

Implementation of Human Powered Water Lifting System

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ABSTRACT

In this paper we are going to develop the water lifting system by human powered. As the name implies water lifting system by human powered, it indicates that water is to be lifted by human with the help of bicycle with some mechanical arrangement. Various types of water system we have seen in and around world. When we purchase the new pump, we only know the basic things like how to ON/OFF and guarantee/warranty and manufacturing date. But very few people are aware of their design and other pump related issues. In this project our many problems related to pump will get solved. There is no need to ON/OFF, less maintenance cost, it is portable, simple in design. The bicycle is to be used which is of very low cost and can be available all the time. In this bicycle operated system the arrangement of pump fits on the carrier of the bicycle and it is bolted so that any time we can disassemble the arrangement in less time. The arrangement of pulley is one side of the rear wheel so that when pedalling, the pulley rotate and the pump discharge more amount of water. Amount of water discharge depend on person to person efficiency. All this system arrangement are to be done in the catia software before manufacturing so that if find any mistake, can be corrected. Hence it save material cost and save time.

KEYWORDS: Bicycle, Belt Pulley, Discharge Rate, Efficiency, Gears, Modelling, Pump

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I. INTRODUCTION

As we very well know about the various types of water lifting system and their pumping system. From ancient days to middle decade, the system changed as per the requirement but the output i.e the main purpose did not change. In the ancient days engineering concept was not developed hence they made the system very critical and need continuous work on the system. Later they used the animal instead of human so they could work more for getting water. It worked quite well. Then from middle decade to 21th century it is still changing as per the handling capacity and the type of use, but the main purpose still same i.e. getting water. In the middle decade the human started engineering concept to get water from the well, river, ponds to their required places to fulfil their daily needs. They also used system for agricultural purpose and for many things. Now in the 21th century the purpose is same but to fulfil requirement changed because of the drastic change in the engineering. Here now the human thinks how to system more reliable to the people? So here is the answer. In this project the water lifting system by the use of the bicycle is introduced. Here the bicycle we get the common in and every home and it is very cheap rather than any other vehicle because it does not require the diesel or petrol. Bicycle concept is very simple, the two wheels i.e. front and rear wheel are connected by the chain so that when pedalling rear wheel rotate it rotates the front wheel by means of the chain. The pump is mount on the carrier of the bicycle and it is bolted to the carrier so that when needed the pump can dis-assembled from the bicycle and the bicycle can be reuse for our daily purpose. It is also useful for the exercise purpose because as the world is growing rapidly, there is no time to look at ourselves because the human work more than their capacity to earn money to live good and luxurious life and hence at the end of the week people get tired and have no interest in doing any work if the work is not very important because he wants to take whole day rest, resulting into no exercise. Because of that the many deceases are developing in the human. To prevent from these the best option is bicycle exercise. It helps to reduce the extra fats from the body and it gives more strength for the whole week and no need to pay extra charges for exercise in the gym. Bicycle exercise looks human younger and free from tension and increases the human efficiency to work more.

II. ARRANGEMENT AND WORKING

The working principle of this system based on bicycle and the common man who will peddel the cycle. Depends on person efficiency the water is to be lift. The pump having one inlet port and second outlet port. Upper port i.e. outlet port is attached to the pipe and the pipe lifts to different heights depends on the

requirement of the person. The side port i.e. the inlet port from where the water is to be lift from the ground level and full of water. The pump is mounted on the frame having base plate, attached to base plate the two T shape plate is attached to it. All the frame to mount pump is bolting together and pump is also bolted. In this project the height upto which the water can lift is 10 meter. Here we are doing one more arrangement of the gears. We are arranging two gears i.e. big gear D1 and small gear i.e. D2 in one side of the bicycle. To this gear arrangement one end of belt pulley is attached to the small gear and the other end is attached to the small pulley which is connected to the pump with the help of rod. When peddelling the bicycle, attached gear rotates and connected small gear and big pulley arrangement also rotates and resulting small pulley and pump arrangement rotates resulting the water is sucked by the inlet port and to lift to the required height.

III. BASIC CALCULATION FOR BICYCLE

Average speed of the bicycle = 15.5 km/h

Formula,

$$V = \pi * D * N / 60$$

Where,

V = Velocity

D = Diameter Of Wheel

N = Speed

Consider,

Diameter of wheel (D) = 45cm

$$D = 0.45\text{m}$$

$$V = 15.5 \text{ km/h} = 4.5 \text{ m/s}$$
 Put in above equation

$$V = \pi * D * N / 60$$

$$4.5 = \pi * 0.45 * N / 60$$

$$N = 190\text{rpm}$$

IV. PUMP IMPELLER EQUATION

$$\frac{U}{2} = Hm$$

Where,

U = Velocity

H = Head in meter

G = Acceleration gravity

r_1 = Diameter of outer impeller

r_2 = Diameter of inner impeller

From this above two equation, we get the value of

The required

= 300rpm of the bicycle

= 1500rpm

The gear ratio is = 50

= 10

Formul/ = /

Put and in above equation,

We get the required = 1500

= 1500

V. RESULT

From this above arrangement and the calculations we get the required amount of water in the needy places. It works mechanically and hence no any out source required electrically. It helps to improve the life of the human by regular exercising on this man made bicycle and fulfilling the main purpose.

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