IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Pedal Operated Washing Machine

YASH GAJANAN NAVGHARE[1], MAHESH GAJANAN LINGAYAT[2], TEJAS TULSHIRAM BHUJBAL[3], [123] Student of Mechanical Engineering Department Shri Shivaji Polytechnic Institute,Parbhani.

Prof. K.S. DEVTARASE[4] , Prof. R.B. CHAVAN[5] , Prof.V.R. VAIDYA[6]

[456] Lecturer of Mechanical Engineering Department Shri Shivaji Polytechnic Institute Parbhani .

Abstract: Pedal Powered Clothes Washer is a low cost machine made up of easily and readily available scrap parts in daily life. It is a machine which generates power through human pedaling and with the drive mechanism, converts the pedaling motion into required rotary motion of the washing drum. Its innovation lies in its simple design, use of inexpensive parts, very low repairing and maintenance cost, affordability to each member of the society and it does not affect the environment. Our team intends to directly address the problems faced in washing clothes, and thus have developed a new design for easy effort in washing, rinsing and drying clothes. The Pedal Powered Clothes Washer is a completely new concept, which in its one laundry cycle does washing, rinsing and drying of clothes similar to that of an automatic washing machine available in the market.

Keywords: Pedal powered washing machine.

1. Introduction

The Pedal-Powered Washing Machine Project revolutionizes laundry in rural areas lacking reliable electricity, empowering women by reducing time and physical strain from hand-washing clothes. This innovative solution frees women to pursue education, income-generating activities, and self-care, improving daily life for rural families. By saving hours daily, women gain dignity, opportunity, and better health, while communities experience social change and local economies grow through increased participation. This practical solution brings hope, transforming the lives of rural women and their families, and fostering a brighter future.

- A very effective machine which is not only cheap but has low maintenance cost. It should have readily available

components and should be ergonomically efficien.

- Must have all the mechanisms – Washing, Rinsing, andSpinning.

2.Background

Washing laundry is one of activities that many households do daily. Basically this is done either by our hands or by powered machines. Washing by hands involves scrubbing, beating, soaking and rinsing the dirty clothes. This is a laborious and time consuming task. Electric Powered washing machines were developed to eliminate the labour and time involved in washing clothes manually. In rural areas electric powered machines are not viable mainly because there is no electricity or because the machine itself is expensive. Women are mainly the ones burdened by the washing of clothes and can spend an entire day washing clothes. The project intends to solve the problem faced by so many people in their day-to-day life.

Figure 1.

In rural areas washing laundry is a laborious and time-consuming task. Electric powered washing machines do not work because of lack of electricity and also due to their high cost. The detergents used in washing clothes are chemically harmful to hands. The scrubbing process also strains muscles.

2.2 Justification

Thus the paper has the following merits:

• The machine does not use electricity thus suitable for places where electricity is not available or is expensive

• Saves time as compared to washing clothes manually

• The machine will be low cost and thus affordable

• One will also be exercising while washing

• It’s an easy to maintain machine as the components are readily availabl.

• Women no longer have to be in contact with soapy water which may damage hands. It is therefore necessary to design and fabricate a pedal powered washing machine

3.LITERATURE SURVEY Dharwa chaitanya kirtikumar created a versatile machine that does not need power for a variety of tasks, such as cleaning. It's a human powered gear-driven machine that relies mostly on human power. However, if you want to run this machine with electric power, you may do so as well. Make use of both human and electric power in order to get the job done. With no power required and a metal base, chain, pulley.rubber, belt, bearings (for operating by human foot pedal), chain socket. The design is suited for usage in the poor countries . S.G.bahaley, Dr. Ague, Awate, S.V. saharkar devised and built a versatile pedal powered machine. At 10 meters in height, it creates 14 Volt/four Ampere of power from human power in the most efficient manner possible. In order to pedal, you'll need a lot less power than you think you have. Aside from being a great way to stay in shape, the device can also be used to get some exercise by allowing users to cycle. Linxu, Weinanbai, Jingyu rue, and Qiang li planned and built a washing machine powered by a pedal, an alternate 19 method of washing clothing when electricity is unavailable is the primary goal of this device. It must be remembered that in rural regions, it is a gruelling and time-consuming undertaking. Using a pedal powered machine, rural residents now have an efficient, affordable, and environmentally responsible option for washing their garments. Zero running costs, low cost, and limited consumption are all features of the product created. For the purpose of this research, a pedal-driven washing machine will be designed and built, and the hand-driven washing machine will be compared. There is a complex gear arrangement in the pedal-powered washing machine. Use the PPWM for washing and drying and for rinsing, too! PPWM makes it easier to wash and clean uniformly with less effort. Electricity isn't always accessible, thus this may be utilized in certain situations. In order to make it convenient for people to utilize it in different locations, it has been built as a portable model. Washing may be done by riding a bicycle, which causes the washing machine's multi-utility drum to spin as a result. Because it uses little energy, this means that it may be used to wash clothing without using fuel or electricity. Since no electricity or fuel is required, this is the cheapest and best option..Bhatawadekar et.al pedal powered multifunctional machine was conceived and built. As a result, it can raise water up to a height of 10 meters and create 14 Volt, 4 Amperes of power in the most efficient manner. Pedalling requires much less power than the typical healthy person can muster. Pedalling is both a healthy workout and a productive activity, making this method ideal for anyone looking to get some exercise The

pedal-driven washing machine was invented by Nitin Chandra et.al . An alternate 19 method of washing clothing when electricity is unavailable is the primary goal of this device. For those who live in rural locations, it is a difficult and exhausting effort. For rural populations in particular, a pedal powered washing machine provides a fast, inexpensive, and environmentally-friendly alternative to traditional washing methods. The created product has no operational costs, is cost effective, and only requires a small amount of resources to be employed. The goal of this research is to develop and build a pedal-driven washing machine to achieve more consistent washing with less effort and to compare it to a hand-driven one. Vijay Talodhikar et.al have analysed and investigated the pedal driven potato peeling machine. The MOPPM was fabricated and peeled 8 kg of potatoes in less than 2 minutes. The machine was operated and tested on three different gear ratios 3:1, 2:1 and 1.5:1. The best operating speed of flywheel was 200 rpm .

4.Components

✓ **Seat:** Seat is an arrangement in any bicycle on which a person can sit comfortably. Seat may be made of plastic, rubber, metal etc. The seat used here is of satisfactory softness and big enough for most users to use the machine without much fatigue. It has been borrowed from a regular bicycle that was designed for adults. A chair can be used instead of a bicycle seat for sitting and pedaling for making of clothes more comfortable.The seat we used in our machine.

✓ **Pillow Ball Bearing :** These bearings are designed to support rotating shafts and are typically used in applications where the shaft needs to be supported by an external bearing unit. The "pillow" shape of the housing refers to the bearing's external appearance, which often has a square or rectangular block with a spherical inner bore that holds the bearing.

✓ **Drum:**

- **Inner drum:** It's typically made of stainless steel.It has numerous perforations (small holes) throughout its surface. These holes allow water and detergent to flow in and out during the wash cycle and allow water to be expelled during the spin cycle.
  In a pedal-operated machine, the inner drum is rotated by the pedal mechanism. This rotation provides the mechanical action needed to clean the clothes.
  During the spin cycle, the inner drum rotates at a higher speed to extract water from the clothes through centrifugal force.

- **Outer drum:** The outer drum's primary role is to hold the water used for washing and rinsing clothes. It acts as a container that surrounds the inner, rotating drum.
  its used to store the water.

✓ **Padlock Clasps**: These are hardware components used to secure doors, chests, boxes, gates, and other items. These are commonly used as a type of door lock or fastener, but they are not typically used in pedal-operated washing machines to lock the inner drum door. Tower bolts are surface-mounted: They are designed to be attached to the surface of a door or frame, providing a sliding bolt mechanism. Washing machine doors usually have integrated locking mechanisms.Washing machine locks are more complex: They need to be robust enough to withstand the vibrations and forces of the washing cycle, and often incorporate safety features to prevent opening during operation.

✓ **Uxcell cabinet gates door:**These hooks are used so that when the outer drum rotates, the water does not spill out and the inner drum is very fast. These hooks are used for the safety of the operator.

✓ **Bolts and Nuts:** The components pictured, bolts and nuts, could be used in a pedal-operated washing machine to connect the bearings to the machine's structure and rotating shaft. Bearings enable smooth rotation of the shaft, which is crucial for the washing machine's operation. The bolts and nuts would secure the bearing housings to the frame and the shaft to the bearings, allowing the pedals to drive the washing machine.

✓ **Chainand sprocket:** In pedal-operated machines like hacksaws or washing machines, the chain and sprocket mechanism transmits rotary motion from the pedals to the machine's working parts,

converting human effort into the required movement.

- ✓ **Cycle body:**Purpose of a Bicycle Frame: A bicycle frame is designed to provide the structural support for a bicycle, allowing a rider to sit and pedal.

DOOR LOCK

5.COST OF COMPONENTS

- ✓
- ✓
- ✓
- ✓
- ✓
- ✓ **LIST OF COMPONENTS**

SHAFT

No.	COMPONENTS	PER.	RS.
1.	INNER DRUM	1	200
2.	OUTER DRUM	1	500
3.	CYCLE BODY	1	1000
4.	SEAT	1	80
5.	CHAIN	1	100
6.	SPROCKET	1	90
7.	DOOR LOCK	2	20
8.	NUT AND BOLT	4	60
9.	TAP	1	35
10.	STRUCTURE (BASE)	1	1488
11.	SHAFT	1	310
12.	BEARING	2	400
13.	oil	1	30
14.	Colour & BRUSH	3	340
15.	TOWER BOLTS	2	60
16.	TRANSPORT PARTS	-	320
	TOTAL		5033

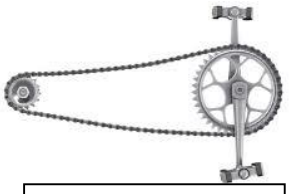
CHAIN&SPROCKET

NUT AND BOLT

TOWER BOLTS

BEARING

CYCLE BODY



CYCLE BODY

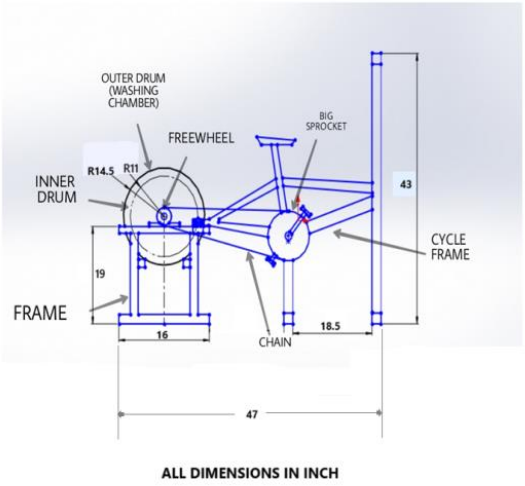
CYCLE BODY

CYCLE BODY

6.METHODOLOGY

- ✓ **Design Specifications** The main perspective in the plan of the machine is capacity to proceed as a gadget facilitates the undertaking of washing garments. To be a feasible arrangement in rustic regions, the machine ought to have the option to convey a similar nature of washing without adding unreasonable overheads (as far as water use, clothing wear, exertion expected to work, and so forth.). Hence the plan and activity of the Machine ought to be immovably grounded in the physical science of dresses washing, with an exceptional accentuation on the mechanical perspectives (since water temperature and cleanser piece are probably going to shift). The gathering likewise distinguished various auxiliary objectives with changing levels of significance that could end up being useful to make the machine more valuable and in this manner more effective. The capacity to turn dry garments would increment water economy by requiring less wash cycles, and could assuage the arduous assignment of physically wringing the garments before they are hung to dry. On the off chance that the design of the machine permitted the client to perform manual work (hand-make, food readiness, and so forth) while accelerating, we could additionally lessen how much time devoured by washing. Various wellbeing elements ought to likewise to be remembered for request to moderate the innate security issues engaged with a chain-driven machine. In the event that the machine was to be utilized in a home, safeguarding its conveyability of would permit it to be divided between families, moved near a water hotspot for activity, or utilized in families where space is restricted. One more arrangement of determinations for load measuring, water utilization and valuing, rely upon the designated Community. Since we are anticipating that how much clothing should fluctuate between families, an underlying size was chosen in light of existing clothes washers, and plans considering simple resizing were liked.

7.DIMENSIONS



ALL DIMENSIONS IN INCH

- ✓ **For inner drum,**

Diameter of inner drum=11inch

Length of inner drum=16.5inch

Volume of inner drum = 29688cm3 = 30litre

- ✓ **For outer drum,**

Diameter outer drum= 14.5inch

Length of outer drum= 19inch

Volume of outer drum = 50893cm3 = 50litre

- ✓ **For big sprocket and rear gear freewhe el,**

Big sprocket diameter =7.28inch

Rear sprocket diameter =1.58inch

No. of teeth on big sprocket = 44

No. of teeth on rear sprocket = 18

Gear ratio= 2.44

Water required for 1kg laundry = 5-6 litre

Maximum weight of cloth that can be wash= 3kg

Average weight of human= 60

Average rpm can human produce at big sproc ket = 60rpm

Average rpm at inner drum = 180rpm

Average power transferred by human during pedalling = 125kw (assumed)

8.WORKING MECHANISM

1. Pedal Action:
   - The user starts pedaling, which rotates the pedal sprocket. The pedal sprocket is directly connected to a chain, which then moves.

2. Chain Movement:
   - The chain moves from the pedal sprocket to the cycle back sprocket. The movement is transferred through the chain links, creating a rotational force.

3. Rotating the Shaft:
   - The rotation of the cycle back sprocket causes the shaft to rotate. The shaft is attached to the inner drum, so this rotational motion makes the inner drum turn.

4. Drum Rotation and Agitation:
   - The rotation of the inner drum agitates the clothes, mimicking the action of a motorized washing machine. The water inside the outer drum moves, allowing detergent to interact with the clothes, thus cleaning them.

5. Water Circulation:
   - The clothes are agitated in the soapy water, creating a scrubbing action. The clothes rub against each other, which helps remove dirt and stains.
6. Speed Control:
   - The speed of rotation is determined by how fast the user pedals. Faster pedaling results in quicker drum rotation, while slower pedaling results in slower agitation.

7. Water Drainage and Rinsing:
   - After washing, the water can be drained out. This can either be done by tipping the drum manually or using a pump or drain valve (if part of the design). Fresh water is added for rinsing, and the cycle is repeated by continuing to pedal.

9.APPLICATION

- It is very useful into the local rural areas.
- Saving in detergent and the water.
- Saving the electricity.
- Easy to operate & the less effect of chemical on the women hand.

10.ADVANTAGES

- Saving the water .
- Replicable anywhere with bicycles.
- It does not required any fuel.
- It does not require any electricity supply.
- It is easy to use.
- It is pollution free.

11.DISADVANTAGES

- The washing machine occupies too much space. If you generally change spaces or live in small apartments then, having a w ashing machine will be a disadvantage fo r you to move around and for the machin e too.

12.CONCLUSION

We have made foot operated washing machine with the use of chain and sprocket mechanism. this project can be feasible in our day to day life. middle class family can also afford this. operation time for this product is also less without applying much great efforts.it also consumes less water. Also strain of washing clothes on women's get reduce. from this we are concluding that this concept can be use at rural as well as urban areas.

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