

Thermocol Cutter based on Beam Engine Mechanism

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ABSTRACT

Beam Engine is a type of steam engine where a pivoted overhead beam is used to apply the force from a vertical piston to a vertical connecting rod. It is basically a link mechanism that converts rotary motion of crank into linear straight line motion of vertical sliding link that in practice is used in pumps and other purposes. Beam engine and water bucket pumps were introduced in Wanlockhead in 1745. It was used to draw out water from mines as well as to dispose water into canals. The engine consisted of a large wooden frame into which a pivoted overhead beam was used to apply force generated by a pump rod and transfer that movement to a vertical piston. This mechanics was mostly used in steam engines but now a day it is used in water pumps, oil rigs, specifically designed sawing machine etc. So, here we are using this mechanism to make a specifically designed saw which is used in cutting thermocol. This cutter cuts the thermocol when placed on its platform which has a hole through which the blade is passed.

Keywords: *Beam Engine, Rotational Motion, Simple Harmonic Motion, Piston, Cylinder.*

I.INTRODUCTION

A beam engine is a type of engine where a pivoted top beam is used to apply force from a vertical piston to a vertical connecting rod. This configuration, with the engine directly driving a pump, was first used by Thomas Newcomen around 1705 to remove water from the mines in Cornwall. The efficiency of the engines was improved by engineers, including James Watt, who added a separate condenser, Jonathan Hornblower and Arthur Woolf who composed the cylinder and William McNaught (Glasgow) who devised a method to combine an existing engine. Beam engines were used to pump water from mines or into the canals, but they could be used to pump water to supplement the flow of a waterwheel powering a mill. The rotating beam motor is a rear beam motor design where the connecting rod drives a flywheel, by the means of a crank (or, planetary gear). These beam motors could be used to directly feed the line shaft in a mill. They could also be used to power steam boats.

II.MATERIAL USED

- Vertical piston
- Cylinder
- Platform(for cylinder)
- Cranks
- Ball bearings
- Base
- Stand
- Horizontal level
- Two vertical rods
- Nuts and bolts
- Cutter or Blade

III.WORKING

The rotational motion of the motor is converted into the translational motion of the rod A in the vertical upward direction. The other end of rod A is attached to a lever which reciprocates the translational motion of rod A to its other end, where it is attached to rod B.

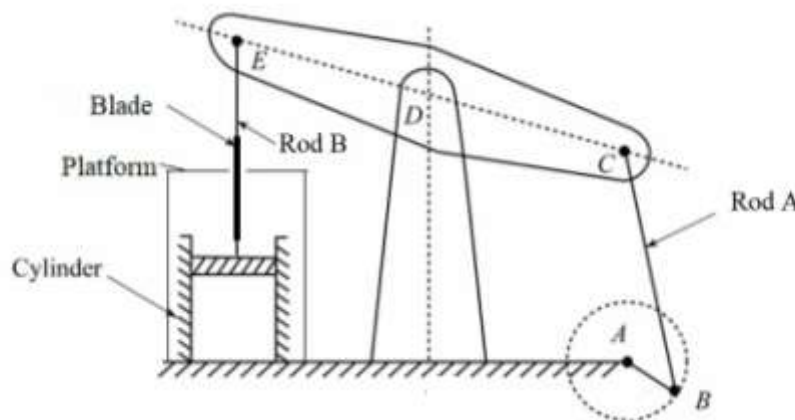


Fig.1 Schematic diagram of Beam Engine Mechanism

Rod B gets set into translational motion in the vertically downward direction and then it is then reciprocated back to the lever with help of Piston-cylinder mechanism. Due to this piston- cylinder mechanism the motion of rod B is feasible in both upward and downward vertical direction.

A blade is bolted to rod B which acts as a cutter due to the translational motion of the rod.

The thermocol block/ material to be cut is then introduced towards the cutter which is then cut with ease.

IV.ADVANTAGES

- Used to precisely cut thermocol especially for mass production.
- Less manual efforts are needed.
- Carried anywhere easily due to low weight.
- Low consumption of energy, cost efficient.
- Compact structure hence, can be placed and used anywhere.
- Low maintenance cost.

V.CONCLUSION

With this cutter materials like thermocol or materials with good machinability can be cut with ease with low manual and power input, which is economical.

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