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Fabrication of Water Pumping System Using Vertical Axis Wind Mill

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Abstract - *This Paper entitled "Fabrication of Water Pumping System using Wind energy" wind energy an important source of renewable energy that can be an option in a remote location where electricity is not available. The wind has often used as energy to operate pumps and supply water to crop fields. Wind energy can be generated using windmills that provided mechanical energy is used directly to operate the water pumps. In this system, a vertical axis multi-blade wind turbine with a piston pump is used. This windmill is attached to a piston pump through two discs are bolted with each other. The blades are placed outside the rim to get better performance when the wind imposes two driving forces lifts and drag on the blades. This rotating blade converts rotary motion into reciprocating motion of pump which is used for delivering water. This system mainly used the pumping of water for irrigation purposes.*

***Key Words*: Vertical axis wind mill, Piston pump Non Return valve, Bearing, PVC pipe.**

1. INTRODUCTION

It has served mankind well for many centuries by propelling ships and driving wind turbines to produce electricity, grind grain, and pump water. Nowadays the worldwide society is going towards renewable energy sources. Currently, all the countries are going towards wind energy for the production of power as its minimum amount threats to the environment where the site is exactly located. India is one of the developing countries and agriculture is the backbone of India. The population and the industries are increasing day by day. So, the demand for electricity is more for domestic and industrial purposes but we are lagging in the production of electricity. Due to this reason power cut is increasing in domestic and agricultural areas. In this paper we use wind energy for pumping of water, so once it is implemented the people are independent of power cut both for domestic and agricultural purposes.

1.1 Vertical axis wind mill

The vertical axis wind turbines are also known as crosswind axis machines. Their axis of rotation is perpendicular to the direction of the wind. Hence they do not need the yaw control equipment to orient the rotor axis. In our project, we have used cross-four wings.

1.2 Piston Pump

In the positive displacement pump, the liquid is transferred positively by the to and fro motion of a member known as piston or plunger of the pump.

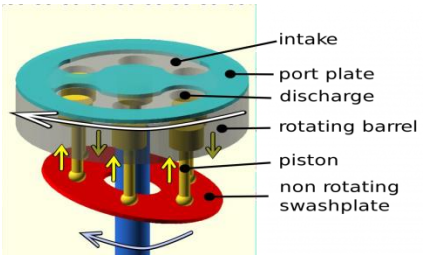

Fig -1: Piston pump

1.3 Non-Return Valve.

It is one of the directional control valves. It will permit free flow only in one direction and reverse flow is not at all possible. It consists of a valve body poppet spring, and a valve seat. If the pressure falls in the inlet port the valve is closed both by the downward spring force and backpressure of the water outlet.

Fig -2: Non-return valve

2. WORKING

Our paper uses curved (egg beater) blades which are attached to wind shafts. The wind force is used to rotate the blades with an eccentric arrangement like a flywheel, bearing, and pinion. By falling air on the blade, it starts rotating automatically. The shaft also rotates as the blade rotates, which converts rotational motion into linear motion. Therefore, the piston reciprocates, creating a

vacuum and absorbing water and sending it to the delivery valve. This process is repeated, and water is sent out.

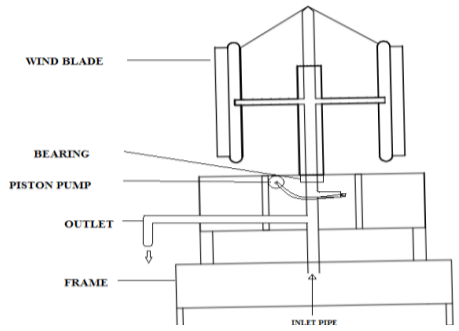

Fig -3: Two dimensional diagram

Fig -4: Final diagram

3. PUMP OUTPUT POWER

Water pumping power is normally determined by the flow rate and the total head

Water power P = ρ_wgQH watts

ρ_w-Density of water (1000 kg/m^3)
g- Acceleration due to gravity (9.81m/s^2)
Q-Discharge (m^3/s)
H-Total pumping head in meter of water

Diameter of the pipe = 0.15 m
Velocity = 0.5m/s (approximates)
Q = A V m ^{3}/ s
Area of the pipe = $\pi/4 \times d^2$
$= \pi/4\ (0.15)^2$
A = 0.0176 m^2
Q = A × V
= 0.0176 x 0.5
Q = 8.8 x 10^{-3} m^3/s

Head = 0.5 m Water

Water power P_w = ρ_wgQH watt
= 1000 x9.81 x 8.8 x 10^{-3} x 0.5
P_w = 4.0164 watt

3. CONCLUSIONS

By considering the various parameters of wind energy and wind water pumps it is noted that performance by combining both will get more advantage. As the pumping water can be stored in tanks, used for later purpose. If necessary any one mode can be used for pumping the water or production of electricity, so overflowing of water and current can be controlled. The global environment is changing day by day and becoming more polluted, by using renewable energy we can reduce it. So, people and companies must focus on renewable energy rather than non-renewable energy.

Since the wind is a major part of this system, converting this into a hybrid method will enhance its efficiency (i.e,) by combining wind and solar energy. Solar energy is the best source of renewable energy and it can be used to produce power.

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