International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

Development the Prototype of Merry Go Round Pump

M. Sampath Kumar[1], C. Chandra Sekhar Reddy[2]

[1, 2] Jntua College of engineering Pulivendula, Pulivendula, Kadapa, Andhra Pradesh, India

Abstract: ***To Date, the consumption rate of electricity balances the generation rate. The generation of electricity can be done in many ways, like using the natural resources and artificial made equipments. The natural resources are diminishing day by day. We must choose an alternative to the consumption rate. We propose an addition to the current generation era named as MERRY GO ROUND PUMP. This method can be equipped with low machinery and can install anywhere because of the easy built up and easy in installation. We can easily install this module in many public areas like parks, schools, super markets, etc.***

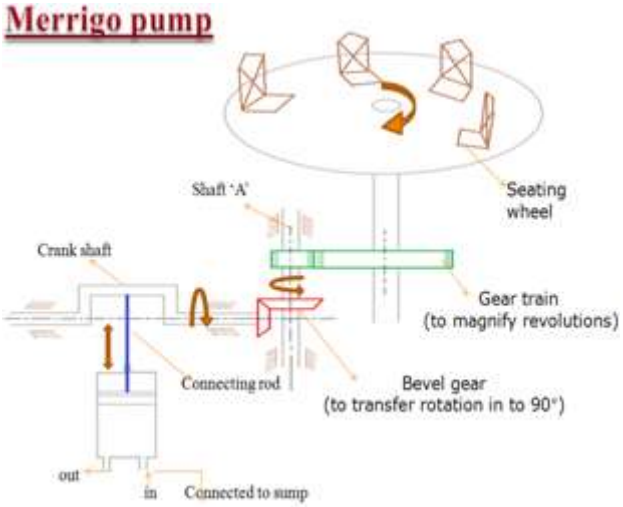
Keywords: rate of electricity, generation rate, artificial made equipments, natural resources

1. Introduction

In the present work is pumping or sending clean and drinking water from a bore well or a sump into the collecting tanks above ground level by without the use of electrical energy such as produced from electrical pump or motors. By the development of Merry go round pump we can avoid the consumption of power as much as possible at some play ground areas such as school, parks, supermarkets and other public places. For initially some of the children will be seated on the merry go round wheel and some other will apply the force to rotate the wheel (a) with the continuous rotation of the wheel gear train setup(gear and pinion) is attached to the wheel shaft and it is rotated at the speed dependent on the children have the physical energy.(b) then the bevel gear attachment is connected to pinion shaft for transferring the motion into the 90 degrees (c) the fabricated crankshaft is coupled to bevel gear setup for converting the rotary motion of wheel into the reciprocating motion of piston inserted inside the pump cylinder (d) by the reciprocating action of piston pump is transferring the underground water from river or a sump to over head tanks which are placed above the ground level (e) this MGR pump makes easily to get water for several purpose without the use of electrical energy for children and other people. The excess water is returned from the storage or collecting tank back into the sump or bore well. The designs of Merry go round pump system is very easily and it is having simple mechanism to operate.

2. Working principle of MGR PUMP

The basic working mechanism of Merry go round pump is to transfer or convert the rotary motion of the Merry go round wheel (children's playing equipment) into a reciprocating motion of the piston inserted inside the cylinder . The simple working principle of the Merry go round pump system is as shown in below figure[1].

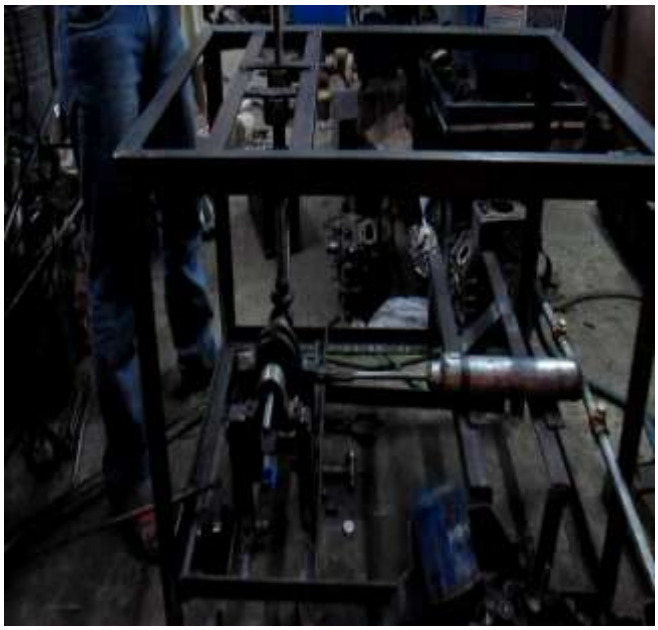


3. Prototype

A prototype is an early sample or model built to test a concept or process or to act as a component to be replicated or learned from. Prototype is to serve to provide specifications or technical details for a real product. Finally the prototype is the process of developing such an approximation of the product. The main advantage of prototype is the proof of concept necessary to attract findings and enable a higher output for user.

3.1 Figure [2]:

3.2 Figure [3]:



The following are the technical details and specifications for Merry go round pump.

For gear wheel:
Material used = cast iron
Outer diameter of wheel = MSR+VSR*LC
= 180+30*0.02 = 180.6mm
Root diameter of wheel = MSR+VSR*LC
= 172+42*0.02 = 172.84mm
Teeth depth = MSR+VSR*0.02
= 4+40*0.02 = 4.8mm
Tooth thickness = MSR+VSR*LC
= 4+27*0.02 = 4.54mm
Number of teeth = 92

For Pinion

Material used = cast iron
Outer diameter = MSR+VSR*LC
= 38+22*0.02 = 38.44mm
Root diameter = MSR+VSR*LC
= 30+22*0.02 = 30.44mm
Teeth depth = MSR+VSR*0.02
= 4+27*0.02 = 4.54mm
Number of teeth = 18
Bore length of pump = 130mm
Cylinder internal diameter = 55mm
Cylinder external diameter = 65mm
Material used for cylinder = brass
Types of valves used = horizontal non return valves
Gear ratio = NTG/NTP = 92/18 = 5.11

3.3 Advantages of Merry Go Round Pump

1) MERRY GO ROUND PUMP provides a play facility for children and to improve the gain of physical energy especially in parks, schools, and also at other public places.
2) It has a simple mechanism and maintenance also very easy.
3) MGR pump is easy to operate and it will attract the children quickly and is very interesting to get new technical innovations.

3.4 References

Rapid prototyping and digital systems by J.O.HAMBLEN, T.S.HALL, M.D.FURMAN [1]. Rapid prototyping and engineering applications by FRANK W.LIOU [2]. www.spanpumps.com/merry go round pdf [3] www.playpumps.org [4] www.gizmag.com [5] http://kids.nationalgeographic.com/kids/stories/peopleplaces [6]

3.5 Equations

1. Velocity ratio for Gear drive

Velocity ratio (n) $= \frac{\omega_2}{\omega_1} = \frac{d_2}{d_1} = \frac{n_2}{n_1}$

ω = angular speed
d = diameter of the gear wheel
n = speed of the wheel.

2. Gear ratio (g) = NTG / NTP

4. Results and Conclusion

1. For the one complete revolution of Merry go round wheel 4 number of strokes will be obtained.
2. Thus the maximum discharge = $\pi\, r^2\, l$
= 3.14 * 27.5*27.5*90
= 217.91*4
= 871.64 ml
3. Suction depth is = 4m
4. Delivery head is = 6m

By this experimental setup of Merry go round pump we can get the water from underground to the over head tanks without the use of electrical power.

5. Abbreviations

MSR = Main scale reading
VSR = Vernier scale reading
LC = Least count
HNRV = Horizontal non return valve
NTG = Number of teeth on gear
NTP = Number of teeth on pinion
D = diameter of cylindrical bore
r = radius of the cylindrical bore
l = length of the stroke

Author Profile

Madanapalli Sampathkumar (M.Tech) CAD/CAM, P.G., Research scholar, Mechanical Engineering, JNTUACE PULIVENDULA, PULIVENDULA-516390, KADAPA (DIST), Andhra Pradesh, India

C. Chandra Sekhar Reddy (M.Tech) R & AC, Adhoc lecturer, Mechanical Engineering, JNTUACE Pulivendula, Pulivendula-516390, KADAPA (DIST), Andhra Pradesh, India