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“Portable Water Filtration Unit on a Bicycle.”

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ABSTRACT

The project is designed to create a feasible water purification system powered by a conventional bicycle. Treatment for drinking water production involves the removal of contamination from raw water to produce water that is pure enough for human consumption without any short term or long term risk of any adverse health effect. This paper focuses on combined use of different components such as a peristaltic pump (powered by paddling on bicycle), filter (here two candles one of cotton and one of activated carbon). This project will help to sort out problems on need of clean drinkable water in villages facing such water crises and villager have to travel long distance for their basic need of clean drinkable water and on the other hand providing a more feasible solution for transportation of water.

I. INTRODUCTION

The world contains a estimated 1,400 million cubic km of water out of which only 0.003% of this vast amount, about 45,000 cubic km, are what that theoretically can be used for drinking, hygiene, agriculture and industrial purposes. But not all of this water is accessible.

The distribution of the locations of water on earth is only 3% of earth's water is fresh water. Most of it is in ice caps and glaciers 69% and ground water 30% while all lakes, rivers and swamps combined only account for a small fraction 0.3% of the earth's total fresh water reserves.

Domestic use of water: it is estimated that 85 of worldwide water use is for domestic purposes like drinking water, bathing, cooking, toilet flushing, cleaning laundry and gardening basic domestic water requirements have been estimated by Peter Gleick at around 50 lits per person per day, excluding water for gardens.

Problem statement:

In the developing world the availability of clean water is often consuming and expensive. Countries around the world face challenges accessing safe and clean drinking water. Alarming statistics led to the idea that we could use a simple mechanism of transportation that is common in villages, such as bicycle, to help aid their water and sanitation struggles.

Proposed solution:

We propose building a compact bicycle powered system that can collect, purify and transport water. In order to make our solution as accessible as possible, total manufacturing cost and materials available will be considered as our significant constraints. We will design some kind of apparatus for any bicycle to fulfill the three goals of collection, purification and transportation. We will do this by using an old bicycle, an old bike rack, and readily available other parts (peristaltic pump, activated carbon filter and storage tanks).

II. II.LITRATURE REVIEW

On reviewing different journals paper related to purifications and transportation of drinkable water it is found that pure water is an essential need of human race.

III. METHODOLOGY**Construction:**

The setup consist of a storage tank, water filter, clutch, peristaltic pump and a clean tank for storing the filtered water all mounted on a bicycle. The water is firstly filled into the primary storage tank, as the rider paddles the bicycle, the peristaltic pump draws the water from water storage tank passing through a filter mounted between the tank and pump. This filtered water travel to the clean tank provided for storage of clean water.

Working:

A bicycle is used for this purpose with the general arrangement and the type of pump is peristaltic pump. A peristaltic pump is a positive displacement pump used for pumping a variety of fluids. The fluid is contained within a flexible tube fitted inside a circular pump casing. A rotor in the form of plate

with a number of "rollers", "shoes" or "wipers" is attached to the external circumference and connected to the sprocket. An operator sits on the seat and pedals, the pedal crank transfer the motion to the rotor thus the tube is squeezed by the set of rollers and move the fluid.

By constricting the tube and increasing the low-pressure volume, a vacuum is created to pull the liquid into the tube. Once in the pump, the liquid is pushed through the tube by compressing the tube at a number of points in contact with the rollers.

The media is moved through the tube with each rotating or oscillating motion. The water is then forced through a filter.

Working of Peristaltic pump:

The peristaltic pump is based on alternating compression and relaxation of the hose or tube drawing the contents into the hose or tube, operating in a similar way to our throat and intestines.

A rotating shoe or roller passes along the length of the hose or tube totally compressing it and creating a seal between suction & discharge side of the pump, eliminating product slip.

Upon restitution of the hose or tube a strong vacuum is formed drawing product into the pump.

The medium to be pumped does not come into contact with any moving parts and is totally contained within a robust, heavy-duty hose or a precision extruded tube.

This pumping action makes the pump suitable for accurate dosing applications and has a pressure rating up to 16 bar (hose) and 2 bar (tube).

The high pressure hose has inner layer of 2-6 reinforcement layers and an outer layer, which allow higher working pressures and generate higher suction lifts than non re-enforced tubing.

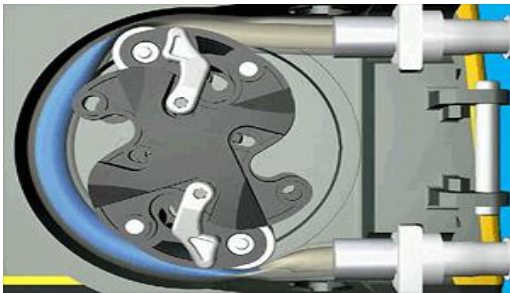


Figure 1. Peristaltic Pump

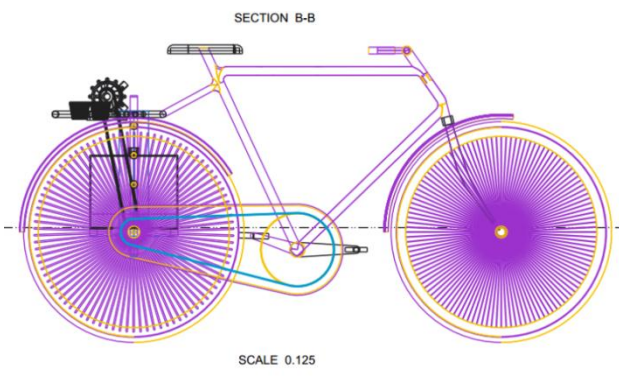


Figure 2. 2D wireframe-side view

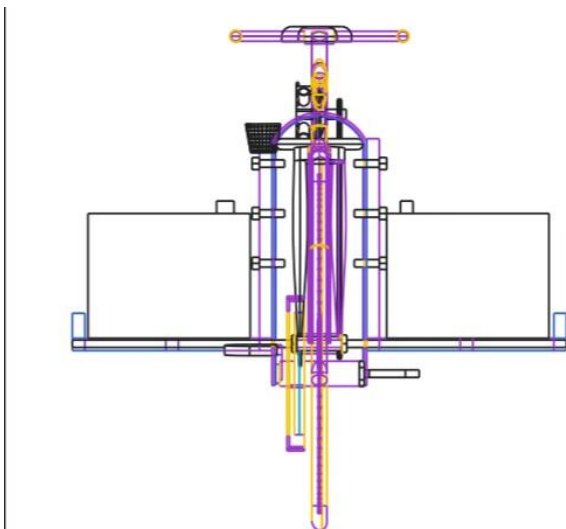


Figure 3. 2D wireframe- when viewed from back side

IV. CONCLUSION

This project presents a solution to meet the basic requirement of safe and clean drinkable water using readily available resources bicycle, bike rack, a peristaltic pump and activated carbon filter and eliminating the use of electricity for filtering, fuel consumption for transportation.

V. REFERENCES

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