

Bicycle Water Purifying System (Asumat)

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Abstract – This paper is the complete study and analysis of bicycle water purifying system made by us.

The entire system is independent of external energy source. The system works on centrifugal pump which runs with the help of tyre friction. The design consists of a bicycle, pump, U.V light unit, R.O filter, battery, dynamo, storage tank, flexible tubes. As the operator starts pedaling the water from the source is sucked and passed to U.V light for disinfection with the help of the pump and thereafter into R.O unit for purification. The purified water is collected in the storage tank. This system will allow reduction of human effort, improve the quality of drinking water, safeguard from the waterborn diseases.

Key Words: Centrifugal pump, Dynamo, R.O filter, U.V unit

1. Introduction

Globally over 844 million people don't have even basic drinking water facilities and 6.5 billion people have least water service. (world health organization). The above stats shows how intense is the problem of water sanitation globally. Impure water affects the health tremendously. It causes the diseases such as typhoid, jaundice, diarrhea. About 4 billion people are affected due to diarrhea every year and over one or two millions are dead every year. (Eric Peterson, Center for strategic and international studies in Washington).

In order to tackle this problem we need a cheap but reliable and easy solution for the purification of water. The design mentioned in this paper fulfils all the aspects of our requirement. This system can be easily fitted to any kind of bicycle. The design is completely independent of external energy source and completely works on human effort.

2. Principle of Operation

The system consists of a bicycle, centrifugal pump which operates due to the bicycle wheel rotation, R.O filter, U.V unit, flexible tubing connected to every element, battery which recharges on dynamo and used to run the U.V light unit. As the person driving the bicycle starts pedaling the pump runs due to the rolling of rear wheel and the rotor of the pump. The discharge of pump is then passed into R.O filter where stage one purification takes place. Later this water is passed into U.V unit where the ultraviolet light disinfects the water and this completes the stage two purification. The purified water is collected finally into a storage tank.

3. Material Selection

BICYCLE: A standard bicycle with step-through frame also known as low step frame is used to avoid any discomfort for rider wearing dresses or long skirt

PUMP: For continuous high discharge locally available 0.5 HP motor pump is used. Pump specification: Discharge= 44-2 LPM. Head= 6 to 42 meters

FILTER: To remove sediments and foreign particles post carbon filter is used which has range up to 5 microns and maximum flow of 3.83 LPM

UV STERILISER SYSTEM: The system utilizes electromagnetic energy of ultraviolet light for eliminating bacteria and ill causing microorganisms. Specifications- Voltage= 12 volts. Discharge= 4 to 8 LPM

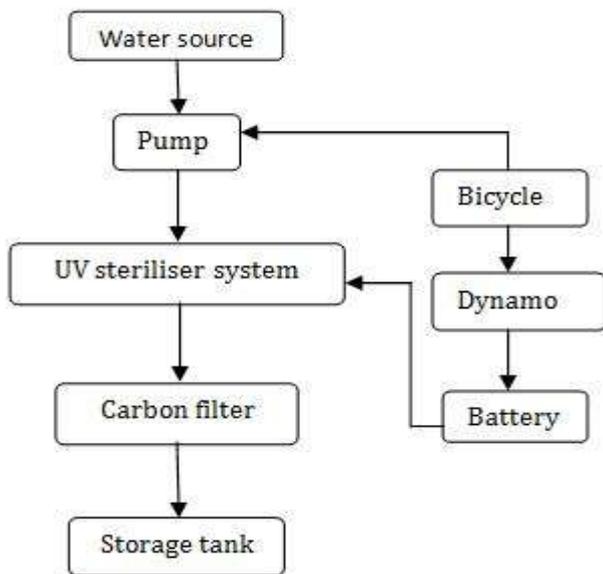
WATER TANK: Filtered water is stored in water tank which is mounted on back carrier of bicycle. We used 20 litre oil drum as water tank

PIPES AND FITTINGS: 8mm Polyvinyl chloride level pipe is used. 20x2mm steel plate is used to fabricate brackets for mounting of pump

4. Design

The system is designed in such a way that it can be implemented to any bicycle easily with minor changes. The design is completely free from the external energy and works on mechanical power. It can be used as kit in order to convert the bicycle into a purifier. The design is robust and simple in construction. Below are the flow chart as well as the actual photograph of the system.

Flow chart of the system



Actual photograph of system



Actual photograph of system



5. Calculations

[1] Discharge calculation

Discharge		
Time(sec)	Discharge(lit)	Discharge(m ³)
60	1.15	0.00115
60	1.20	0.00120
60	1.18	0.00118
60	1.22	0.00122
60	1.23	0.00123

Therefore net discharge is 0.0000996 m³/sec

[2] Water purity

The water purity is within 400 ppm which is completely safe for drinking

3. CONCLUSION

Saving energy is the need of the time especially in the developing and under developed countries like India, Bangladesh and countries from African continent. With the increase in global warming water deficiency is the biggest devil for mankind. Hence water purification without energy consumption is the only solution for both water and energy deficiency. The bicycle water purifying system is the most innovative system to have daily access to safe drinking water and thereby saving enormous watts of power.

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