

Manual And Solar Powered Cam Operated Reciprocating Pump

Albert Francis A¹, Aravind T²

Department of Mechanical Engineering

^{1,2}UG Student,K.Ramakrishnan College Of Engineering,Tiruchirappalli,Tamilnadu,India-621112.

Abstract-*The effective design is suitable for any kind of places with out any limitations.The rotary motion of the cam shaft is converted into reciprocating motion of the washer by using connecting rod.The cam top to bottom clockwise motion the washer reaches the above the water surface and cam bottom to top the washer sucks the water from the under ground.The rotary motion can be done on both manually and solar power.The solar panels absorbs the maximum sunlight and it is stored in a battery.An inverter is used to convert the direct current into alternating current and it is supplied to the motor.A slip joint is provided for the cam shaft.The require amount of power is not supply to battery then we have use pedals through chain drive transmit the rotary motion.The both rotary techniques are familiar to the environment and does not pollutes the surrounding.*

Keywords-slip joint, reciprocating motion, connecting rod, washer, cam shaft and sunlight

I. INTRODUCTION

In our life we are dependent on many sources. One of the major source is water. The source of water is obtained from surface water, underground and rain water. Due to growth of automobile, chemical and mining industry wastes are combined to the surface water such as river, pond and lake.The refrigerators and air conditioners emits the sulphur and nitrogen dioxide.The harmful gases are mixed with atmospheric oxygen and then the contaminated gases affects the rainfall.This produces acid rain in the effect of contaminated gases.So the only one source is ground water for drinking and cooking purposes.Because the underground water is one of the most non polluted water.Due to population growth and demand of water resource we are need in many conservation processes.The above problems can be reduced that many innovators have introduced tho conversion of contaminated water into drinking water by the process of natural methods and artificial methods.Any methods can not be completely recycle the contaminated water for household applications.The main source of water pollution is industrial,animal and human wastes.In order to the problems can be reduced that the governmental and non governmental organizations are creating the awareness in both rural as well

as urban areas. The pollution control board also creating the rules and regulations in various acts. The major source of sea water is not utilized in home and other application. Because the major contaminated sources are present in that water. The artificial techniques eliminates the impurities and obtain pure water for house hold applications. The water pumping, transportation and storing are the process in huge size and time taken is maximum.

II. BACKGROUND OF THE INVENTION

In present day of life there are various techniques of water pumping is available.But these methods takes more time and more human effort is required.The other side advanced machines are used in the pumping industry and it is consumes more energy for water pumping.In ancient days manually operated water pumping supplies the sufficient water for whole family.But now-a-days the water not enough for all the applications.So the electric and fuel powered engines are used to supply the sufficient amount of water and it is stored in a tank.The storage water is automatically polluted by the source of wind and sunlight.The tank leakages also affects the demand of the water in various places.The utilization of excess amount of water will be joined to the sewage.The high horse powered motor are used to pump the maximum capacity of the water from the underground.The cost will be increased by the usage of tank,motor and fuel supply.So the problems can be reduced that in our design of water pumping from the underground is the combination of ancient and modern water pumping techniques for minimum cost.In the design of main aim is to supply the sufficient water for intermediate agricultural lands and forests.The solar power is collected the energy from sunlight.So no need for fuel supply and external electriccurrent.





Fig 2.1 and 2.2 manual pumping

III. EXISTING PROBLEM

In tamilnadu [India] there is no enough fresh surface water due to uneven rainfall and maximum evaporation due to sunlight. So the effect will be reflected in people. The drinking water is supplied through the pipe in number of intermediate days between the two water stations. The water is partially polluted by the internal sludge. So the contaminated water particles during drinking time and affects the internal system of the body. So physical health will be damaged.



Fig 3.1 water scarcity in rural area

IV. OBJECTIVE

To design a device for water pumping and increase the supply of pure water from the ancient pumping and modern techniques. To install the design at any kind of the place without limitations. To avoid the external power and fuel supply from the power stations. To install the eco friendly device for underground water pumping with minimum cost and human effort.

V. DESIGN

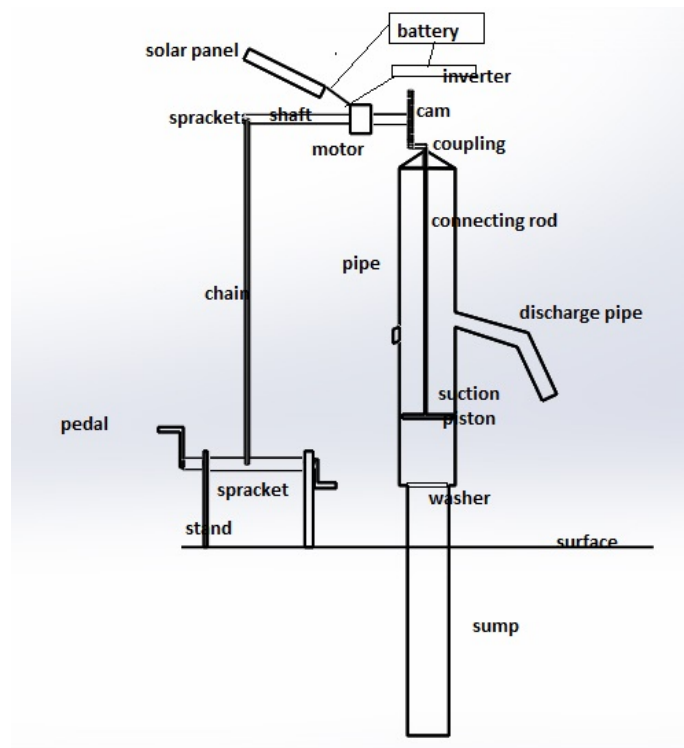


Fig 5.1 layout of the design

VI. FEATURES

The design of water pumping device is applicable for all the kind of places and efficient water supply is possible. The design is the source of solar power as well as manually operated. The solar panels collect the maximum amount of sunlight. The sunlight is converted into electrical energy and the direct current is stored in a battery. An electric motor is provided for the rotary motion of the cam. The source of power supply is battery. The motor rotation is directly connected to the cam shaft and the cam in one end is attached to connecting rod. The rotary motion is converted into reciprocating motion of the pump. The vertical reciprocating motion of the washer is to suck the water from the underground. The same arrangement of piston cylinder is the same to the pump and washer. The suction of the water is done on the bottom to the top direction of the washer motion. In one complete revolution of the cam, one cycle is completed. The motor rotary movement is effectively utilized to the washer by using connecting rod. The other feature of the design is a pedal-operated cam shaft. The two sprockets, pedals, and chain drive are totally operated manually. One pedal is placed above the surface, and the other sprocket is connected to the horizontal cam shaft. The ratio of two sprockets differs from one to another. A chain drive is provided to transmit the rotary motion from pedals to the cam shaft. One revolution of the pedal-connected sprocket is equal to two

revolutions of the cam shaft. The design has both manually operated as well as solar power is utilized. The insufficient power continuation affects the performance of the system. So the shaft is connected to the chain sprocket and it is operated by the man powered pedals. The design is rotary motion of the pedals and solar power is utilized for the water pumping purposes. The solar panels are facing in north south directions. Because the maximum amount of sunlight is captured by the panels in north south directions. The stored direct current is convert into alternating current by using inverter. The motor is rotated in the source of alternating current as well as manpower. The slip joints are provided for the cam shaft. Because the slip joint to avoid the energy losses in the rotating time. The same time motor and pedals are not operated by the safety purposes.

VII. CONCLUSION

This method of water pumping is to reduce the waste of time in the ancient method and minimize the time taken. The design is perfect alternate for fuel powered pumps. The design is environmentally favour and does not pollutes the environment. The device is completely minimizes the manpower depending upon our requirement. It is possible to install the intermediate forests and agricultural lands. There is no special tanks are required to store the water for long days. The pumping of fresh water for drinking, cooking and bathing is possible.

REFERENCES

- [1] www.wikipedia.com
- [2] A reference paper on “Automatic Solar Powered Water Pumping Using Zigbee Technology” by Mohit Bansal , Tushar Bhatia , Sanchit Srivastava , Shivangani Gupta , Tripti Goyal.
- [3] A reference paper on “DEVELOPMENT OF PEDAL OPERATED UNIT FOR AGRICULTURAL USE” by Suyash B.Kamble, I.D.Burase, Avinash R.Kharat, Amol A.Nannikar.
- [4] A reference paper on “SOLAR POWERED WATER PUMPING SYSTEMS” by B. Eker.
- [5] A reference paper on “Solar Powered Reciprocating Pump” by Dave Umang Y., Nena Vivek, Thakor Nirmal, Parmar Krunal.