

“Pedal Operated High Speed Wood Cutter with Chain Sprocket Mechanism”

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Abstract - The Pedal Powered Cutter Machine is a device which is used for cutting wood, plastic and metals. The basic principle of this machine is slider crank mechanism, which is an inversion of four bar mechanism. The concept of this mechanism is that the rotary motion is used to cut the wood. The mechanism has four links connected to form sliding pair. Thus when one link is moved along the circumference of the circle, the final link will generate the sliding movement for cutting process.

The objective of this paper was to design, fabricate and experimentally investigate the working of High Speed Wood Cutter (HSWD). HSWD is working on Slider Crank Mechanism. The experiment was done using HSWD and plywood work pieces. The main parts of HSWD are hack saw, reciprocating rod welded to the pedal of a bicycle, flywheel, sprocket and chain drive. The hack saw is connected with the reciprocating rod. By pedaling the bicycle the reciprocating rod moves to and fro, the hack saw will be moving with the rod. The plywood to be cut is placed under the hack saw. Thus the plywood can be cut without any external energy like fuel or current. Since this uses no electric power and fuel, this is very cheap and best. The performance of the HSWD was compared with Hand Cutter at different rpm. The results indicate that the HSWD had given better, accurate and faster cuts when compared with hand cutter at different rpm. HSWD reduces the effort of cutting plywood to a great extent. When compared to the Power Saw the HSWD requires only manual power thereby reducing the utility bill considerably. Experimental result shows that cutting depth of about 17 mm can be obtained in one cycle of strokes for around 100rpm.

We have firstly invented and made this “High Speed wood cutter” with new technique and new facility of increasing RPM that means there is less effort but the gained output is more than the provided input of pedal by driving it. This will minimize the effort required and also the time required. The RPM increased in shown by the chart given in this report by pedal rotations vs. cutter rotations.

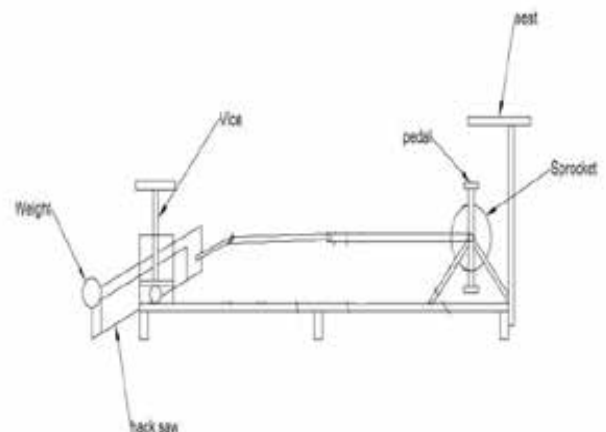
We consider it a great privilege to express our heartfelt gratitude to many respected personalities who have guided, inspired, and helped us in the successful completion of this project. First and foremost, we express our thanks to God almighty for guiding us in this endeavor and making it is success.

Key Words: The main parts of HSWD are hack saw, reciprocating rod welded to the pedal of a bicycle, flywheel, sprocket and chain drive

1. INTRODUCTION

The High Speed Wood Cutter(HSWD) is working on chain Crank Mechanism. The HSWD is used to cut ply wood in small scales. HSWD helps to obtain a less effort uniform cutting. It can be used in places where electricity is not available. It is designed as a portable one which can be used for cutting in various places. The main parts of HSWD are hack saw, reciprocating rod welded to the pedal of a bicycle, flywheel, sprocket and chain drive. The hack saw is connected with the reciprocating rod. By pedaling the bicycle the reciprocating rod moves to and fro, the hack saw will be moving with the rod. The plywood to be cut is placed under the hack saw on a work piece holder. Thus the plywood can be cut without any external energy like fuel or current. Since this uses no electric power and fuel, this is very cheap and best.

1.1 Types Pedal Operated Wood Cutter



1.2 Pedal operated wood cutter with rotating cutter:



2. List of Components

Chain Sprocket:- The chain sprocket consists of a chain, a small sprocket, and a bigger gear. The smaller sprocket in this chain sprocket has 10 teeth and the bigger one has 40 teeth. The diameter of the bigger sprocket is 18 cm and the smaller one is 9 cm. The length of the chain is varying.

Angle plate :- the angle plate used in this High Speed Wood Cutter is 1.5 inch. The two pieces of the angles are used to make the frame of the project.

Pedestal Bearing :- These bearings are used to support the shaft. These are of internal diameter 20 mm and made up of cast iron.

Polish Bar:- These are used to support chain sprocket. These are made up of mild steel.

Nut and bolt :- These are used to joint to the pedestal bearing. It is made up of mild steel.

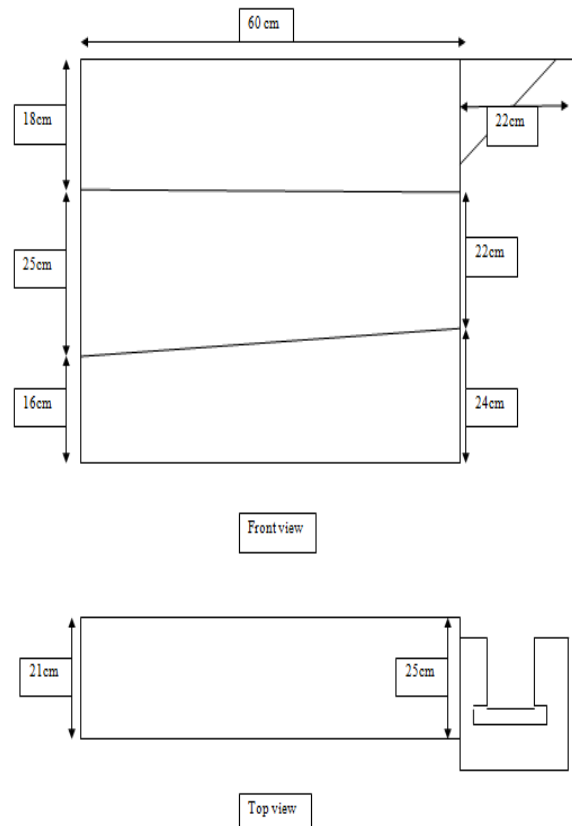
Pedal: - It is used to give input to shaft. It converts the manual power into rotary motion.

Helical Cutter: - It is made up of cast iron. It is used to cut the wood. It has a sharpened tooth having a diameter of 135 mm. It is located at the top of HSWC.

Sheet Metal:- It is used for placing wood to be cut.

3. Stepwise Procedure of High Speed Wood Cutter

1. Construction of Frame:-



The main part of this project is the angle frame, this made as shown in the above figure. The angle frame is mainly constructed by the Raut Shrinivas, and shortly welded by Ajay Potdar by arc welding. The upper figure shows the front view of the project and below that shows top view of the project. The dimensions are given in the above figure, as per above dimensions the angle frame of High Speed Wood Cutter is constructed.

2. Fitting of the Shafts into the Pedestal Bearings:-

This is the next step; the angle frame is drilled at suitable places by Ajay Potdar by electric drilling machine in workshop of institute. Then the bearings are located and fitted by Krishna Tigile at the drilled places with the help of nut and bolt. The next step to that is fittings of the polish bar or shafts in the pedestal bearing. This is also done by Krishna Tigile. We have failed in the first time during the making of the High Speed Wood Cutter, but second time it is successful.

3. Arranging of Chain sprocket:-

Next step to that is, fitting the chain sprocket into the pedestal bearing and this is successfully done by Somesh Patil. The lower gears are at 15° to the vertical angle frame as the angle is fitted at 15°. This is the main part of the project.

High Speed Wood Cutter because the whole power is transmitted by these chain sprockets.

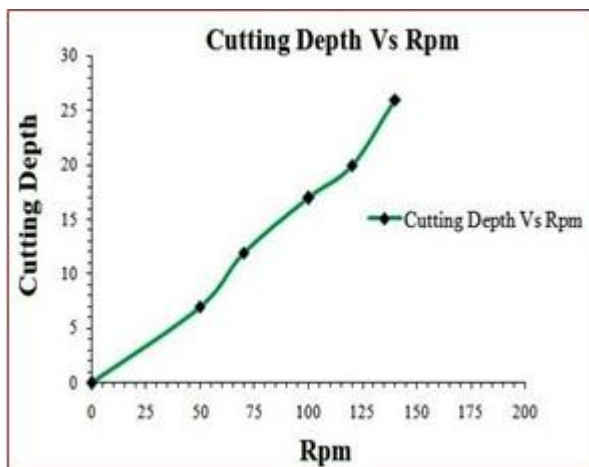
4. Assembling of different Parts:-

The last step regarding to this project is assembly of different parts. This is done by all us four. This step includes assembly of the sheet metal, helical cutter, pedal rod, pedals, nut bolts at different places. Like this we have completed the project. The cycle frame is fixed with the base mild steel by the process of welding the chain sprocket is connected to the cycle frame and it is connected to the pedals. The one end of the chain is connected to the big sprocket and the other end is connected to the small sprocket which is held in a chain hub. The other end of the hub is fixed with the small chain sprocket. From the other End of the hub another chain is connected to the sprocket and other end is connected to another small sprocket which is held with the circular rod and bearing setup. The circular rod is inserted into the bearing and is welded with the sprocket at one end and with rotating disc at the other end. The connecting rod is connected to the rotating gear at one end and to the rotary cutter at the other top end.

4. INFORMATIVE CHARTS

4.1 Cutting Depth Vs RPM:

Figure shows the variation of cutting depth with rpm of HSWD. It is observed that the cutting depth increases with the pedal rpm. Experimental result shows cutting depth of about 17 mm can be obtained in one cycle of strokes for around 100rpm. The variation in the obtained plot is due to errors in observation and due to power transmission losses.



5. Advantages

1. No need of electricity.
2. Less effort required to cut the same wood.
3. No need of skilled worker.
4. Time required to cut the wood is less.
5. Simple in construction and working.

6. Requires very less maintenance.
7. Requires less space and can be placed anywhere in workshop.
8. Capital investment is very small.
9. Motor can be attached to the wood cutter.

5.1 Disadvantages

1. Creates noise during cutting of the wood.
2. The required Cutting force for some wood is more so sometimes the effort required to cut this type of wood is also more.
3. It requires more and good lubrication.
4. Backlash in chains or /*s can occur.

6. Applications

1. Can be used to cut the small as well as large piece of wood.
2. Can be used to cut the wood where electricity is not present.
3. Time required is less so can be used to cut more numbers of wood pieces.

7. Conclusions

1. Thus the High Speed Wood Cutter is designed tested successfully. The output is verified by cutting the metal pipes, plastics in the cutter by pedaling action. The following advantages were seen such as it is more convenient and easier. It is more eco-friendly. Power is not required.
2. HSWD can be used for light duty cutting operations of plywood.
3. HSWD can be used in remote places where electricity is not available. It is designed as a portable one which can be used for cutting in various places.
4. The ply wood can be cut without any external energy like fuel or current. Since HSWD uses no electric power and fuel, this is very cheap and best.
5. High Speed Wood Cutter helps to obtain less effort uniform cutting. The results indicate that the HSWD had given better, accurate and faster cuts when compared with hand cutter at different rpm.

8. References

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