

DESIGN AND FABRICATION OF PEDAL OPERATED WASHING MACHINE WITH DRYER AND DRAINING SYSTEM

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Abstract: The Fabrication of Pedaling Washing machine with a dryer and draining system is a new innovative concept which is mainly used to save power consumption. It uses manual power instead of electric power. Nowadays, washing the clothes is very easy by using the electric power devices like washing machine, these machines are very costly. Instead of that, this machine is designed in such a way, in which manual power is used and electrical power is avoided. Due to non-renewable energy crises, basic need of this machine is to utilize the energy from renewable sources and to save the non-renewable energy.

Key Words: Bicycle, Helical Bevel Gears, Eco friendly, Power consumption, Cost Saving.

1. INTRODUCTION:

A washing machine (laundry machine, clothes washer) is a machine used to wash laundry, such as clothing and sheets. The term is mostly applied to machine that use water as opposed to dry cleaning (which uses alternative cleaning fluids, and is performed by specialist business) .It covers one of the daily house hold activities. We wash clothes by hands or in washing machine. This projects solves the problem faced by village people around the world. . In the rural areas where electric supply is unavailable and expensive, this pedalling washing machine will be used there.

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- Provide a low cost machine.
- Wash any type of cloth.
- The mechanism is Washing, Rinsing, and Spinning.

2. MATERIALS:

NAME OF THE MATERIAL	TYPE OF MATERIAL	QUANTITY	COST OF MATERIAL
1. BI-CYCLE	CAST IRON	1	500/-
2. SHAFT	TUBE ROD	2	150/-
3. HELICAL BEVEL GEAR	CAST IRON	1	300/-
4. V BELT	BELT	1	60/-
5. V-BELT COUPLER	M.S	1	60/-
6. TAP	PVC	1	25/-
7. BLUE WATER DRUM	PLASTIC	1	500/-

3. METHOD:

A washing machine is used to wash garments. The term is mostly applied to machine that use water as opposed to dry cleaning .The Basic principle of this machine is to convert mechanical energy into rotational energy. Generally, it is used for washing clothes. During Pedaling, the Mechanical energy is transferred to the shaft as the rotational energy, where the shaft is coupled with the sprocket and helical 1st bevel gear. Further the energy is transferred to the 2nd helical bevel gear and it rotates. Thereafter, the washing machine pulley and v-belt coupler is interconnected by the V-belt. Finally the washing machine conveyor rotates and washes the clothes. The waste water drains through water tap. The drum can contain 12litres of water. But we use only 9 litres of water in the drum. Fill the water and put some cloths. The drum can wash 1.5kg of cloths, **i.e. two shirts and one pant**. By pedaling the cycle for 10-15minutes the cloths will be clean and dry. **After completing 1 rotation 0.15 calories will burn. 600 rotation=90calories. By pedaling the cycle for 10-15minutes the cloths will be clean and dry.**



Fig.1.1



Fig.1.2

4. DISCUSSION:

- This washing machine's advantage is “time”.
- It is Low cost when compare to normal Washing Machine.
- It will not need any types of electricity.
- Spin dries so no wringing needed
- Comfortable to use.

- It is a non-polluting
- By applying the pedal we get the advantage of exercises with washing the cloth

5. ANALYSIS: Calculations

Capacity of clothes: Minimum 1.5kg of clothes should be easy to resize.

Water usage: Maximum 9litres water / 1.5kg clothes

Pedalling time: Maximum 15 minutes each for wash and rinse cycles

Total operation time: Maximum 20 minutes including, filling water, washing, draining, and cleaning machine

Lifetime of structure: By assuming daily usage it will withstand up to 10 years

Manufacturing capital cost: Rs.2000/- (welder, metal cutter, shop tools)

6. FINDINGS:

Although the working model of the drive of PPWM is fabricated and implemented, there is a scope of further work in the project which has not been undertaken. There are a number of ideas where the loss of power can be reutilized and the design can be modified for better performance. Some of them are listed below:

Energy Storage The energy being wasted during washing can be stored using flywheel and can be used at the time of spin drying. This would reduce the effort required during drying and would increase the overall capacity of the machine as more energy would be available during spin drying.

Increasing Washing Capacity the capacity of washing can be increased so that more clothes can be washed, thus utilizing the wasted energy. It has a disadvantage that all the clothes would not be rinsed and dried simultaneously in the same cycle. The capacity of rinsing and drying is low as compared to washing. Thus, increasing the washing capacity would require the rinsing and drying of the clothes to be done in turns. The machine would then no longer complete the entire laundry process in one cycle

7. RESULT:

- It is very useful in village areas.
- Saving in detergent and the water.
- Traces of detergent on clothes are reduced.
- Better wash quality.

8. RECOMMENDATIONS:

Designing a Multipurpose Machine the energy wasted during washing can be utilized in most fruitful way by using it in another household machine which would work simultaneously as the washing goes on. Load on the new machine would be such that entire energy is consumed and not wasted. The excess energy can be used to generate electricity to charge battery. It can be used to operate pedal powered pumps. Many machines operated on pedal power have been developed such as, Cassava graters, Coffee/grain hullers, cracking of oil palm nuts, Potter's wheels, Flexible shaft drive for portable grinders, saws, etc., Tire pumps, Sewing machines.

Designing and Implementing the Drain Valve mechanically A normal washing machine uses an electronic control valve in the drainage system to control the flow of waste water out. This valve can be designed mechanically using bicycle brakes. The brakes would block the rubber outlet pipe when the clothes are being washed, rinsed or dried. The blockage would open to make the waste water flow out after a washing cycle or during drying.

Table 1.1

Process	RPM Required	Torque Available	Power Required
1. Washing	20 rpm	59.68 Nm	2.5 W
2. Rinsing	500 rpm	2.38 Nm	62.5 W
3. Drying	1000 rpm	1.19 Nm	125 W

9. CONCLUSION:

The main objective is to provide a product with a different way to wash clothes when there is no electricity. From the above project, it can be concluded that the “pedaling washing machine” is a very simple yet very powerful design of washing cloth which if brought into application in the rural areas. The poor peoples who find it very difficult to wash cloth by means of hand , they can use this machine. . It has to be understood that in rural areas, it is a very stressful and laborious task. So the product which is a pedal driven machine, it satisfies the need of rural people by giving them an alternative way of washing clothes which is quick, cost-effective and eco-friendly. The product designed has zero operating cost, cost-effective.

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