iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** VII **Month of publication:** July 2021

DOI: https://doi.org/10.22214/ijraset.2021.36698

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

Design and Development of Ram Pump

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Abstract: Due to A hydraulic ram (or water ram) pump is a simple, motorless device for pumping water at low flow rates. It uses the energy of flowing water to lift water from a stream, pond, or spring to an elevated storage tank or to a discharge point. It is suitable for use where small quantities of water are required and power supplies are limited, such as for household, garden, or livestock water supply. A hydraulic ram pump is useful where the water source flows constantly and the usable fall from the water source to the pump location is at least 3 feet.

I. INTRODUCTION

Automatic water pumps have been used for over two centuries in many parts of the world. Their simplicity and reliability made them commercially successful, particularly in Europe, in the days before electrical power and the internal combustion engine become widely available. As technology advanced and become increasingly reliant on sources of power derived from fossil fuels, the Automatic water pump was neglected.

It was felt to have no relevance in an age of national electricity grids and large-scale water supplies. Big had become beautiful and small-scale Automatic water pump technology was unfashionable. In recent years an increased interest in renewable energy devices and an awareness of the technological needs of a particular market in developing countries have prompted a reappraisal of Automatic water pump. In hilly areas with springs and reliable pumping device is large. Although there are some examples of successful ram pumps installation in developing countries, their use to date has merely scratched at the surface of their potential.

The main reason for this being, lack of wide spread local knowledge in the design and manufacture of Automatic water pump. Hence, the wide spread use of Automatic water pumps will only occur if there is a local manufacturer to deliver quickly; give assistance in system design, installation and provide an after-sales service.

A. Background

The Automatic water pump has been around for quite some time now; the first device in the modern era is reported to have been devised by an Englishman John Whitehurst in 1775. His design was not automatic and was controlled by opening and closing a stopcock. Easier than carrying water by hand but sure sounds like it was still a lot of work and very time consuming. The Automatic water pump is works on simple principle of water hammering. The concept behind the ram idea is a "water hammer" shock wave. Water has weight, so a volume of water moving at a certain speed has momentum - it doesn't want to stop immediately. If a car runs into a brick wall the result is crumpled metal. If a moving water flow in a pipe encounters a suddenly closed valve, a pressure "spike" or increase suddenly appears due to all the water being stopped abruptly. If you turn a valve off in your house quickly, you may hear a small "thump" in the pipes that water hammer.

II. PROBLEM STATEMENT

For agriculture purpose water is the main source. Electric pumps are used to lift up the water from the well, lake etc. It requires 3 Phase electric current to drive these pumps. In villages the 3 Phase electricity is not constant. Two or Three days of a week, the electricity fluctuates and does not remain constant also for Domestic purpose electric pumps are used and it consumes the electricity. So by considering these problems we made A Free Energy Pump which does not required any electricity and hence it its environment friendly.

III. SCOPE

There is increasing demand for manufacture of Ram Pumps as they provide water totally without electricity. Rural Areas tend to bend towards this technique as electricity is it constant and not everybody can afford it.

Due to on further analysis and selection of parts wisely with respect to weight and cost. Proper usage of material can make the pump to discharge water at even higher level.

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IV. LITERATURE REVIEW

A. Design Of Ram Pump

The Design of a Hydraulic Ram Pump is studied. It is meant to uplift the water from a depth of 2m under the surface with no other energy source needed. Based on the design the volume flow rate in the derived pipe was 4.4237 × 10-5 m3 /s (2.76l/min), Power 1.383 kW which gives us an efficiency of 56.3%. Costs of fabrication of this hydraulic ram show that the pump is relatively cheaper compared to other pumps. The present study is focused on the development of a hydraulic ram pump that can properly alleviate the problem of water supply to the mass.

B. Power Supply

The availability and cost of electric power is a great concern to common man. Conventional energy is also a great concern for environment. Hence more attention of designers is diverted towards use of unconventional energy or other forms of energy than convention energy. Water pump is a more utility item. Though the pump is in use since long, it is not seen in common forms for lots of its performance limitations.

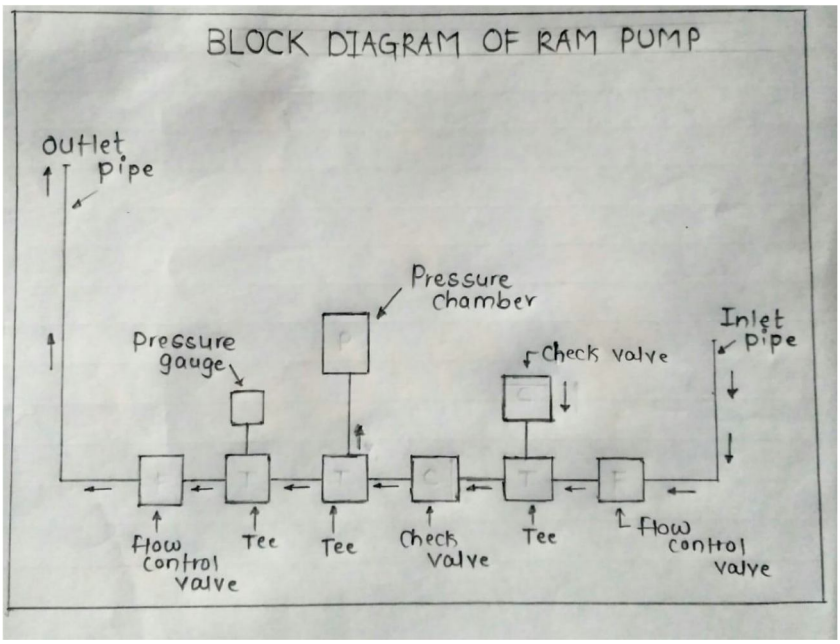
C. Manufacturing Of Ram Pump

A hydraulic ram is a pump in which the momentum of a driving stream of water undergoing a small head drop is used to pump a small portion of the stream to a head considerably greater than that of the supply. In the current study, a hydraulic ram was designed, manufactured and tested. It is meant to lift water from a depth of 2m below the surface with no other external energy source required.

D. Design And Parts

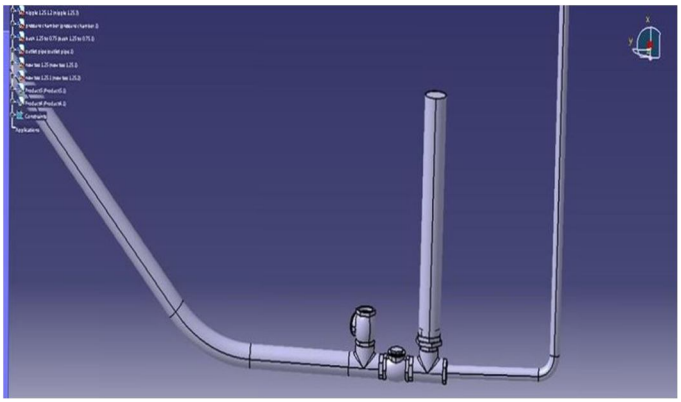
The techniques and guidelines to successfully install the modern hydraulic ram pump. The proposed technique illustrates the methodology that can be used for the primary design considerations and applications in various ways. Those techniques and guidelines to successfully install the modern hydraulic ram pump. The proposed technique illustrates the methodology that can be used for the primary design considerations and applications in various ways.

V. MODEL DESIGN IMAGE



Block Diagram of Ram Pump

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Catia model of Ram Pump

VI. WORKING PRINCIPAL

Automatic water pump or Free energy pump has only two moving parts, a spring or weight loaded "waste" valve sometimes known as the "clack" valve and a "delivery" check valve, making it cheap to build, easy to maintain, and very reliable. In addition, there is a drive pipe supplying water from an elevated source, and a delivery pipe, taking a portion of the water that comes through the drive pipe to an elevation higher than the source.

Initially, the waste valve is open because of its own weight, and the delivery valve is closed under the pressure caused by the water column from the outlet. The water in the inlet pipe starts to flow under the force of gravity and picks up speed and kinetic energy until the increasing drag force lifts the waste valve's weight and closes it.

The momentum of the water flow in the inlet pipe against the now closed waste valve causes a water hammer that raises the pressure in the pump beyond the pressure caused by the water column pressing down from the outlet. This pressure differential now opens the delivery valve, and forces some water to flow into the delivery pipe. Because this water is being forced uphill through the delivery pipe farther than it is falling downhill from the source, the flow slows; when the flow reverses, the delivery check valve closes. Meanwhile, the water hammer from the closing of the waste valve also produces a pressure pulse which propagates back up the inlet pipe to the source where it converts to a suction pulse that propagates back down the inlet pipe. This suction pulse, with the weight or spring on the valve, pulls the waste valve back open and allows the process to begin again.

VII. ACKNOWLEDGEMENT

The word ‘thank you’ is much less, for the word encouragement which we all have received from people going out the way to make us feel comfortable and make the things very simple.

We express our since thanks to our guide Mr. S.T.Ghutukade who guided us during the entire session of the project. High evolutions & suggestions have helped us enormously towards the completion of this project.

We are also thankful to the entire mechanical engineering department for making available all the required resources & co-operation in our project work and also for their constant guidance and a constructive criticism throughout our project work. We are also thankful to Mr. M.M.Jadhav (Head of Department) Mechanical.

My sincere and peculiar thanks to my friends who have motivated us every time and shared their valuable time and provide us with all the necessary information..

VIII. CONCLUSION

We have completed the project with our top effort to make the “Automatic water pump” an adequately and innovatively designed water pump. Automatic water pump, pumps the water without using electricity or fuel. It simply works on water hammer and gravity.

This pump conserves the energy and very economical. It is very simple in construction, does not requires high capital investment. Once it is set up it does not require any human interference.

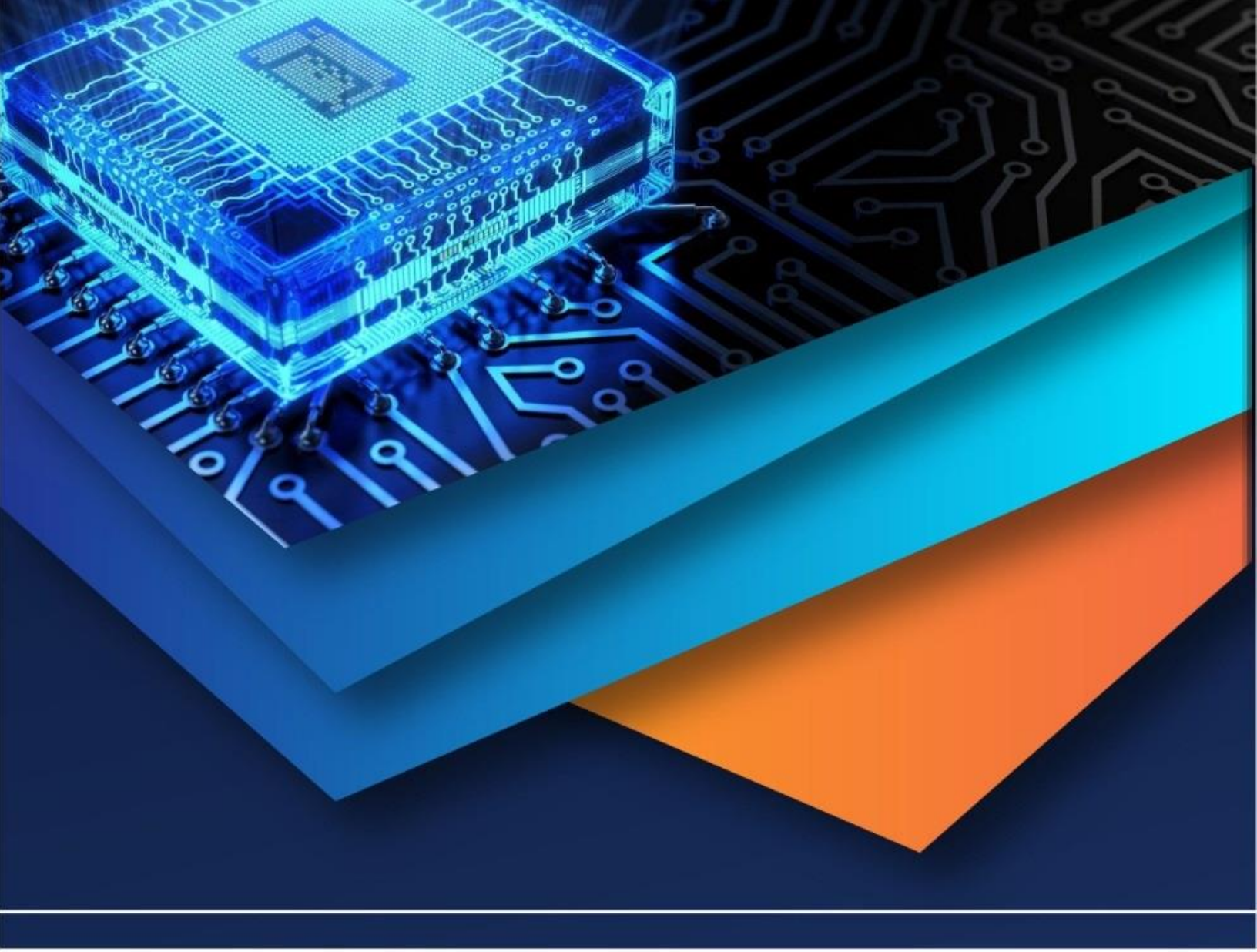
The principle of the hydraulic ram is invented in 1775. Due to electrical power and the internal combustion engine this technology is get neglected. The main reason for this being, lack of wide spread local knowledge in the design and manufacture of ram pumps. Hence, the wide spread use of ram pumps will only occur if there is a local manufacturer to deliver quickly; give assistance in system design, installation and provide an after-sales service.

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REFERENCES

[1] https://tameson.com/pvc-ball-valve.html
[2] http://www.greenandcarter.com/main/rampumpleaflet.htm
[3] Shuaibu Ndache MOHAMMED, "Design and Construction of a Hydraulic Ram Pump", Leonardo Electronic Journal of Practices and Technologies.
[4] Whitehurst, John (1775). "Account of a Machine for Raising Water, executed at Oulton, in Cheshire, in 1772". Philosophical Transactions of the Royal Society. London: Royal Society. 65: 277–279. doi:10.1098/rstl.1775.0026
[5] Executive Documents of the House of Representatives at the Second Session of the Twenty-first Congress … , vol. 2 (Washington, D.C.: Duff Green, 1831), pages 328 and 332.
[6] "Hydraulic Ram Pumps", Practical Action, United Kingdom, 2010.
[7] "Hydraulic Ram Pumps", John Perkin, Green and Carter LTD.

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