instead of chain drive which is utilizing maximum effort, previously which was going waste in overcoming friction. Also the whirling problem is resolved.

IV. PROPOSED METHODOLOGY

In this project we generally give mechanical power to the shaft, and the shaft is connected to pump which is mounted on bicycle. The power generated by pedaling is transferred to the rear sprocket as is done in bicycle via chain drive. The rear sprocket is connected to pulley, which is connected to another pulley on the same shaft & axes. The power generated is being supplied to the rear sprocket then to the pulley connected, then to the second pulley connected mounted on the same shaft. The power by this shaft is transferred to the pump. The inlet of the pump is connected to the surge tank via pipe. Outlet of the pump is connected to the water purifier for purification process. With the help of this setup we can have a discharge to a certain head if required or we can purify water when needed.

There are only three major principles on which our working model generally works:

1. Power transmission through chain drive mechanism.
2. Bernoulli's equation
3. Power transmission through pulley belt arrangement

Power Transmission through Chain Drive: Chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles. Most often, the power is conveyed by a roller chain, known as the drive chain or transmission chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system.

Bernoulli's principle: In fluid dynamics, Bernoulli's principle states that an increase in the speed of a fluid occurs simultaneously with a decrease in pressure or a decrease in the fluid's potential energy. The principle is named after Daniel Bernoulli who published it in his book *Hydrodynamica* in 1738. Bernoulli's principle can be applied to various types of fluid flow, resulting in various forms of Bernoulli's equation; there are different forms of Bernoulli's equation for different types of flow. The simple form of Bernoulli's equation is valid for incompressible flows (e.g. most liquid flows and gases moving at low Mach number). More advanced forms may be applied to compressible flows at higher Mach numbers (see the derivations of the Bernoulli equation).

Power Transmission through pulley belt arrangement: Belts are the cheapest utility of power transmission between shafts that may not be axially aligned. Power transmission is achieved by specially designed pulley and belt. They run smoothly and with little noise, and cushion motor and bearings against load changes. This arrangement is made power transmission and to reduce rpm as per requirements.

V. WORKING OF THE MODEL

In working model of "pedal powered water pumping and purification" we are giving power to the shaft which is connected to the pump. The pump is then connected to the purifier which simultaneously purifying the water. Power which we are getting from pedaling is transmitted from front to rear sprocket through chain drive mechanism, the same rpm then transmitted to the pulley which is mounted on the same shaft. This pulley transmits power to the main shaft via belt drive arrangement which is then connected to the pump. This pump's outlet is connected with the filter to purify the water.

1	Diameter of sprocket	168mm (driven)
2.	Diameter of sprocket	0.065m(driver)
3.	Center distance between driver and driven	0.48m
4.	No. of teeth of driver	45
5.	No. of teeth on driven	18



Figure 1 Pedal Powered Water Pumping and Purification

VI. CONCLUSION

We know that electricity is still one of the major problem in I-wal area. In summer days people struggles "ith the shortage of water. pedal powered water pumping and purification meet these problem as this system only works on pedal powered there is no need of electricity neither to pump nor to purify the dirty water. of Pedal Powered Water Pump along "ith its purification which is used pure drinking water supply and irrigation in remote areas. pedal powered water pumping and purification is not only free from pollution but also provide healthy exercise. pedal powered "Oter pumping and purification reduces the rising energy costs. pedal powered water pumping and purification is design as a portable one which can be use irrigation in various places. The experimental investigation was execute and performance of the pedal powered water pumping and purification had carried out at different rpm. So in this paper "e have proposed that the pedal powered water pumping and purification will give a considerable amount of discharge and head

REFERENCES

- [1]. Atul.P.Gan0rkar, K.S.Zakiuddin, H.A.Hussain, "An Experiment on Development of Pedal Operated Water Pump", IOSR
- [2]. Vishal Garg, Neelesh Khandare, Gautam Yadav, "An Expelimental Setup and Design of Pedal Powered Water Pump" «International Journal of Engineering Research and Technology (Vol.2, Issue.
- [3]. Ademola Samuel Akinwonmi, Stephen Kwasi Adzimah, Fredrick Oppong, "An Experiment on Rdal Powered Centrifugal Pump Purified Water Supply Device" ISDE (Vol.3, No. 11) (2012).
- [4]. Bryan Lee, "A Design of Simple Human Powered Water Pump", International Journal of Technology(2007).
- [5]. M.Serazul Islam, M.Zakaria Hossai and M. Abdul Khadir, "Design and Development of Pedal Pump f(NL0wLift Irrigation", JARD, (2007).