Designing and Development of Free Energy Water Pump

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Abstract: A free energy pump (also called a hydram) is a pump that uses energy from a falling quantity of water to pump some of it to an elevation much higher than the original level at the source. No other energy is required and as a long as there is a continuous flow of water, the pump will work continuously and automatically. Provision of adequate domestic water supply for scattered rural populations is a major problem in many developing countries. Fuel and maintenance cost to operate conventional pumping systems are becoming prohibitive. The free energy pump is an alternative pumping device that is relatively simple technology that uses renewable energy and is durable. The hydram has only two moving parts; these are impulse valve and delivery valve which can be easily maintained.

Keywords: Free Energy Pump/ Hydram, Hydraulic Ram, Waste Valve, Nipple Valve,

I. Introduction

This project is about designing a free energy pump to transfer water from a river or pond into a water tank with given dimensions and conditions. The free energy pump designed is believed to be the most suitable and efficient for the given conditions based on the calculations performed.

For the first step of designing, all the related problems are listed and understand. Then the specific actions, criteria, and evaluation of the solution are developed. This including choosing the most suitable operational working principals for the free energy water pump or hydraulic ram pump, outline of the theoretical background behind the operation and its details calculations, which are being referred to the concept and theory entitles to Fluid Mechanics.

II. CONSTRUCTION PROCEDURE:

Figure-1: Construction of the pump

The thread portion of the bushing is coated with Teflon thread tape to prevent leakage.Two nipples are fitted at the two openings of a Tee valve. One bushing & one L shaped valve is fitted at both the free ends of the two nipples. Another nipple is fitted in the free end of the L shaped valve followed by a bushing at the free end of the same nipple. The swing valve is fitted on to the free end of the bushing with its arrow pointing downwards. This is the wastage valve. The middle Tee valve is fitted with a nipple valve followed by a bushing. The bushing is fitted with a swing valve whose arrow is pointing upwards. This is the delivery valve and is and is fitted with a bushing followed by a nipple & a Tee valve. The outward projection part of the Tee valve is fitted with a nipple valve followed by a bushing. The two MAIN valves are fitted at the inlet and outlet position of the pump & both are fitted with a bushing followed by a nipple. The upward projection of the Tee valve is fitted with a hollow bottle cap which is properly glued inside the valve to prevent insulation & the bottle is fitted tightly with the bottle cap to create the insulated pressure chamber. The entire set up is then clamped on a wooden board with the help of clamping clips to prevent any unwanted movement. The delivery pipe is connected to a natural filter which will finally clean & purify the water. The wastage valve is connected with a bushing followed by a nipple. Another pipe will be attached to this nipple which will take the excess water to Tank 2 constructed at the side of the pump to to prevent wastage of water. The drive pipe connects the pump to Tank 1. The end of the pipe connected to the tank will be properly coated by waterproofing pudding from both inside and outside to prevent leakage.

III. WORKING MECHANISM

Step-1: Water starts flowing through the drive pipe and out of the "waste valve", which is open initially. Water flows faster and faster through the pipe and out of the valve.

Step-2: At some point, water is moving so quickly through the brass swing check "waste valve" that it grabs the swing check's flapper, pulling it up and slamming it shut. The water in the pipe moving quickly and doesn't want to stop. All the water weight and momentum is stopped, through by the valve slamming shut. That makes a high pressure spike at the closed valve. The high pressure spike forces some water through the another swing valve and into the pressure chamber. This increases the pressure in that chamber slightly. The pressure "spike" the pipe has nowhere else to go, so it is begins moving away from the waste valve and backup the pipe. It actually generates a very small velocity *backward* in the pipe.

Step-3: As the pressure wave or spike moves back up the pipe, it creates a lower pressure situation at the waste valve. The pressure chamber swing valve closes as the pressure drops, retaining the pressure in the pressure chamber.

Step-4: At some point this pressure becomes low enough that the flapper in the waste valve falls back down, opening the waste valve again.

Step-5: Most of the water hammer high pressure shock wave will release at the drive pipe inlet, which is open to the source water body. Some small portion may travel back down the drive pipe, but in any case, after the shock wave has released, pressure begins to build again at the waste valve simply due to the elevation of the source water above the ram, and water begins to flow towards the hydraulic ram again.

Step-6: Water begins to flow out of the waste valve, and the process starts over once again. Again and again for these process air pressure in the pressure chamber is continuously increase and being affected by the water hammer, water lift into the height.

Steps 1 through 6 describe in layman's term a complete cycle of a hydraulic ram pump. Pressure wave theory will explain the technical details of why a hydraulic ram pump works, but we only need to know it works. The ram pump will usually go through this cycle about once a second, perhaps somewhat more quickly or more slowly depending on the installation. Each "pulse" or cycle pushes a little more pressure into the pressure chamber. If the outlet wave is left shut, the ram will build up to some maximum pressure and stop working.

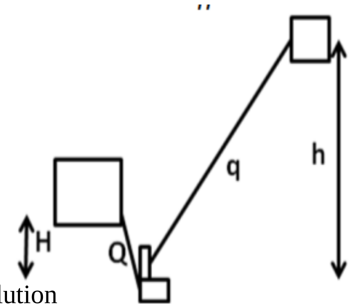
IV. DESIGN ANALYSIS

Let,

- The drive flow in litre per minute = **Q**
- The drive height in meter = **H**
- The delivery height = **h**
- The delivery flow in litre per minute = **q**

Then the efficiency of the pump is

$$E = \frac{(q \times h)}{(H \times Q)}$$



Here, $Q = (\pi R^2 Ln/60)$

Where, R = Inlet pipe radius L = Pipe length in inlet n = Speed of revolution

And, $Q = (\pi r^2 ln/60)$

Where, r = Outlet pipe radius, l = Pipe length in outlet, n = Speed of revolution

V. CONCLUSION

From the object stated, we have come out the solutions from the study of our hydraulic ram pump (hydram), the modifications and assumptions made were counted and the calculations give the exact answers for this project. From the results obtained, we have found out that:-

(A) There is board prospect of utilizing the country's abundant surface water runoff potential for various purposes or requirements using locally designed and manufactured hydraulic ram pumps and other similar appropriate technologies.

(B) To disseminate hydrams at potential sites throughout the country, there is a need to create awareness through training and seek integrated work with rural community, government institutions like water, energy and mines bureau of local regions and non-governmental organizations.

(C) Hydraulic Ram Pumps made by casting have many advantages, but they could be expensive. In addition, considering the cost of civil work and pipe installation, the initial investment could be very high. To reduce cost of hydrams made by casting, there is a need of standardization. Standardizing hydram pump size will also have an advantage to reduce cost of spare parts and facilitate their easy access when they are needed.

(D) The use of appropriate means of treating river water or pond water should be looked at in conjunction with any development project of domestic water supply using hydrams

.VI. FUTURE SCOPE OF WORK

One of the suggestions that can be applied is to use a bigger supply pipe to obtain a large amount of water so that more water can be delivered to the tank. In this report we use supply pipe width diameter of 0.1 m, and we get only about flow rate and it is just about 1% of compared to the river's flow rate. Bigger supply pipe will increase the flow rate, but we also need to increase size of hydram to cope with bigger force that the water carries. It is not necessary to increase the delivery pipe because referring to continuity equation, the flow rate across a pipe is same. Since we already increase the flow rate of water by increasing the diameter of supply pipe, thus with the same diameter of delivery pipe we can get achieve a higher velocity of water flowing to the tank. But if we increase the diameter of supply pipe tremendously we may also need to increase the delivery pipe diameter so that more water can be delivered within velocity. We can also try to build a tank near the river to store the water collected from river. This is for us manipulate the velocity of water flowing since we cannot do anything to the river. We know from continuity equation that the property that is shared between the river, and water flowing to supply pipe in the velocity. So if we find any solution to increase the velocity, we could increase the flow rate in the pipe thus increasing the pump rate of the hydram. For the most optimum performance of the hydram is to apply both of the suggestion but we need first to consider the necessity of such high pumping rate according to use of the water delivered. If we were able to deliver a lot of water to the tank, but later we will only just use some of it, then it will be a waste and will cost us high. Thus we first need to identify the necessary amount of water needed. From there we try to adjust so that we can fulfil the demand with minimum cost.

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