International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 05 | May - 2023 SJIF 2023: 8.176 ISSN: 2582-3930

Review On Design and Fabrication of Pedal Powered Washing Machine

Dr. Yogesh Mahulkar[1], Ritesh Duragkar[2], Rohit B Meshram[3], Rahul R Gandhi[4], Rohit Rautkar[5] , Rahul Raut[6]

[1]*Project Guide, Department of Mechanical Engineering, Tulsiramji Gaikwad-Patil College of Engineering & Technology Nagpur*
[23456]*Students, Department of Mechanical Engineering, Tulsiramji Gaikwad-Patil College of Engineering & Technology Nagpur*

Abstract-
Pedal Powered Washing Machine (PPWM) is an inexpensive washing machine made from simple and readily available scrap metal parts from everyday life. It is a machine that generates power in a person's pedals and, with the help of a drive mechanism, converts the pedal movement into the necessary rotational movement of the drum. Its innovation is a simple design, the use of cheap parts, very low costs of repair and maintenance, affordability for every member of society, and it does not affect the environment. The goal of reducing the initial cost and operating cost of the washing machine is almost achieved within the scope of the works mentioned in the present work. The main goal is to reduce human effort to provide light clothing in rural and dark areas very far from electricity and development.

Keywords : Pedal Mechanism , washing machine , Cycle Frame , chain and Gear mechanism etc.

1. INTRODUCTION

Washing clothes is one of the most important parts of life. We all wash our clothes either by hand or by machine. A washing machine is a washing machine designed to wash clothes such as clothes and sheets. Today, there is a wide selection of washing machines on the market, and there is intense competition between manufacturers. These washers cost between $350 and $750 depending on features and functions. All these washing machines are powered by electricity and the basic principle of operation is to create a turbulent flow of detergent around the dirty clothes. Almost 60 percent of our population lives in rural areas where the use of electric washing machines is impossible, mainly due to the lack of electricity or the lack of the machine itself due to the expensive purchase of a new washing machine. Washing clothes by hand is tedious, tiring, time-consuming and requires a lot of breathing.

The purpose of this project is to design and manufacture pedal-powered washing machines to directly address the problems that rural residents face when doing laundry. The machine can also be used in urban areas to save electricity and also for exercise. The machine does not need electricity or a motor, but uses human power. The transfer of human energy using the foot pedal and crank mechanism is called pedal power. This is a mechanism that was used to transport bicycles. As part of the project, a pedal washing machine is designed and produced. Experiments are conducted to determine the best operating conditions.

A pedal-operated washing machine allows women to wash faster and with less effort. Young daughters who help their mother with household chores can also focus more on their studies. Washing machine micro-businesses may even emerge if our washing machines are successful. In developing countries, the situation is different, but in many places, women wash clothes by hand, even though they could be doing more profitable or rewarding work elsewhere.

2. LITERATURE SURVEY

A pedal-operated washing machine operates with a combination gearbox. PPWM is used for washing, drying and rinsing. PPWM helps to make less effort even in sins and ablutions. It can be used in places where there is no electricity. It is designed to be portable, which can be used to lift and wash in different places. When pedaling the bicycle, the pedal movement turns the drum, the washing machine moves with a crank and turns the multi-function drum to wash. Such a light material can also be used to wash clothes without external energy such as fuel or electricity. Since it does not use electricity or fuel, it is very cheap and best.

• **Dharwa Chaitanya kirtikumar [1]** designed and developed a universal machine that does not require electricity for multiple functions such as washing. It is a human-powered machine that works with gears mainly by human power. But if you want to run this machine with electricity, this machine can do that too. It has a special attachment, so use both human and electric power. The design is ideal for use in developing countries because it requires no electricity and can be built with a metal base, chain, pulley, rubber belt, bearings, foot pedal (for human use), chain sleeve.

• **S.G. Bahaley, Dr. Ague, Awate, S.V. saharkar [2]** designed and manufactured a pedal operated universal machine. It is a human-powered machine designed to raise water up to 10 meters and produce 1volts, 2 amps of electricity in the most efficient way. The power required for pedaling is clearly below the power of an average healthy person. The system is also useful for exercise, because pedaling works as a health exercise and also does useful work.

• **Linxu, Weinan bai, Jingyu rue and Qiang li [3]** designed and developed a pedal washing machine. The main goal is to provide a product that has an alternative way to wash clothes in the absence of electricity. It must be understood that in rural areas this is very stressful and labor-intensive work. Thus, the machine, which is a pedal-operated machine, meets the needs of rural people by offering them an alternative way of doing laundry that is fast, cost-effective and environmentally friendly. The designed product has no operational costs, is cost-effective and minimally usable.

The purpose of this work is to design and manufacture a pedal-operated washing machine that achieves smooth washing and washing with less effort, and to compare manual and pedal-operated washing machines.

3. OBJECTIVES

To support the basic family economy through the design and marketing of cycle machines, providing an effective alternative for rural development in India.

- A study of washing machines based on design and construction, performance, economics and applications.
- Design and build an inexpensive washing machine, consisting of simple and readily available everyday waste parts.
- It generates power through human pedaling and driving to perform all functions such as washing, washing and spinning.
- Unit price analysis of a pedal operated washing machine.

4. DESCRIPTION OF THE PROPOSED WORK

- **Functional Diagram**

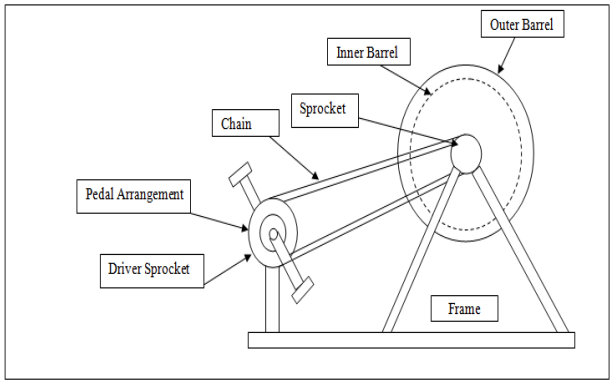

Fig. 1. Functional Diagram

- **Working**

The above image shows the working principle of a pedal operated washing machine on a horizontal axis.

• When the pedal is operated by human power, it turns the driven gear through the roller chain.

• This tooth rotation is caused by the internal drum (smaller drum placed inside the fixed outer frame/drum) because both the used toothed wheel and the internal drum are mounted on the same shaft.

• This rotary motion of the drum causes the water to shake between the outer (and inner) drum when the inner drum is punctured.

• This results in clothes twisting and unraveling inside the inner drum. Also, when the inner drum rotates, the clothes (which are properly soaked in the detergent mixture) also rotate with the drum. Thanks to this rotation, the clothes fall under the influence of gravity as they rise in the drum.

• This cycle is repeated until the pedal is turned. This causes the clothes to be washed.

In our project, turning the drum is possible by turning the wheel. The wheel is turned by a chain drive. When a person begins to trade, the gear connected to the cogwheel begins to transmit power, the speed of rotation of the drum depends on the power of the person. In our project, the whole process depends on the combined gearbox. Transmission is a way of transferring mechanical power from one place to another. It is often used to transmit power to the wheels of a vehicle, especially bicycles and motorcycles. It is used in many different machines besides vehicles.

- **Components**

Pedal powered washing machine consists mainly of the following parts:

- Barrels (two different barrels of different diameters)
- Shaft
- Sprocket with chain.
- Bearings
- Driver sprocket with pedal
- Axle
- Frame (for support)
- Others

5. METHODLOGY

1. Recognition of need- First of all, makes a complete statement of the problem, indicating the need, aim or purpose for which the system is to be designed.

2. Design of structure: Decide the size and shape of the structure by considering the installation of all the electronic and mechanical components/parts. Draw the detailed plan of each component of the structure with complete specifications and dimensions.

3. Modification: Modify the size of the member to agree with the past experience and judgment to facilitate manufacture. The modification may also be necessary by considering of manufacturing to reduce overall cost.

4. Selection of components- Select the possible components and decide the proper number of components, which will be used in the project.

5. Programming the Micro-Controller- The micro-controller is nothing but an Arduino Mega board. The Arduino board is feed with a program that is used for the actual project application. As per the program feed, the fire sensed by the sensors is processed and signals are sent to the actuators that will extinguish the fire.

6. Production& Assembling: The components, as per the drawing, are assembled in the frame. After assembling all the components, the project is ready.

6. ADVANTAGES

The washing machine makes you forget about laundry. If you buy it, you will have enough freedom to conveniently wash your clothes when needed. The biggest advantage of a washing machine is time. Just think of all the things you can do while doing laundry. Although the prices are high, your time is valuable. Especially when you are with your family or doing something you like. If you have your own washing machine, you can determine which washing steps you need for each fabric, and you don't have to do it for other people.

- Uses less water, power, and soap
- Cleans as well as commercial washer with similar capacity
- Spin dries so no wringing needed
- Comfortable to use
- Enables women to do more rewarding things
- Technology for women
- Community investment that also benefits the poor
- Sustainable with local production and maintenance
- Replicable anywhere with bicycles
- Save the water.
- It is a non-polluting, as well as not using any types of electricity.
- Also we get the advantage of exercises with washing the cloth by means of applying the pedal.

7. DISADVANTAGES

The washing machine needs detergent and water. This means an increase in consumption and expenses in your house. If you are buying a washing machine, you should treat these things as future expenses and analyze your financial possibilities. The washing machine takes up too much space. If you usually change rooms or live in small apartments, having a washing machine is a disadvantage for moving and also for the machine.

8. APPLICATION

- It is very useful into the local rural areas.
- Saving in detergent and the water
- Scale free tub
- Reduced traces of detergent on clothes
- Better wash quality
- Softer clothes
- Easy to operate and the less effect of chemical on the women hand.
- Exercise is also done with the applying the pedal.

9. CONCLUSIONS

A pedal-operated washing machine would allow women to wash clothes faster and with less effort. It can be used by men, women, the elderly, etc. When asked what they would do in their free time, the women replied that they would try to earn an income by making handicrafts or selling food. Young daughters who help their mother with household chores can also focus more on their studies. Washing machine micro-businesses may even emerge if pedal washing machines are successful. Conditions vary in developing countries, but in many places women wash clothes by hand, even though elsewhere they could be doing more lucrative or rewarding work. It is also helpful in keeping fit.

We hope that through our research and analysis, we have shaped, or at least helped to clarify, the concept of a pedal-operated washing machine. Hopefully, such useful tools will become a common addition to Cambodian villages and third world countries in the near future.

REFERENCES

1. R.S.Khurmi “Design of Machine Elements”, Eurasnia publishing house 3 Pvt Ltd, 14th revised edition.

2. Prof. Nitinchandra R. Patel, Mohammed A. Vasanwala, Balkrushna B. Jani, Miteshkumar D. Rathwa & Ravi A. Thakkar “Material selection and testing of hacksaw blade based on mechanical properties’ international journal of innovative research in science, engineering and technologyvol. 2, issue 6, June 2013

3. S.M.Moghe & K.S.Zakiuddin (2013) “Design and Development of Turmeric Polishing Machine Energized

4. By Human Power Flywheel Motor.”-A past review, Proceedings of the 1st International and 16th National

5. Conference on Machines and Mechanisms IIT Roorkee, India, Dec 18-20 2013

6. Bicilavadora: The Pedal-Powered Washing Machine - IDEAS 2005 Proposal.

7. Bruzzone, M. & Wieler, A. (2010) “Reflecting on an Intercultural Design-Build Project in the Kathmandu Valley” Final Draft, February 5, 2010.

8. http://en.wikipedia.org/washing mc/pedal-powered-washing-machine.htm

9. http://en.wikipedia.org/wiki/Washing machine.

10. http://www.ideafinder.com/history/inventions/washmachine.htm

11. http://home.howstuffworks.com/washer1.htm

12. http://www.apparelsearch.com/definitions/miscellaneous/washing_machine.htm.