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MULTI-PURPOSE HACKSAW MACHINE

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ABSTRACT

The manuals & electrical operated machine is design for cutting process. Hacksaw cutting process is simple cutting is slide over the Work piece It works on slider crank mechanism in which pedal is rotating & hacksaw is reciprocating with the help of connecting rod. In manual pirated human energy is required. When we start pedaling hacksaw is slide over Work piece. In this way manually cutting operation is done. In case of electrically operated motor & electrical energy is required to run the machine. The motor having more number of R.P.M with less torque. We use the chain & sprocket mechanism to increase torque & reduced R.P.M of the machine. Through that arrangement required cutting speed of hacksaw can be achieved.

INTRODUCTION

In Multipurpose hacksaw machine the cutting process is carried out in such a way that the pedal is rotates in angular motion and causes the hacksaw to reciprocate in linear direction. In half revolution of pedal forward stroke is completed and in another half revolution return stroke is completed .The displacement of hacksaw is equal to the twice of length of pedal. The cycle is fixed on base like having some inclination with horizontal surface. The ground clearance is from the pedal is 15cm .At the front end of the cycle the vice is fixed on the table to hold the work piece . The electrical motor is placed at the rear end. In this two sprockets and one chains are required The sprocket A having 16 teeth is joined t the output shaft of the motor and it is connected to big sprocket having 40 number of teeth with the help of chain at the pedal end .This big sprocketdrive the pedal. Due to sprocket arrangement R.P.M. of motor is reduced in velocity ratio of 0.3. The R.P.M. of motor is reduced by the regulator up to 300. Then this R.P.M. is reduced to 90 by the chain and sprocket arrangement. The hacksaw is connected to the pedal through connecting rod. When pedal is operated by human energy the sprocket should be rotate freely on the motor shaft. Therefore human energy is utilized to reciprocate the hacksaw only..The pedal rotates with big sprocket and the hacksaw is slide over the work piece. In this way cutting operation is done. By increasing the weight of hacksaw force is applied on the work piece and the work piece is cut. By the addition of weight time required for cutting is reduced i.e. cutting speed is directly proportional to weight on work piece.
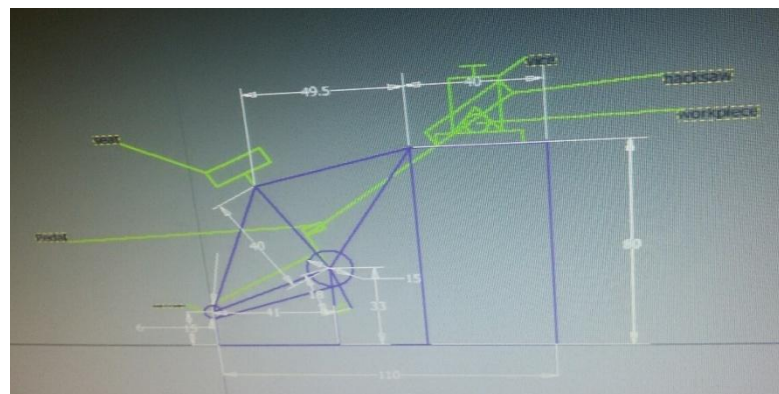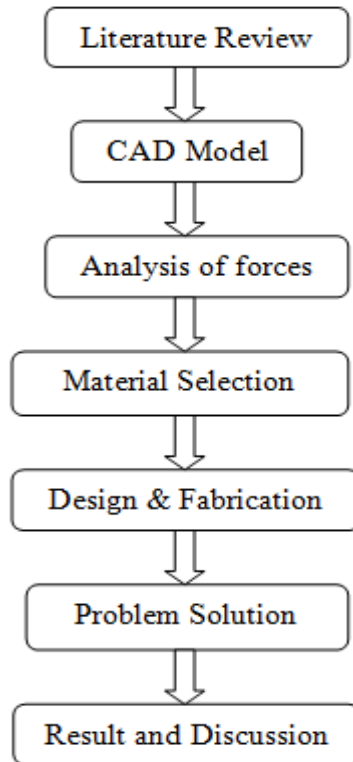
MODELING

Fig 1 :Multipurpose hacksaw machine

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METHODOLOGY

FORMULAE

Velocity Ratio = No. of teeth of driving / no. of teeth driven

$$P = 2\pi NT / 60$$

where : P = power in watt
    T = torque in N-m
    N = No. of rpm

$$T = F\,r$$

Where: F = Force in N
    r = Radius of pedal

$$V = \omega\, r$$

Where, ω=angular velocity
r= radius
    V= linear velocity

MATHMATICAL MODELING

Velocity Ratio of sprocket =NO. ofteeth n small sprocket\NO. of teeth on big sprocket
V.R= 12\40
    =0.3
Initial R.P.M * V.R. = Final R.P.M.
300*0.3 = 90
P=2πNT / 60
10=2π*300*T/60
T=31.83 N-cm
T=F*r

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F=T/r
 =31.83/18
F=1.76 N

TABLES

Table 1: Magnitude of parameters

Sr. No	Parameter	value
1.	Initial RPM	300
2.	Final RPM	90
3.	power	10W
4.	torque	106.10 N-cm
5.	force	5.90N
6.	angular velocity	90 rpm
7.	linear velocity	1620cm/m

FUTURE SCOPE
It can be used as a compressor. Itcan used for filling air in tiers. It can used as pump. It is used to blow the balloon.

RESULTS AND DISCUSSION
The machine was tested for three different materials like mild steel pipes, wood and plastic pipes.The material of mild steel is required less time for cutting in case of electrical energy as compare to human energy. To apply cutting force weight of hacksaw is increased.

CONCLUSION
We have optional energy source to perform cutting operation. This machine reduced the human effort .Because in earlier day we required two people for the same work. The cutting surface is perfectly vertical without any inclination.

ACKNOWLEDGEMENTS

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