

Crank and Lever Reciprocating Mechanism Them College of Engineering University of Mumbai, Mumbai

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Abstract— This paper deals with the analysis of crank and slotted mechanism that converts rotary motion into reciprocating motion at different rate for its working stroke and return stroke. A CAD model of synthesized link lengths has been prepared to simulate the mechanism and to specify the accurate path of the mechanism which would provide the actual position of the slider against the crank rotation. Software package will be helpful for manufacturing industries to get accurate performance in minimum manufacturing cost. Software also provides the optimized scheme of tolerance for desired permissible variation in output. In this mechanism we are using spraying pump as an application. With help of spraying pump we can wash any car. It reduces human effort. As we know spraying pump can be used in various industries. We can also use it for spraying water to the flower. The mechanism is fully made of mild steel. The quick return mechanism is broadly used in manufacturing industries, like slotted link shaper machine, such type of machine sustain varying load during the manufacturing the job. We have studied static and dynamic force behaviour of the entire mechanism of particular machine. Our project is concerning to the study of kinematic motion with the help of the Whitworth quick return mechanism. The objective of the project is to investigate the performance of a Crank and lever reciprocating mechanism and to verify that the motion does have a quick return stroke and a slow forward stroke with additionally attaching spraying pump. Additionally the increase in efficiency of the system mechanism is also determined.

Key words: Lever Reciprocating Mechanism, Spraying Pump

I. INTRODUCTION

The Crank and lever reciprocating mechanism has been modified and used for constructing high velocity impacting press. The Crank and lever reciprocating mechanism is a mechanism able to transform circular movement into reciprocating movement. In this project we are using Spraying Pump as an application. The objective of the project is to verify that the motion does have a quick return stroke and a slow forward stroke. Additionally the increase in efficiency of the system mechanism is also determined. It improves machining productivity.

II. ELECTRONIC CONNECTIONS WITH SPECIFICATIONS:

The major components of this apparatus are the Motor, quick return links (crank, connecting rod, fixed link)

A. Motor:

The motor is a constant speed type that derives power from the electrical source. The motor has a provision to be driven at different constant speeds. The motor is coupled with the rotating disc.

The main advantages or specification of using 12 V DC Motor is as follows:

- It is light in weight.
- 30kg load carrying capacity.
- Input speed = 3000 rpm
- Output speed = 40 rpm
- Stealth looking.
- Cheap purchase price.

B. Adaptor:

- Supply Voltage :- 230V AC
- Output Voltage :- 12V DC
- Current :- 7 Amp

It is used to drive the Motor.

It is used to convert AC voltage into DC voltage.

C. Quick Return Links:

The various links are assembled and are driven by the motor at various speeds. In this apparatus the crank radius can change for 4 different position of crank. For this various crank radius the quick return ratio is calculated.

III. CONSTRUCTION

Base table is made of rectangular shape and has proper support to base to avoid vibration. It consist of a Connecting Rod, Slider, disc, Gear box Motor, tachometer, spraying pump etc. Motor is attached to rotary disc. Motor uses electricity and a magnetic field to produce torque, which cause it to turn. Spraying pump is attached to the slider. Crank and lever reciprocating Mechanism are used in machine tool such as Shapers and power driven saw.

IV. WORKING

In this mechanism, there is a input power supply of 230V AC. This is reduced to 12V DC. This is achieving with the help of reduction transformer (Adaptor). Once this power is giving to the DC motor it revolves to 40 rpm with the help of reduction gear box. Therefore, Speed is reduced to 40rpm. DC motor is connected to gear box which is directly connected to the pillow block bearing. This type of bearing is used in light duty applications. Then this bearing is connected to the wheel with proper shaft. In this mechanism, there are 2 links. 1st link is connected rod and 2nd link is slider.

In 1st link, there are two holes. 1st hole is directly engaged with the wheel and 2nd hole is engaged with the slider (2nd link). Both the links are connected to each other with the help of Rivet. The connecting rod converts the rotary motion into reciprocating motion of slider which is directly connected to the piston of spraying pump. There is certain amount (around 1 liter) of water in the bottle. The purpose of this machine is to spray the water in desired

direction having uniform deposition on this sub-straight. Therefore the pressure is created into the bottle. This pressurized water is then used for spraying with the help of

nozzle. And can be used for different application as shown in below fig.(A)



Fig. 1: Crank and Lever Reciprocating Mechanism

V. CONCLUSION

As a conclusion, it is confirm that the quick return motion may increase the efficiency of the machine. This is because; the time taken for the slider to return to its initial position is less than the time taken for the slider to accomplish the cutting operation with the same distance.

From this experiment, the purpose of this machine is to spray the water in desired direction having uniform deposition on this sub-straight.

Finally, the aid of this project has demonstrated to the difference of rotation angle for cutting and returning strokes that may increase the efficiency of machine.

REFERENCES

- [1] International Journal of Engineering and Innovative Technology (IJEIT) Volume 2, Issue 11, May 2013.
- [2] Oldham-Coupling Second-Harmonic Balancer,” Journal of Mechanisms, Transmissions, and Automation in Design, Vol. 106, No. 3, pp. 28–2–1984.
- [3] Dwivedi, S.N., “Application of a Whitworth Quick Return Mechanism For High Velocity Impacting Press,” Mechanism and Machine Theory, Vol. 19, pp. 51–59, 1984.
- [4] Harry H Cheng (2004), “Computer-Aided Mechanism Design”, Journal of Mechanical Engineering Science, Vol. 220, March 14.