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Design and Working of Pedal Operated Flour Mill

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ABSTRACT

Due to industrial development, use of natural fuel is increasing continuously that's why there is need of alternating source of senergy.
Eg Human energy.

To reduce use of natural fuel we can use bicycle technology to run a machine using human power.

Dynapods (Greek word) for power and foot. Dynapods can be run by one or two person.

We are transmitting rotary motion from paddle to wheel of mill. Human input is low as compare to hand operated machine

Keywords: *industrial devlopement, energy, human energy, bicycle technology, dynapods, rotary motio , pedal operated machine, natural fuel etc*

Introduction

Keeping these limitations of human capabilities in mind the proposed machine consists of three sub systems:

1. The energy unit,
2. Transmission mechanism
3. The process unit.

Paddling power= 4X handling power
If it will be run by ¼ horse power then a person can work for 10 minutes.
If it will be run by 1/8 horse power then a person can work for 60 minutes.
94Watt(.12HP) can be maintained for 60 minutes or more.

DESIGN

Pedal Power

T= 7X9.81X170 =11673.9Nmm
=11.6739Nm
Power= (2X3.14X70X11.6739)/60
=85.53W
Na=70rpm
Ta=44
Nb=?
Tb=18
Na/Nb = Tb/Ta =18/44 =0.409
Nb=171.11rpm

Wheel Design Of Mill

Diameter of cycle's wheel=50.8cm
Diameter of mill's wheel =22cm
Nc=Nb=171.11rpm
Nc/Nd=Db/Dc=50.8/22
Nd=395.10rpm

DESIGN OF CHAIN

Pitch of chain =[2X3.14(Ra+Rb)]/(Ta+Tb)
=[2X3.14X(100+45)]/(44+18)
=14.68mm

Design of V belt
It depends on speed of driving and driven
Power
Center Distance
Speed ratio
Service Condition
Speed Ratio=Nd/Nc=395.1/171.11=2.309
According to this speed ratio
Diameter Factor =1.13(Design data book)
Equibalent dia=220X1.13=248.6mm
Based on this we select belt cross section

V=3.14XDdXNd/60= 3.14X220X395.1/60
=4.548m/sec

Power transmission capacity

$N^*=v(1.47/v^{0.09}-143.27/De-2.34v^2/10^4)$
=3.1917KW
Based on these factor V belt of 'C' type.
Upper width=22mm
Thickness=14mm
T=torque
Na=rotational speed of larger spoket
Nb= rotational speed of smaller spoket
Nc= rotational speed of rare wheel
Nd= rotational speed of wheel of mill
Ta=teeth on larger spoket
Tb= teeth on smaller spoket

Working concept and Model

In conventional stone wheel mechanism the intermittent flow is required to get fine output. The same type of arrangements of flow is made in Pedal operated flour mill.

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.

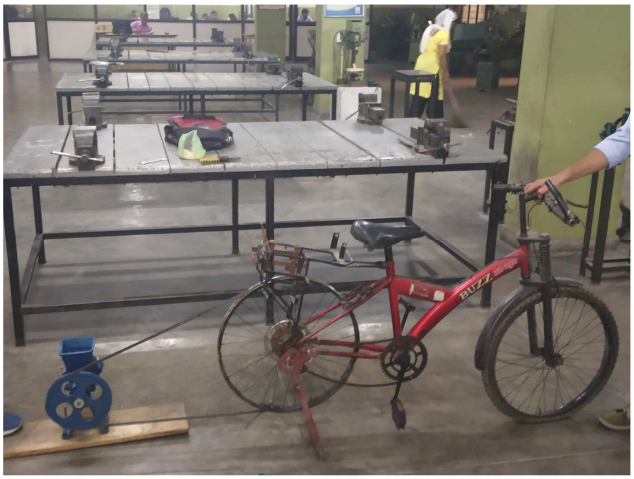
By breaking, the flow may control. The output of the stone wheel mechanism is collected between a hemispherical collector which is located below the stone wheel mechanism. The energy unit basically consists of conventional bicycle mechanism; the transmission mechanism consists of chain drive running over a pair of sprockets and belt drive running over pulley and stone wheels

The process unit is a pair of stone wheels mounted over one another where the wheat gets crushed into powered form to produce wheat flour. All these units are assembled on bicycle like structure (seat , saddle, handle etc).

Drive unit:

This is first stage of transmission. 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.

1-Front Chain Sprocket, 2-Pedal ,3-Chain ,4-Rear chain sprocket 5-Bearings for belt drive shaft , 7-CrossV Belt, 8-Stonewheels



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