PEDAL OPERATED CENTRIFUGAL PUMP

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ABSTRACT

In this paper, design and construct pedal operated water pump which used in small irrigation and garden irrigation. The pedal operated pump can be construct using local material and skill. A water system includes a Centrifugal pump operated by pedal power. The pump stand includes a housing in which a foot pedal and a drive shaft rotate. It works on the principle of compression and sudden release of a tube by creating negative pressure in the tube and this vacuum created draws water from the sump. This bicycle pedal operated pumps water at 2-3 gallons per minute from wells and boreholes up to 23 in feet depth. Provides irrigation and drinking water where electricity is not available. They can be built using locally available materials and can be easily adapted to suit the needs of local people. They free the user from rising energy costs, can be used anywhere, produce no pollution and provide healthy exercise. Energy is the primary and most universal measure of all kind of work by human Being and nature. Everything what happen in the world in the expression of flow of energy is one of its forms. Most people use the world energy for input to their bodies or to the machines and thus about fuels and power. Energy is an important input in all sectors of counters economy.

Introduction to Pedal Powered/Operated Centrifugal Pump (PPCP)

Pedal Powered Centrifugal Pump (PPCP) is an ecofriendly water pump. The PPCP works on mechanical energy without electricity. PPCP provides drinking water and irrigation in remote areas where electricity is not available. PPCP is not only free from pollution but also provide healthy exercise. PPCP reduces the rising energy costs. PPCP is designed as a portable one which can be used for irrigation in various places. PPCP 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 is 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.

Construction Of Pedal Operated Centrifugal Pump:

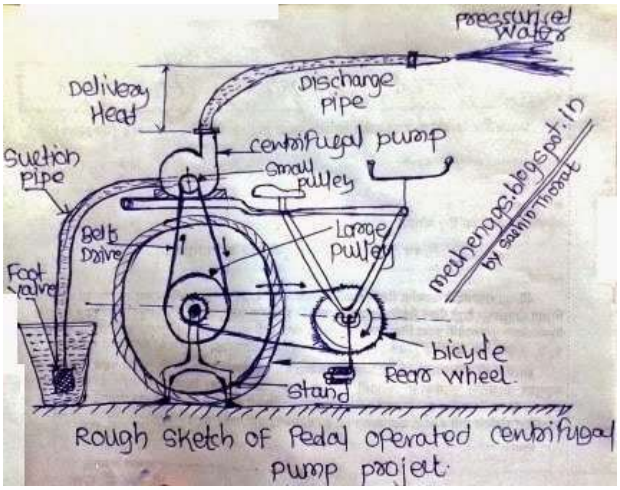


Fig. Rough sketch of Pedal Operated Centrifugal Pump Project.

The mechanism consists of single centrifugal pump which is fixed with the rear wheel bicycle. Paddling for just a minute for just a minute or two is enough to pump 30-40 liters of water to a height of 100 feet. Our project could prove helpful for rural areas. It can be used mainly for irrigation and water drawing from wells and other water bodies. The centrifugal water pump which is run by rotating the pedal of a cycle. The system comprises a bicycle, rim, impeller, pulley and inlet and delivery pipes. A bigger pulley is connected to rear wheel of bicycle. Smaller pulley is mounted on Centrifugal pump's shaft. These two pulleys are hold with 'V' type of belt. We drive a bicycle by using a paddling the wheel of the bicycle rotates a particular rpm. 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 we can use the pulley which is mounted on the shaft of the pump and create the high rpm by using less power.

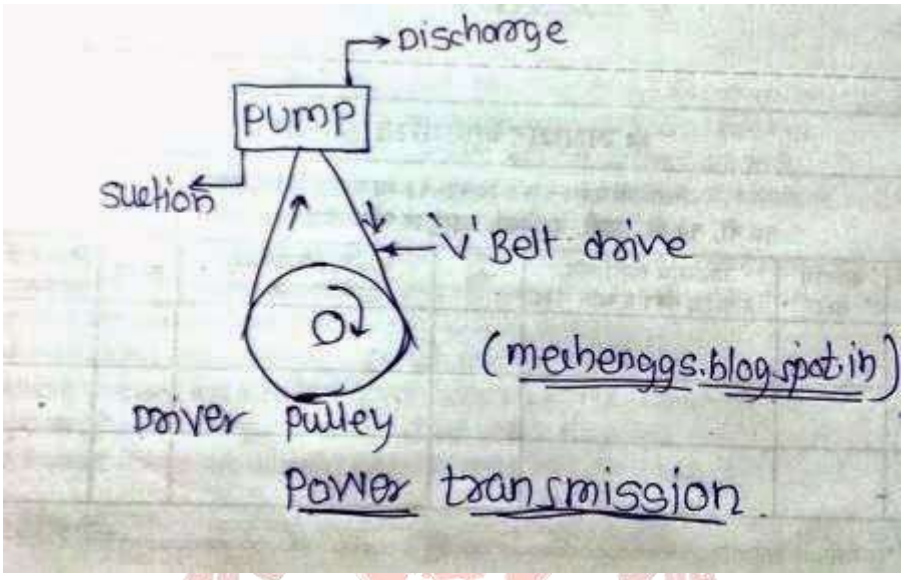


Fig. Pulleys and belt- Power Generatio

In process operations, liquids and their movement and transfer from place to place, plays a large part in the process. Liquid can only flow under its own power from one elevation to a lower elevation or, from a high pressure system to a lower pressure system. The flow of liquid is also affected by friction, pipe size, liquid viscosity and the bends and fittings in the piping.

1) Working mechanism of a Rotary Pump

A centrifugal pump is one of the simplest pieces of equipment in any process plant. Its purpose is to convert energy of a prime mover (a 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 virtue of two main parts of the pump, the impeller and the volute or diffuser. The impeller is the rotating part that converts driver energy into the kinetic energy. The volute or diffuser is the stationary part that converts the kinetic energy into pressure energy.

CENTRIFUGAL PUMPS

The pumps employing centrifugal effects for increasing fluid pressure have been in use for more than a century. The centrifugal pump, by its principle, is converse of the Francis turbine. The flow is radially outward, and the hence the fluid gains in centrifugal head while flowing through it. Because of certain inherent advantages, such as compactness, smooth and uniform flow, low initial cost and high efficiency even at low heads, centrifugal

pumps are used in almost all pumping systems. However, before considering the operation of a pump in detail, a general pumping system is discussed as follows.

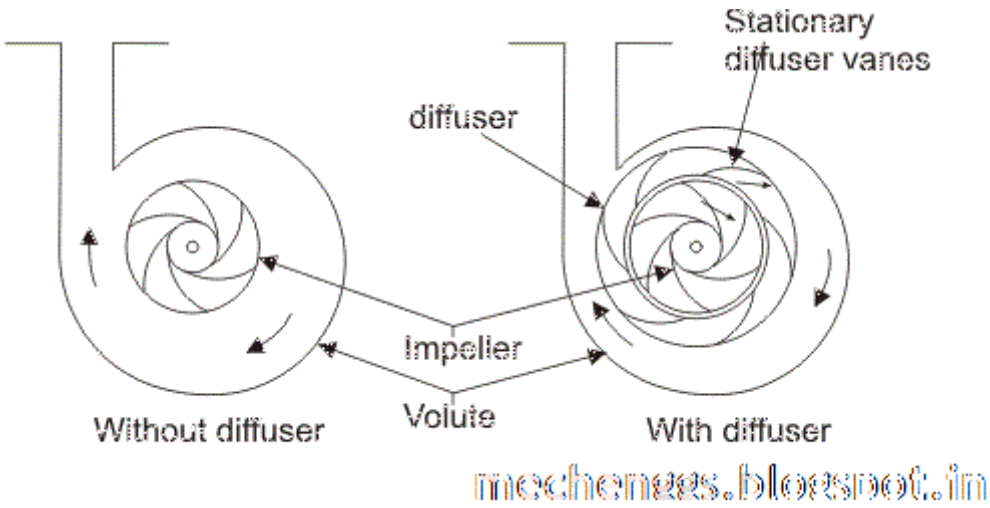
The simplest from of a centrifugal pump is shown in Figure. It consists of three important parts:

(i) The rotor, usually called as impeller,

(ii) The volute casing and

(iii) The diffuser ring.

The impeller is a rotating solid disc with curved blades standing out vertically from the face of the disc. The impeller may be single sided (Figure.a) or double sided (Figure b). A double sided impeller has a relatively small flow capacity.



Centrifugal pump

2) Performance characteristics of a pump

Pump curves relate flow rate and pressure (head) developed by the pump at different impeller sizes and rotational speeds. The centrifugal pump operation should conform to the pump curves supplied by the manufacturer. In order to read and understand the pump curves, it is very important to develop a clear understanding of the terms used in the curves.

There are there performance characteristics of pump:

1. Head developed by the pump (H)
2. Brake horse power (BHP)
3. Efficiency of the pump

-all plotted against the flow rate.

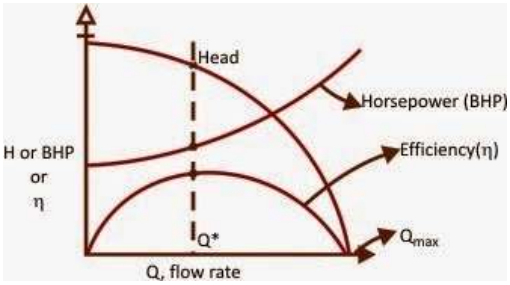


Fig. Performance characteristics of a pump

3) CONCLUSION (OR ADVANTAGES):

The whole study over the topic that the wheel deal bicycle powered water pump is a very advantageous especially for rural areas

The problem of energy crises is very big in India and many rural powered water pump by use of this project we save electricity and get a particular water head and we supply the water in irrigation. We will operate a water pump by using bicycle mechanism in the project and we can fill the water tank of housing power and get construction work. when we drive a bicycle the wheel of bicycle are rotate so we can provide a pulley over the wheel 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 deliver the water at a particular head this project is installed any of the place where water. Create a simple and efficient way of pumping water utilizing a human powered bicycle for communities where electricity is unavailable or impractical. Isolated community with or without electricity in need of efficient water pumping. Pumps can be adapted to fit individual community needs.

4) Alternative mechanism for this project:

Fig. Pedal Operated Centrifugal Pump Project Mechanism