

Bi-cycle operated centrifugal pump mechanism for water lifting

¹Arvind T. Wadgure, ²Ishan P. Lade, ³Prashim K. Kamble, ⁴Runali V. Kaware

¹Asst. Professor, Department of Mechanical Engineering, DMIETR, Wardha, Maharashtra, India

²Asst. Professor, Department of Mechanical Engineering, DMIETR, Wardha, Maharashtra, India

³Asst. Professor, Department of Mechanical Engineering, DMIETR, Wardha, Maharashtra, India

⁴Student, Department of Chemical Engineering, SSBTS, Jalgaon, Maharashtra, India

Abstract— Now days India suffering from big problem like human power and electric power. Generally water lift by using motor .by using bi-cycle operated centrifugal pump mechanism for water lifting we can reduces the human and electric power. In this paper, design and construct pedal operated water pump which used in small irrigation and garden irrigation. The bi-cycle operated pump can be constructed using some local material and skill. A water system includes a Centrifugal pump operated by by-cycle. The pump attached with the by-cycle shaft and a drive shaft rotate. It works on the principle of vacuum created in centrifugal pump. These bi-cycle operated centrifugal pumps lift the water up to 15 in feet depth.

Index Terms—Centrifugal Pump, bi-cycle, Shaft, Impeller, Pulley.

1. INTRODUCTION

Present Method for Lifting the Water

By using electric operated Centrifugal pumps we can pump the water are a sub-class of dynamic axis symmetric work-absorbing machinery. Electrical operated Centrifugal pumps are used to convert rotational kinetic energy to the hydrodynamic energy of the liquid flow. The rotational energy comes from electric device like motor. The fluid enters the pump impeller along o to the rotating axis and is accelerated by the impeller, flowing radials in chamber outward into volute chamber, from where it exits.

Common uses include petroleum, water bodies, and petrochemical pumping. The function of the centrifugal pump is converting potential energy of water pressure into mechanical rotational energy.



Fig. 1 Centrifugal pump

2. RESEARCH METHODOLOGY

2.1 3-D Modeling of proposed work

Generally we can use the centrifugal pump for lift the water from hole of ant ft. by using electric power we can operate the pump. For electric power saving we can used the mechanism like bi-cycle operated centrifugal pump for water lifting. by using these mechanism we can save electric power.

Whole mechanism of bi-cycle operated centrifugal pump mechanism for water lifting proposed work shown by 3D-modeling.

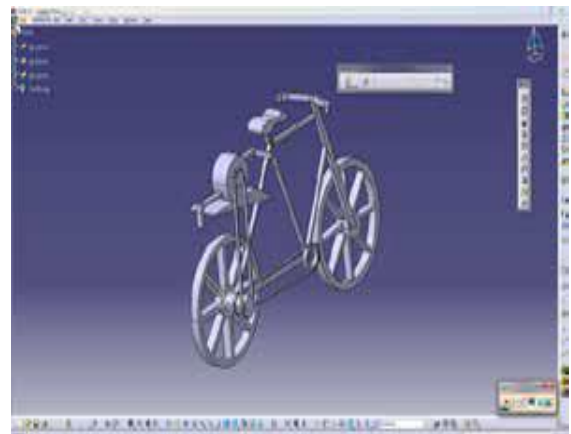


Fig. 2 3D Model of mechanism

Introduction of mechanism

By-cycle operated mechanism consists of single centrifugal pump which is fixed on the rear wheel bi-cycle. Paddling for few minute to pump 30-40 liters of water to a height of 30 feet. Our project helpful for rural areas. Which are facing electric problem? It can be used mainly for water lifting from wells and other water bodies.

By-cycle operated centrifugal water pump which is run by rotating the pedal of a cycle. The system activated a bicycle, rim, impeller, pulley and inlet and delivery pipes. Centrifugal pump is mounted on Rear wheel of cycle which is operated due to the rotation of wheel which creates the vacuumed in pump. This research is useful for lifting water from different kinds of water bodies like river, ponds, wells etc. by using a paddling We drive a bicycle, the rear wheel of the bicycle rotates at particular rpm using paddle. And this wheel rotates the impellers of the centrifugal pump by sliding action between wheel and pulley but the rpm of the

wheel is very low so we can't get require head and power effort on the paddling is low so for generating high speed in less power we can use the pulley which is mounted on the shaft of the pump.

2.2 Working mechanism of a rotary pump

A centrifugal pump is one of the simplest equipment in any process of water lifting plant. It convert energy of a prime mover (an electric motor or turbine) first into velocity or kinetic energy and then into pressure energy of a fluid that is being pumped. The energy changes occur by two main parts of the centrifugal pump, the diffuser and the impeller.

The impeller is the rotating part of mechanism that converts rotating energy into the kinetic energy and the diffuser is the stationary part that converts the kinetic energy into pressure energy.

1. REQUIRED PARAMETERS

Minimum rpm required for impeller shaft = **450 to 1000 rpm**

Rpm available in rear wheel = **150 to 450 rpm**

Diameter of cycle rim= **0.5m**

Circumference of cycle rim= **3.14X0.5**

Diameter of pump pulley = **0.07 m**

Circumference of pump pulley=**3.14x0.06**

Therefore,

Ratio between rim & pump pulley=**1/10**

2. ADVANTAGES

1. By using this mechanism we can easily lift the water.
2. By using these we can save the electric power.
3. It is portable.
4. It is low constable.

5. DIS-ADVANTAGES

1. It is not suitable for maximum lift water.
2. High man power required.

6. CONCLUSIONS

As per the study over the topic that the bicycle powered water pump is a very advantageous especially for rural areas

The problem of energy is very big in India and many rural powered water pump by use of this project we save electric power and We will operate a water pump by using bicycle operated mechanism in the project and we can lift the water. when we drive a bicycle the wheel of bicycle are rotate so we can provide a pulley over the wheel for high rpm , the pulley is mounted on the shaft impeller of impeller of the pump the impeller is rotate due to rotating of wheel with rotation of pulley. So we operate the pump and lift the water at a particular head this project is installed any of the place where water bodies. It can also be placed in garden, both gardening & cycling can do simultaneously.

REFERENCES

- [1], M. Zakaria Hossain, M. Serazul Islam And M. Abdul Khair "Design and Development of Pedal Pump for Low-Lift Irrigation" Publisher *JARD*
- [2] Stephan Kwasi Adzimah, Ademolo Sumuel Akinwanmi, Fredrick Oppong "Pedal Powered Centrifugal Pump Purified Water Supply Device" Published by *Innovative System Design And Engineering*.
- [3]www.mayapedal.org
- [4] DR. R. K. Bansal *laxmi publication (p) ltd. "Fluid mechanics and Hydraulic Machine"*
- [5] "Non conventional sources of energy" fourth edition 2008 By G.D.RAI *Khanna publisher*.
- [6] "Machine Design" (S. I. Units) By R.S. Khurmi & J. K. Gupta
- [7] "Engineering Mechanics" (S.I Units) By R. S. Khurmi.
- [8] "A Textbook of Fluid Mechanics" by Rajput. *SCHAND & COMPANY LTD*
- [9] *Shafting, Pulleys, Belting, Rope Transmission, and Shaft Governors* By Hubert Edwin Collins (Author), Published By *General Books*.
- [10] www.wikipedia.com