

Pedal Operated Green Coconut Trimming Machine for Vendors

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Abstract: In rural area of India it is not possible to trim the coconut by using motor operated machine due to lack of electric power. Trimming coconut by hand takes lots of efforts and skill. The motor operated coconut trimming machine is a machine design to trim coconut automatically. Generally, these machines are operated by electricity but pedal operated machine is human operated and totally eco-friendly. It can be used to save electricity and also use to trim coconut in a very attractive way. Aim of the project is to fabricate such machine for green coconut vendors those are works in rural areas, which is pedal operated so they can easily trim the green coconut.

Keywords: Bicycle chain, Pedal power, Sprocket, Trimming mechanisms.

I. INTRODUCTION

Energy is the indivisible part of our living, with the even increasing the cost and decreasing sources of conventional energy like fossil fuels, finding the alternative non-conventional energy sources is the need of present time. Apart of other renewable energy resources human power is one of the effective and alternative resources available since ancient time. The human being delivered their energy from calorific contains of foods they eat. A person can generate four times more power (1/4 HP) by pedalling than by hand-cranking. At the rate of 1/4 HP, continuous pedalling can be done for only short periods, about 10 minutes. However, pedalling at half this power (1/8 HP) can be sustained for around 60 minutes but power capability can be depend upon age [1-2]. A healthy male can only reliably maintain the high-power range of around (250 watts and above of mechanical power). As a result of the brainstorming exercise, it was evident that the main use of pedal power one specific product was particularly useful: the bicycle. Many devices can be run directly with mechanical energy. It also support to small scale, self-sustainable and to help contribute to the conservation of the environment and health of the local economy. Satisfying energy needs by method will be great way to improve human health in busy life. It is badly needed a better system which considered the ergonomic and psychological factors of operator and that should be multiple purpose that can used producing pumping water, generation of electricity as well as exercise of operator which will look after fitness of operator and it can protect and safeguard of operators own interest and concerns. Pedal operated green coconut trimming machine is mostly designed by considering vendors interest. Recently the coconut is crushed to extract water from fruit, chopped by hand to remove above husk. The main purpose of the design was to trim most of the outer husk (green husk) to create an attractive looking trimmed coconut (hexagonal shape) which could easily be cut open. Designed and developed multipurpose machine which was not require electricity for several operations like washing. This is a human powered machine runs on gear drives mainly with human efforts. In this project the machine developed for green coconut vendors which is pedal operated, by which they can easily trim the green coconut. Here the input power from pedal is given to the machine and that power is transmitted through the sprocket-chain to the one end of horizontal shaft which is situated at another end of the sprocket-chain. Then that rotating power is transmitted from one end of the horizontal shaft to the another end of horizontal shaft and their vertical shaft is situated. And at the end of this rotating shaft coconut can be mounted by additional arrangement. And hence the coconut will rotate. Now, the coconut can be trim by: A) The body knife first paired the midsection of fruit. B) Following this the shoulder knife trimmed the top to form a conical shape. C) Finally, the base cutting knife sliced the bottom of coconut to form a flat underside. Several local organizations have already expressed their interest in pedal-operated machines technology. It is an affordable, eco-friendly alternative to devices operated by electricity or fossil fuels. Since it is based on bicycle components, the machines can be manufactured locally and repair parts are affordable and readily available in a local market.

II. PEDAL POWER AND RATE

Bicycle power is also a product of your speed and all of the forces that resist forward motion. Forces like aerodynamic resistance or wind, gravitational resistance or the grade of a given hill, rolling resistance or the quality and pressure in your tires, and the resistance in moving parts like your chain or bearings all impact your power. Pedal power meter uses the amount of force applied to each pedal to measure power. The direction and magnitude of the applied force is then analyzed in real-time to determine which

portion of that force is directed to drive the bike forward. Pedal power is the transfer of energy from a human source through the use of a foot pedal and crank system. This technology is most commonly used for transportation and has been used to propel bicycles for over a hundred years. Less commonly pedal power is used to power agricultural and hand tools and even to generate electricity. Some applications include pedal powered laptops, pedal powered grinders and pedal powered water wells. Some third world development projects currently transform used bicycles into pedal powered tools for sustainable development. The articles on this page are about the many wonderful applications for pedal power technology.

III. LITERATURE SURVEY

The pedal operated green coconut trimming machine for vendor is working on simple sprocket chain mechanism. The POGCTM is used to trimming the green coconut in attractive way in order to reduce its weight for transportation and for extracting water for it. By preparing the project the pedal power is converted into rotational energy which rotate the trimming machine, shaft. Thus, the green coconut can trim without any external energy thus the machine is energy efficient. Since this machine uses no fuel this is very cheap and best. The surveying of the literature regarding the ecosystem are listed below. Dharwa Chaitanya kirtikumar [1] developed and designed a multipurpose machine which does not require electricity at all for several operations. This is a human powered machine runs on gear drives mainly with human efforts. It has special attachments to use both human power as well as electric power. It doesn't require electricity and can be built using chain sprocket, foot pedal (operated by human), roller chain, pulley, metal base, rubber belt, thus this design is ideal for use in the developing countries. S.G. Bahaley et al. [2] Power required for pedalling is well below the capacity of an average healthy human being. The system is also useful for the work out purpose because pedalling will act as a health exercise and also doing a useful work. In the development of modern technological civilization, energy is the most vital aspect. The conventional energy sources are being scarce, so alternative energy sources are found which must be cheap, easily available and must satisfy the technical requirements. Krishnamurthy M, Rakshith K K, R Harshaa, Rakesh N [3] In many developing countries it is not possible to machine wash clothes due to the lack of electric power or the absence of machine itself. Washing clothes by hand leaves one breathless and takes an awful amount of time. A coconut trimming machine is a machine designed to wash laundry. Generally, these machines are generally operated by electric power but pedal operated machine is human operated and totally eco-friendly. It can be used to save electricity and also get physical exercise when implemented in urban areas. In this project, we fabricated such a coconut trimming machine with both washing and rinsing mechanism.

IV. DESIGN PARAMETERS

A. Cutting Mechanisms

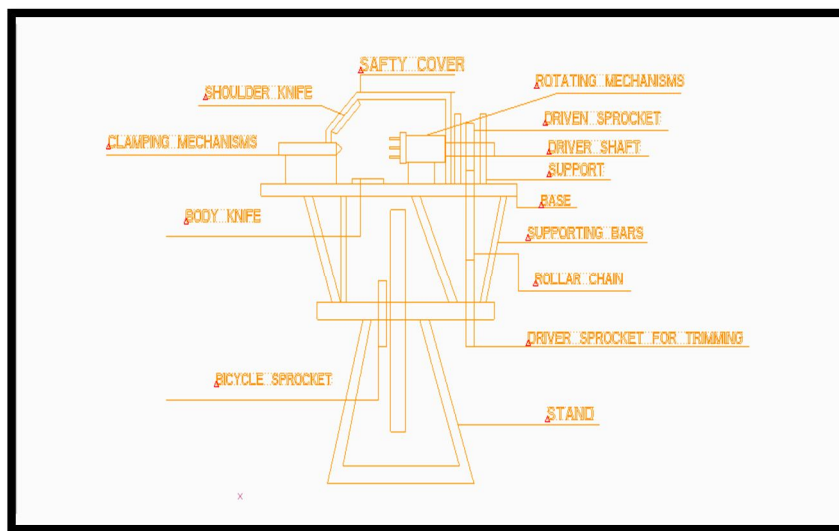


Fig 1: Design of cutting mechanisms

The young coconut trimming machine comprises a main frame, bottom-up fruit holder, a shoulder trimming knife and a body trimming knife. Figure illustrates the main parts of the machine and its clamping components. The machine was driven by bicycle with chain and sprocket mechanisms. In this design, the human expended for an average weight man of 70kg (1501b) at a cycling

speed range of 16km/h – 24km/h or 233 r.p.m was used and after the analysis the efficiency and human power required to drive the shaft was calculated to be 56% and 1.02hp respectively. However, a range of 100 – 300 rpm was normally applied for trimming the fruits. In this case, 300 rpm is considered to be a general speed for trimming young coconuts. Basically, the longer the fruits being stored, the higher the rotational speed. The design concept was to trim the horizontally rotating fruit by using an inclined sharp knife at different angles to get the desired contour for the body and shoulder of the fruit. The cutting edge angles of shoulder and body blades ranged between 52 – 56° and 74 – 76° respectively. The most suitable angles of the feeding knives were determined according to the appearance and defect rate of the final trimmed fruit. A single operator was required to perform the trimming operation.

B. Power Supply To Cutting Mechanisms

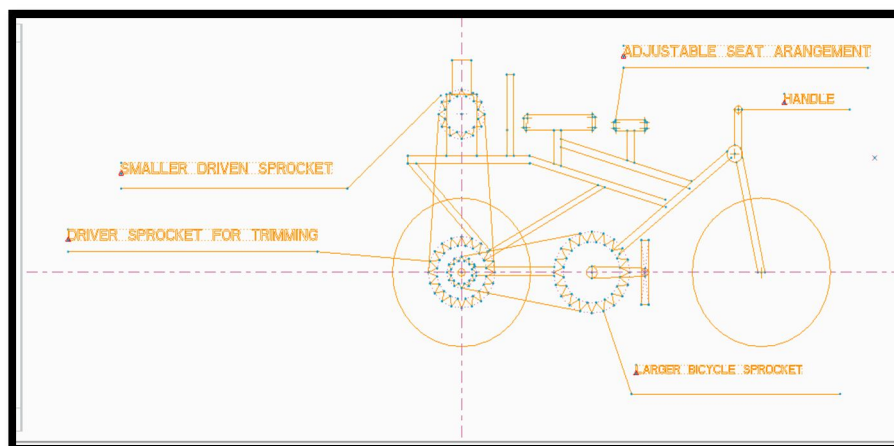


Fig 2: Design of power supply to cutting mechanisms

Pedal power is the energy transfer from a human source through the use of a foot pedal and gear system. This technology is most commonly used for transportation and has been used to propel bicycles for over a hundred years. In this design, the human expended for an average weight man of 70kg (1501b) at a cycling speed range of 16km/h – 24km/h or 233 r.p.m was used and after the analysis the efficiency and human power required to drive the shaft was calculated to be 56% and 1.02hp respectively. The machine is pedal operated and it is supply by the input power by the peddling of the bicycle chain and sprocket drive, the power is then transmitted from sprocket wheel to the rear end i.e. smaller sprocket with the use of chain and sprocket drive. The small sprocket which is acting as a driven for bicycle chain and sprocket drive, the same sprocket will act as the driver for the further green coconut trimming mechanism. Thus, the driven sprocket of the chain and sprocket mechanism of bicycle will drive the driver sprocket for the green coconut trimming mechanism.

V. WORKING PRINCIPLE

As the name suggest, the main aim of the green coconut trimming machine is to remove the outer green husk of the young coconut so that it can be converted into light weight for easy transportation and for extracting water from it by coconut venders. The machine is pedal operated and it is supply by the input power by the peddling of the bicycle chain and sprocket drive, the power is then transmitted from sprocket wheel to the rear end i.e. smaller sprocket with the use of chain and sprocket drive. The small sprocket which is acting as a driven for bicycle chain and sprocket drive, the same sprocket will act as the driver for the further green coconut trimming mechanism. Thus, the driven sprocket of the chain and sprocket mechanism of bicycle will drive the driver sprocket for the green coconut trimming mechanism. Due to this chain and sprocket arrangement in the machine the rpm and speed will get multiplied and the same will be transfer to green coconut trimming mechanism shaft by another chain and sprocket arrangement. The power from chain and sprocket of the bicycle is transfer to the machine shaft of the coconut trimming machine further on which coconut clamping mechanisms is mounted. The green coconut clamping mechanisms is a device which used to clamped the coconut with the help of four number of screw arranged in circular pattern to hold the coconut tightly. From the top of the coconut clammer there is spring loaded bar which is used support the coconut from top which allow to rotated the green coconut axially and trimmed it easily. Then the coconut is placed in clammer, rotates axially and the blades are arranged according to the desired angle and place

to trim the coconut easily and in very attractive shape. After all this trimming process, the base of the coconut is cut by using base cutting knife arrangement.

VI. ADVANTAGES

- A. As the machine is pedal operated, it requires less efforts to trim the coconut
- B. Machine is fully manually operated using bicycle chain sprocket mechanism.
- C. The machine is portable it can be setup anywhere.
- D. As the machine does not require electric power supply, this machine is eco-friendly.

VII. CONCLUSION

The machine must be easy to build and inexpensive if it will be adopted into the community. We recognized this need and designed the machine from the start with low cost in mind. The machine will only contain parts that are readily available in rural areas. For all machine components it uses bicycle parts. The pedal-powered coconut trimming machine is quite different from the community's current method of trimming coconuts; the community may be reluctant to try the new machine. To encourage the adoption of the coconut trimming machine, we will run multiple trials with local coconut vendors so we can adjust the design to meet their needs. We will run the trial periods with groups like the coconut vendor's cooperative who are already familiar with pedal powered machines; they have already proved they are willing to try new technologies. We achieved what we desired i.e. to build a manually driven pedal powered low cost coconut trimming machine using locally available materials and performing necessary function of trimming the coconut with ease. The coconut trimming machine can be used by the urban coconut vendors to workout and exercises. If the production of this coconut trimming machine is done at commercial scale then the total production cost of the machine can be reduced to 40% of estimated cost.

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