Scientific Journal of Impact Factor (SJIF): 5.71

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Technophilia-2018.

Volume 5, Special Issue 04, Feb.-2018 (UGC Approved)

Bicycle driven water pumping and power generation system.

Balsaraf A.A[1], Jadhav P.M[2], Kute K.V,[3] Adhore P.D[4] ,Kohinkar T.S.[5]

[1]*Mechanical Engg .Jaihind Polytechnic, Kuran.*
[2]*Mechanical Engg. Jaihind Polytechnic,Kuran.*
[3]*Mechanical Engg. Jaihind Polytechnic, Kuran.*
[4]*Mechanical Engg. Jaihind Polytechnic,Kuran.*
[5]*Mechanical Engg. Jaihind Polytechnic,Kuran.*

Abstract — *Bicycle is the most cheap and easiest mode of transport especially in countries like India on which humans apply their effort to propel the bicycle, over centuries from now. Human effort is transferred to the wheels through pedals, crank and chain mechanism. But the same pedal power can be used for other purposes such as to generate electricity, to operate hand tools or agricultural tools. Therefore, an idea of using pedal power is presented in this paper. In this paper, a system is fabricated for generating electricity by pedaling a bicycle and at the same time water pumping also. The fabricated mechanism is tested to determine its performance and results are presented.*

Keywords- *Pump,Manual pedaling ,sprocket, centrifugal pump,Discharge*.

I. INTRODUCTION

The idea of pumping water has been in existence since the evolution of man. Pumping plays a very pivotal role in the day to day existence of mankind and as a result, different methods have evolved over the years to pump or displace water. Water supply has been a very critical issue, mostly affecting the rural areas . The mechanism consists of single centrifugal pump which is fixed with the rear wheel bicycle. 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 50 feet. Our project could prove helpful for rural areas. It can be used mainly for irrigation and water drawing water from wells and other water bodies. 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. We are wasting resources that can produce energy as if they are limitless. If we can renew and reuse the energy we waste, it would help in some way to the problem of scarcity of energy, which is the major threat of present world. Humans are able to generate approximately 150W of power while riding bicycle. However, this power goes waste without any use. If we can make use of this energy, we would be able to power many electronic devices. A dynamo or an alternator can be used for harvesting the energy generated by a cycle rider while riding. We can charge mobile phones or a small lighting device with this power.

II. LITERATURE SURVEY

Atul. P. Ganorkar et al.[1] [1] Conducted an experiment on “Development ”. Their machine consists of three subsystems namely
(a) Energy Unit : Comprising of a suitable peddling mechanism, speed rise gear pair and Flywheel conceptualized as Human Powered Flywheel Motor (HPFM)
(b) Suitable torsionally flexible clutch and torque amplification gear pair and
(c) A water pump unit. Vishal Garg et al.
Ademola Samuel Akinwonmi et al.[2][2] Conducted an experiment on “Pedal powered water pump”. They founded an pedal operated pump can be construct using local material and skill. 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.
M.Serazul Islam et al.[3][3] Has prepared a conceptually “Simple water pump” that will be easy to maintain and repair using basic tools while providing enough water flow to irrigate a small plot of farmland. The report outlines the design process that has been followed and a description of the agreed model that is to be constructed, cost analysis and timeline.
Bryan Lee.[4][4] Conducted an experiment on “Pedal powered centrifugal pump for pure water supply device”. This analyzes the design of a pedal powered purified water supply device to be used by local dwellers. 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 into the pump while rollers push the water through to the filter where adsorption takes place to purify the water.

Neelesh Khandare:Studied , 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

III. PROJECT DISCRIPTION

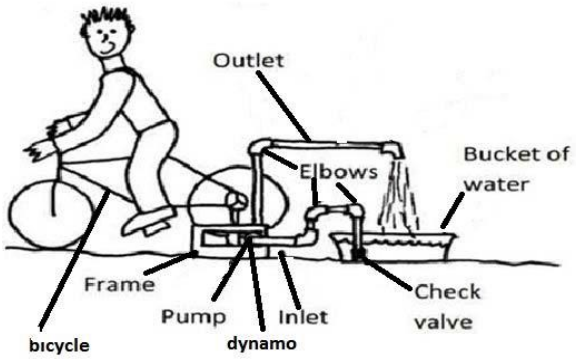
"DESIGN AND FABRICATION OF PEDAL OPERATOR CENTRIFUGAL PUMP"

The whole study over the topic concludes over the fact that the bicycle powered water pump is very advantageous especially for rural areas. The problem of energy crises is very big in India and by the help of this pedal powered water pump (by use of this project) we can save electricity and also supply the water in irrigation. We can operate a water pump by using bicycle mechanism of the project and we can fill the water tank of housing, produce power and get help in the construction work. When we drive a bicycle the wheel of bicycle rotate so we can provide a pulley over the wheel. The pulley is mounted on the shaft and the impeller of the pump rotates due to rotating of wheel with rotation of pulley. So we can operate the pump and deliver the water at a particular head. Pumps can be adapted to fit individual community needs. It can also be placed in garden, both gardening & cycling can be done simultaneously. We will try to operate the pump near best efficiency point.

PART LIST

List of Components	Material
MS Frame	Mild steel
MS Base Plate	Mild steel
Lead Screw	Hardened steel
Centrifugal pump	Standard (Casting)
Shaft	Mild steel
Bearings	Standard
Bearing Mountings	Standard
Friction material	Rubber
Alternator	Standard

WORKING



This fabricated unit consists of mainly three parts, the first one is centrifugal pump, and the third one is the stand, the third one is dynamo. This 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 pedalling the bicycle,

the bicycle wheel rotates, thereby rotating the centrifugal pump which in turn discharges water from the sump and also generates electricity from dynamo which is connected in parallel and opposite to shaft of pump. The suction and delivery pipes are then connected to the suction and delivery ports respectively Manual priming of the centrifugal pump is done next. By pedaling the Rpm of the rotor shaft is measured using tachometer. The flow rate of water is measured by using measuring tank and stop watch. Such that the water lifted is measured in terms of liters per minute. The multi meter is connected to the dynamo output. The electricity is generated and is varied due to variation in speed of pedaling. This electricity generated is measured in terms of amperes.A frame is set to support the bicycle on which a carriage can be moved. On this carriage pump and dynamo are fitted which can be driven by a screw arrangement to adjust the friction between rear wheel and shaft of the pump. GI square pipes are made into sufficient pieces and are welded together to get the frame. The total frame comprised of this square pipe of one inch. In this frame the joints are arc welded to give stiffness and strength.

IV. FUTURE SCOPE

In present scenario when the electricity as well as fuel crisis increases day by day it become a great aspect without putting such amount of fuel & electricity. The initial cost of the project is very low; mass production of this project reduces the cost by half of times. In this project normal human effort is required to work. Another great aspect of the future is that it is eco-friendly. It is also easy to maintain. There are also such errors which can be reducing by making such changes on the pump & transmission. There are some notable efforts at devising human powered machines. In most cases these efforts are being done in developing nations by international aid organization.

V. CONCLUSION

The whole study over the topic concludes over the fact that the bicycle powered water pump is very advantageous especially for rural areas. The problem of energy crises is very big in India and by the help of this pedal powered water pump (by use of this project) we can save electricity and also supply the water in irrigation. We can operate a water pump by using bicycle mechanism of the project and we can fill the water tank of housing, produce power and get help in the construction work. When we drive a bicycle the wheel of bicycle rotate so we can provide a pulley over the wheel. The pulley is mounted on the shaft and the impeller of the pump rotates due to rotating of wheel with rotation of pulley. So we can operate the pump and deliver the water at a particular head. Pumps can be adapted to fit individual community needs. It can also be placed in garden, both gardening & cycling can be done simultaneously. We will try to operate the pump near best efficiency point.

VI. REFERENCES

[1]https://en.wikipedia.org/wiki/Bicycle_pedal
[2] http://pedal-power.com
[3] http://www.mayapedal.org/machines.en
[4]http://www.ibike.org/library/tech_pedal_po wer_machines.ht
[5]http://www.designboom.com/technology/pe dal-powered-un-knitting-machine-by-im ogen-hedges/