

Pedal Powered Grinder

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Abstract:

Now-a-day's pedal powered grinding machine is used only for grinding purpose. Also, it requires lots of efforts and limited for single application use. Another problem in existing model is that it consumed more time and also has lower efficiency. Our aim is to design a human powered grinding machine which can also be used for many purposes like pumping, grinding, washing, cutting, etc. it can carry water to a height 8 meter and produces 4 ampere of electricity in most effective way. The system is also useful for the health conscious work out purpose. The purpose of this technical study is to increase the performance and output capacity of pedal powered grinding machine.

Keywords — Pedal power grinder, Multipurpose, Electricity generation.

I. INTRODUCTION

The multipurpose machine that is 'exercise bicycle' which was basically used for exercising purpose has been modified for grinding, water lifting, washing machine and generation of electricity. The consideration for designing was to grind and used as blender, lift water to the height of 10 meter and to generate 14 volts, 4 ampere of electricity in most efficient way. Source of power utilized for above purpose is pedal power. Selecting 'exercise bicycle' for this application is due to its low cost, availability and design simplicity. The technical problem addressed by the utility model: the prior art, the process is relatively simple, small parts of the object is small grinder, using electric drive is not conducive to energy saving. according to the above technical solution, the operator holds the part to be machined, sit on the seat cushion, two feet on the foot pedal handle and rotate the handle, the handle foot drive shaft rotates, the first drive shaft on which two sprocket rotation, the second sprocket by driving the first drive chain sprocket rotation, the first drive sprocket is rotated in the first rotation of the spindle sleeve, the first rotary drive sleeve is fixed on the disc rotation. Thus, the operator can be in the hands of grinding parts on the disc.

This utility model the human-driven small grinder, the disc drive, the part to be processed feed, are entirely done by hand, not only to save processing costs, and energy saving.

Previous devices and systems have been developed to analyze forces applied by a cyclist on a pedal. Such previous devices and systems have used strain gauges or piezo resistors mounted on a pedal, on other parts of a cycle, or on the shoes or cleats of the cyclist. The previous devices and systems, however, have required extensive calibration and

complicated equipment, and therefore have been limited to use in the laboratory.

II. Literature Review

A. *Manpower-driven small-sized grinder, Yang Jianhua [1]*

The invention discloses a manpower-driven small-sized grinder comprising a frame, a spindle horizontally fixed on the frame, a first rotating sleeve mounted on the spindle through a bearing, a grinding disc, a first sprocket And a manpower drive mechanism. The grinding disc and the first sprocket are fixed on the first rotating sleeve.

B. *Method and apparatus for converting human power to electrical power, Linda Vasilovich, Richard Hilger [2]*

This application is a continuation-in-part of U.S. patent application Ser. No. 11/060,992, attorney docket number PVAS0002US/MRK, entitled "method and apparatus for converting human power to electrical power," filed Feb. 18, 2005, now U.S. Pat. No. 7,253,534 the entire content and disclosure of which is incorporated herein in full by reference as if stated in full herein, which claimed priority to U.S. Provisional Patent Application Ser. No. 60/545,383, attorney docket number PVAS0001/MRK, entitled "method and apparatus for converting human power to electrical power", filed Feb. 18, 2004, the entire disclosure of which is incorporated herein in full by reference as if stated in full herein.

C. *Human powered device with removable flywheel power unit, Cory Dension [3]*

A flywheel power unit that can be inserted into a variety of machines. The standardization of the power unit means that the more expensive gearing, clutch and flywheel components do not have to be duplicated in each human powered machine. Standard bicycle gearing components can be assembled with a modified clutch for a typical motorcycle to create an inexpensive human powered flywheel power unit. As the user pedals, power is stored in the flywheel.

III. Design Methodology

A. Components required:

Bicycle assembly, Stationary shaft, Front wheel, Extension for free wheel, Hopper, Chain drive

B. Material Required:

Material can be selected SS304 for long life however any other Aluminum alloy, Magnesium alloy material also can be preferred with the paint system. Material need to be selected such a way to avoid any corrosion.

C. Design Consideration:

1. The device should be suitable for local manufacturing capabilities.
2. The attachment should employ low-cost materials and manufacturing methods.
3. It should be accessible and affordable by low-income groups, and should fulfill their basic need for mechanical power
4. It should be simple to manufacture, operate, maintain and repair.
5. It should be as multi-purpose as possible, providing power for various agricultural implements and for small machines used in rural industry.
6. It should make use of standard bicycle parts wherever possible.
7. Excessive weight should be avoided, as durability is a prime consideration.

IV. CONSTRUCTION

A. Drive unit:

The transmission of power from human to processing unit is carried out in two stages namely chain drive and belt drive. The operators uses his feet & legs to rotate pedal around the crank axel. The pedals, in turn, are fixed to a chain ring (sprocket) with teeth that engages the bicycle's continuous chain. The chain then transmits the pedaling action to a cog on the hub of the front wheel causing the front sprocket to rotate and then drive the shaft on which pulley is mounted. This is first stage of transmission and in second stage this power is transmitted to stone wheels from pulley with the help of cross belt drive which actuate by pedaling.

B. Processing Unit:

Process unit is the one where actual crushing of wheat kernels take place. This process unit basically consists of stone wheel, hopper & the hemispherical collector. Stone wheels are two rigid chiseled emery stones placed one above the other. The bottom wheel is fixed one & the upper one can rotate about vertical axis. The selection of stone wheels are made in such a way that it should not be too heavy to cause early fatigue to operator but it should be capable of delivering the required fitness of flour at optimum production rate. The provision is also made to enter the wheat kernels inside through the hole at center of upper stone. Hopper is mounted exactly above the stone wheels, in which the wheat to be crushed is collected. Since the intermittent flow is required from hopper to stone wheels and the provision is also made to control the flow of wheat kernels. The hemispherical collector is fixed below the stone wheels where the flour is collected.

C. Chassis assembly:

The utility model provides the following technical solutions: one small human-powered grinder, comprising a frame, a horizontal axis fixed to the frame by means of bearings mounted on the shaft of the first rotating sleeve fixed in the first rotator cuff the first disc and sprocket, rack-mounted in the spindle and flanking the human drive mechanism; centerline of the disc coincides with the center line of the first sprocket and the first rotating sleeve, the human power drive mechanism comprises a bracket, pivoted on the support shaft, the drive shaft is fixed to the second sprocket fixed to the drive shaft at both ends of the foot handle, fixed to the bracket of the seat cushion, the second drive chain sprockets driving the first rotation of the sprocket.

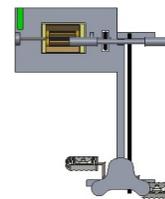


Figure-1 Top view of machine

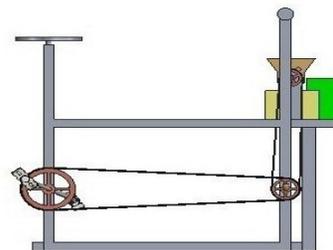


Figure-2 Side view of machine

V. WORKING

A. Component Required:

- Main frame structure- (460cmx200cm)
- 12 ft. (3.7m)--3/4" (20mm) angle, 1/8" (3.2mm) wall thickness
- 8ft. (2.5m)--1/2" (12.5mm) x 3/16" (4.7mm) flat steel.
- 1 - 1" (25mm) x 6" (15.25cm) cold-rolled steel rod for axle extensions.
- 16--1/4" (7mm) x 5/8" (16mm) bolts, nuts, lock washers
- 2 --3/8" (10mm) x 3/4 "(20mm) bolts, washers
- 2 - Extra rear axle nuts which fit the bike to be adapted.
- 1-Big wheel Radius 10 cm

B. Working principle:

The basic principle of operation of "Pedal Operated Flour Mill" is that when a sufficient amount of

Qty.	Materials	Cost
For power generator:		
1	Flywheel or old wheel	325
1	Bike, interchangeable	0
2	Bike gear sprockets, 54-tooth	975
2	Bike sprockets, 12-tooth	650
1	Heavy-duty spring	65
2	Metal dowels steel	65
For the stand:		
2	5 ft. angle iron	1300
1	8 ft.5 inch flat steel	650
20	Various bolts, nuts, washers	390
1	JB weld	455
1	7/16 inch metal drill bolt	390
	Total Cost	5265

power is applied by means of cycling through chain as well as cross belt drive to the conventional stone wheel mechanism, then the upper wheel revolves in a particular direction say clockwise or anticlockwise direction. The frictional force between two wheels is responsible for the grinding. In conventional stone wheel mechanism the intermittent flow is required to get fine output. It consists of Hopper mechanism in which the grains are stored. It is having a flow control unit, which is connected by means of mechanical spring to the left hand brakes. By breaking, the flow may control. The output of the stone wheel mechanism is collected between a hemispherical collectors which is located below the stone wheel mechanism. Fig shows the working of pedal power principle.

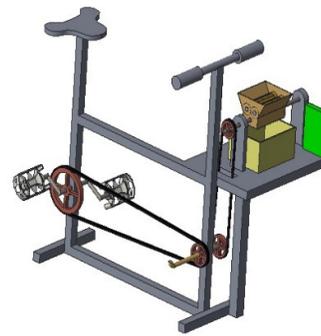


Figure-3 Model of pedal powered machine

C. Working flow diagram:

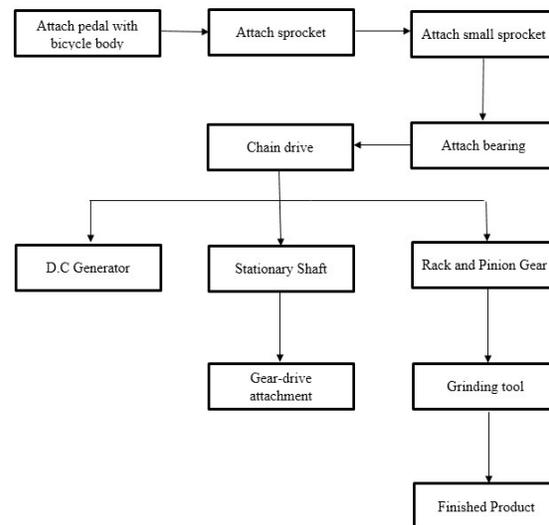


Table 1: Cost Analysis

VI. Result:

- Reduce operator effort and increase efficiency
- Multi field application that is industry, household, agriculture, etc.
- Generation of electricity
- Multi-purpose application that is pumping, grinding, washing, cutting, etc.
- Substantial savings on cost
- Produce no pollution and provide healthy exercise

VII. Conclusion:

We had successfully designed human powered grinding machine which can also be used for many purposes like pumping, grinding, washing, cutting, etc. it can carry water to a height 8 meter and produces 4 ampere of electricity in most effective way. The system is also useful for the health conscious work out purpose. The purpose of this technical study is to increase the

performance and output capacity of pedal powered grinding machine.

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REFERENCES

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