

## Pedal Operated Multi Purpose Machine for Domestic Use: A Review

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### ABSTRACT

Human has applied energy through the use of arms, hands and back. With the invention of bicycle and pedaling, legs also began to be considered as a means to develop power from human muscles. A person can generate four times more power by pedaling than by hand cranking. At the rate of 1/4hp, continuous pedaling can be done for only short periods, about 10 minutes. However, pedaling at half this power (1/8hp) can be sustained for around 60 minutes. It is important to visualize new ways to bring power to the people as population continues to grow and power shortages continue to occur. Much of the power that is provided to people today is done in very un-sustainable ways; new ideas are needed to transition in to a post cheap-petroleum era. Pedal power enables a person to drive devices at the same rate as that achieved by hand cranking, but with far less effort and fatigue. Pedal power also lets one drive devices at a faster rate than before, or operates devices that require too much power for hand cranking. Over the centuries, the treadle has been the most common method of using the legs to produce power. Treadles are still common in the low-power range, especially for sewing machines. The maximum power output from treadles is very small; perhaps only 0-15 percent of what an individual using pedal operated cranks can produce under optimum conditions. The power levels that a human being can produce through pedaling depend on how strong the pedaling person is and on how long he or she needs to pedal. If the task to be powered will continue for hours at a time, 75 watts mechanical power is generally considered the limit for a larger healthy non-athlete. A healthy athletic person of the same build might produce up to twice this amount. A person who is smaller and less well nourished, but not ill, would produce less; the estimate for such a person should probably be 50 watts.

**Keywords-** Horse Power, Pedal Operated, Treadles, healthy athletic person

### I. INTRODUCTION

Industries are basically meant for Production of useful goods and services at low production cost, machinery cost and low inventory cost. Today in this world every task have been made quicker and fast due to technology advancement but this advancement also demands huge investments and expenditure, every industry desires to make high productivity rate maintaining the quality and standard of the product at low average cost In an industry a considerable portion of investment is being made for machinery installation. So in this paper we have a proposed a machine which can perform operations like colander, squeezing, coconut grinding.

This project presents the concept of Human Powered Multi-Purpose Machine mainly carried out for domestic purpose. Basically the objectives of this machine are to reduce the human effort, human time and carry out the number of operation simultaneously. It is economically efficient .This machine can be used in remote places where electricity is irregular or insufficient. It is designed as a portable one. The machine is operated without any external energy like fuel or electric supply. Since machine uses no electric power and fuel, this is very cheap.

### II. NEED OF DEVELOPMENT OF MACHINE

In the present scenario machines are electrically driven. Machine with electric motor are faster but that are costly as well as required electricity. The unit operating by means of electricity has limited applications in the rural area. In remote and interior places like in our Vidarbha where there is no facility of electricity as well as in urban areas, while in the duration of load shading or during electrical power-off timings, this type of human power operated unit will have very extensive utility. Therefore this human powered machine is having extensive utility in such areas. Also it reduces the machining equipment cost as three machines can be used simultaneously on same platform.

### III. LITERATURE REVIEW

#### **The surveys of the literature regarding the Pedal driven machines are listed:**

Chaudhary Pravin , Solanki Chirag ,Vaghela Jaydeep ,RabariMehul ,Detroja Pratik [1] in their design and fabrication, Pedal operated hacksaw machine which can be used for industrial applications and Household needs in which no specific input energy or power is needed. This project consists of a crank and slider mechanism. In the mechanism pedal is directly connected to the hacksaw through crank and slider mechanism for the processing of cutting the wooden blocks, metal bars, pvc materials. The objective of the modal is using the conventional mechanical process which plays a vital role. The main aim is to reduce the human effort for machining various materials such as wooden blocks, steel, PVC etc. The power hacksaw machine, which runs on human power, works on the principle of the conversion of rotational motion to oscillatory motion. Importance of this project lies in the very fact that it is green project and helps us to reduce our electricity need. Secondly, this cutter can be used and transferred to our working place easily. Moreover, if we want we can generate electricity with our project by connecting it to dynamo, diode and battery.

Adarsh Ranjan, Kushagra Sharan, Sudeep Mazumdar[2] in their paper , Pedal Powered Washing Machine (PPWM) is a low cost washing 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 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. PPWM 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.

Vishal Gehlot, Abhinay Nigam, Kunal Marmat[3] in their design and fabrication of Pedal operated air compressor with the goal of building a working prototype. Here is a try to create a mechanical device that can use the mechanical power operated by pedals as in bicycles to run an air compressor and additional water pump. The additional cooling system is used for maintaining the temperature of compressed air. We used a cycle chain-sprocket system as a basic pedaling power source and connect it to the main shaft joining both the air compressor and a water pump through several gears. This approach will be helpful for saving a sufficient amount of electricity and get a robust portable air compressor system.

Chethana T. V and D. Ramesh[4] in their research, they have shown that in the developing world, powered grain cleaners exist, but they are impractical in rural regions because of electricity are expensive or unavailability. The objective is to develop a low cost, pedal powered machine that is designed using readily available parts. Innovation is its simple design using bicycle components, which is easy to operate and without using electricity. Methodolgy involved here using pedal operated and vibrating mechanism cleaned variety of grain is collected leaving chaffs, lighter impurities and stones present in the grains.

Ikechukwu Celestine Ugwuoke, Olawale James Okegbile, Ibukun Blessing Ikechukwu, Robert Temitope John[5] in their design and development of a manually operated roasted groundnut seeds peeling machine. The machine comprises a specially designed peeling chamber which greatly reduces the amount of breakages during peeling and a transmission mechanism which greatly reduces the required effort to drive the system. It has a peeling efficiency of about 85% which is an improvement over previously fabricated designs. The machine is easy to operate and has a capacity of 5.4kg/hr of roasted groundnut seeds. With such capacity, the machine can be used both in medium scale industries and also for domestic needs of peeled roasted groundnut seeds.

S.B. Patil, A.D. Chendake, M.A. Patil, S.G. Pawar, R.V. Salunkhe And S.S. Burkul[6] in their design, A pedal operated maize Sheller was designed, developed and built by using locally available material with overall dimensions of 1270×760×1150 mm. The machine could be operated continuously for a comparatively long time with high shelling rate without causing damage to kernels. Four shelling units were provided for shelling of maize cobs and operated with the chain and sprocket arrangement. The results revealed that the machine was easy to operate with an average kernel shelling rate of 110 kg/hr when operated by two persons with no

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any kernel damage. Shelling efficiency was 98 per cent with collection efficiency of 94 per cent and average rate throughout was 150 kg/hr.

#### IV. PROPOSED METHODOLOGY

Manually pedal operated machine in which Power is transmitted from pedal to shaft with the help of belt through flywheel. The whole shaft, drum and blades are mounted on the stationary stand. Drum is mounted on vertical shaft and blades are attached to the shaft. At the one end of pedal shaft we connect coconut grinding operation and other operation, colander is connected to the flywheel.

#### V. CONCLUSION

We can see that all the production based industries wanted low production cost and high work rate which is possible through the utilization of multi-function operating machine. It requires less power as well as less time, since this machine provides working at different center it really reduced the time consumption up to appreciable limit.

In the above literature review we see that pedal driven machines are used for driving the power hacksaw machines and it reduces need of electricity and ecofriendly in its working. It has to be understood that the washing machine 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.

It also seen that in pedal operated air compressor, achieved supply pressure up to 23-26 psi under the normal conditions. This pedal operated mechanism can generate enough power to drive the air compressor and the water pump. The compressor and pump both are human powered. This narrows down our powering options significantly to something purely mechanical (probably no electric power of any kind).The pressurized air generated and be used in various other purposes such as filling air in tires, paint sprayer etc.

In the grain cleaner pedal operated machine, the final outcome from is that cleaned variety of grain is obtained.

In the a manually operated roasted groundnut seeds peeling machine, the technology used is affordable and less expensive when compared to imported peeling machines. The time taken to the peel 2.5kg of groundnut using hands is about 4-5 hours while the time taken to peel same quantity of groundnut using this machine is about 30-40 minutes. This clearly shows that it is more advantageous to peel roasted groundnut seeds using this machine than using bare hands.

From the above literatures of different authors we conclude that the pedal operated machine is better option to use human being instead of automatic machine. Purpose of fabrication of this machine is to determine the suitability of machine for domestic use. Since this machine is made especially for domestic purpose. And we design a pedal operated machine which posses different operations such as squeezing, colander and coconut grinding which are working simultaneously. There are two major principles on which our proposed machine works:

1. To – Fro Motion: It converts rotary motion to reciprocating motion which is used for operation i.e. colander.
2. Power transmission through flat belt and pulleys: It transmits power through the flat belt and pulley to the squeezing and grinding of coconut attachments.

#### VI. REFERENCES

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