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## **AUTOMATIC BABY CRADLE SWING MACHINE USING FOUR BAR MECHANISM**

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### **ABSTRACT**

*Cradle is used for baby's sleeping. Manually we have to swing the cradle till baby getting sleep. So manpower is required to swing the cradle. To overcome this problem automatic cradle swinging machine was fabricated and arc welding process was used to join the square steel and four bar mechanism was used to convert from rotary motion to longitudinal motion. The purpose of this product is to swing the baby's cradle automatically with electrical assistance. The input electrical energy is converted into useful mechanical energy. Selected high torque and low speed motor (wiper motor). Wiper motor is used for generating the rotary motion. One end of the chain sprocket is connected with motor shaft and another one end is connected with crank for transmit the motion to crank without noise. Switch mode power supply (SMPS) is used for providing efficient power supply to motor.*

**KEYWORDS:** *Four Bar Mechanism, Manufacturing Process, Wiper Motor, Chain Sprocket.*

**1. INTRODUCTION**

In early year, need of man power was very important to swing the cradle as well as at that time no technology development [1]. In current world, parents always busy because of many works in home and office. That’s why they could not consider the take care of baby. So automatic baby cradle swing machine is required for take care of baby [2]. Preference gives to automation mechanism for making automatic baby swing machine and reducing the man power [3]. Mostly wiper motor (D.C motor) was selected because it has low speed and high torque. Possible mechanism to obtain the oscillation such as pendulum, four bar mechanism, and slider crank mechanism. Now a day, many electronics devices are using for providing automatic motion to cradle [4]. Cry recogniser was proposed for sensing the baby crying voice. Sensor starts to sense when baby is crying. Then cradle is swinging

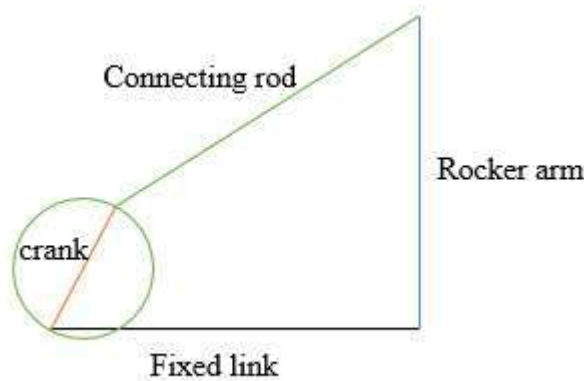
automatically. After stop the cry, motion of cradle will be stop automatically [5].

In our work, automatic motion was achieved using four bar mechanism but did not use any sensor. In future, different kind of sensors will be used for further development.

**2. MECHANISM INVOLVED**

Fig 1 is an image of Four bar mechanism and this mechanism comprises four different length link. Grashof’s law is used for checking whether relative motion is possible or not. Smallest link length (S), Largest link length (L), Sum of remaining two link length (P + Q). Grashof’s law is satisfied by choosing proper links length as well as relative motion also achieved.

$$S + L < P + Q \text{ (Grashof's law)}$$



- Fixed link length = 150 mm
- Crank length = 50 mm
- Connecting rod length = 300 mm
- Rocker arm length = 350 mm

Fig 1: Four Bar Mechanism

**3. EQUIPMENTS DESCRIPTION**

**Wiper Motor:** Wiper motor was selected because of it has high torque and low speed. Wiper motor is used to convert electrical energy into

mechanical work. Image of the wiper motor is shown in fig 2. It is very compact and produce very less noise.

**Table: 2**

Voltage	12 V
Torque	28 Nm
Working speed	40 rpm
Working current	4.5 A
Working noise	50 dB



**Fig: 2 wiper motor**

**Switch Mode Power Supply (SMPS):** Switch mode power supply (also known as switching mode power supply or switched power supply or switcher)

is an electronic device and regulate the efficient power supply. In this work, Use of SMPS is for giving efficient power supply to motor.



**Fig: 3 Switch Mode Power Supply**

**Chain Sprocket:** To transmit the rotary motion from motor to crank without any noise.

chain sprocket is assembled to the shaft and is fixed using welding process. From the secondary sprocket, crank has been welded and is made to rotate along its axis. The connecting rod made of steel is welded to the crank and it moves relatively to the crank. The rocker arm which oscillates is welded to the base with two bearing that holds it. Number of holes has been drilled in the rocker arm to adjust the height of the rocker arm with respect to the height of the cradle. The holder which holds the cradle is welded to the rocker arm.

#### **4. MANUFACTURING PROCESSES AND WORKING PROCEDURE**

##### **Manufacturing Processes**

The base of the product has been made of square steel by arc welding process. The two shafts required to hold the sprockets are supported using bearings and the bearing holder which holds it has been aligned regularly and is welded to the base. The



**Fig 4: Automatic Cradle Swing Machine**

**Parts name**

- |                   |                             |
|-------------------|-----------------------------|
| 1. Base           | 6. Chain sprocket           |
| 2. Rocker arm     | 7. Wiper motor              |
| 3. Cradle holder  | 8. Bearing                  |
| 4. Connecting rod | 9. Switch mode power supply |
| 5. Bearing        | 10. Crank                   |

**Working Procedure**

The motor starts rotating when the power supply is turned on. one end of the chain sprocket is connected with motor shaft and another one end is connected with crank. So use of Chain sprocket is for transmitting the rotary motion from motor to crank. when the crank starts rotating the connecting rod also moves relatively. This relative motion is converted into oscillating motion of the rocker arm. The rocker arm is connected with the link which connects the cradle holder.

**FUTURE WORK**

In future it has been planned to place a Voice Recognition Sensor(VRS). Which gets input signal as the baby cries and signals the motor to rotate and go on with the proceeding.

**5. CONCLUSIONS**

This system emphasizes the importance of child care. The above designed system is economical and user friendly and very useful for working parents. So parents can manage their work

efficiently. With the development of this technology, day to day work has been eased for parents along with baby care. Otherwise, mother’s lap would be best cradle for baby.

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