

Design and Fabrication of Industrial Conveyor Using Crank Mechanism

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ABSTRACT: This machine is basically works on the principle of Single Slider Crank Mechanism which is the heart of this machine and it converts rotary motion into a reciprocating motion. Here Fabricated the conveyor using crank mechanism machine, this project can be utilized in industry. This machine makes use of transfer the product from one place to another place with the help of conveyor, the conveyor rotation is based on the crank mechanism. This project deals with the industrial products are moving from one place to another place in timing by using crank mechanism.

KEYWORDS: Crank mechanism, inertia force balance, Material handling.

1 INTRODUCTION

There has been a serious demand for intermittent movement of packages in the industries right from the start. Though the continuous movement is more or less important in the same field the sporadic motion has become essential .The objective of our project is to produce a mechanism that delivers this stop and move motion using mechanical linkages. The advantage of our system over the conveyor system is that the system has a time delay between moving packages and this delay can be used to introduce any alterations in the package or move the package for any other purpose and likewise. While in conveyor system such actions cannot be performed unless programmed module is used to produce intermittent stopping of the belt which basically is costly. The prototype design requires electric motor, shafts and the frame of which the frame and platform on which the packages are moved is fabricated. All the links are being made of Aluminium which reduces the weight of the whole system including the head which has a direct contact with the boxes being moved. The system is expected to move as heavy packages as 2 to 3kgs approximately.

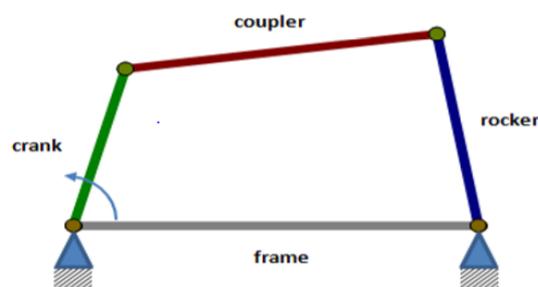


Fig.1.1 Four bar linkage

This machine is basically works on the principle of Single Slider Crank Mechanism which is the heart of this machine and it converts rotary motion into a reciprocating machine to crush the Cans/Plastic bottles

1.1 WORKING PRINCIPLE

In this machine can comfortable for moving the product from one place to another place with safely. The machine is placed and working process is very easy for using persons. In this machine , the control unit is control the motor drive for rotation of the crank shaft .The motor is placed and the crank shaft is attached with the motor with the help of bearing. The products are safely placed in the stored place and then motor is ON ,

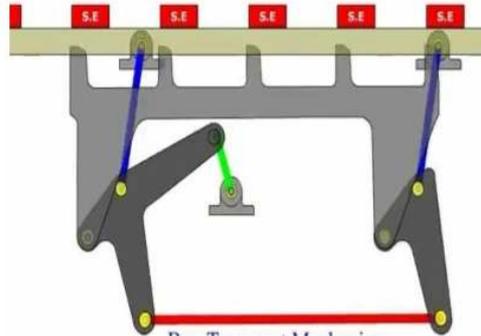


Fig.1.2 Four bar linkage

the crank is rotated and the first box is move from first place to second place in the first rotation , after that the second box is placed in the first position , the second rotation is started the first box is move from second place to third place , in the mean time the second box is move from first place to second place . In this based the boxes are move from one place to another place simultaneously .The products are safely transfer from one place to another in conveyor using crank mechanism.

2 EXPERIMENTAL SETUP

2.1 SELECTION OF MATERIALS

1. Linkages
2. Dc motor
3. Dc battery
4. Steel Frame

The design and fabrication of box shifting mechanism constructed by various components such as hylem board, dc wiper motor, dc battery, steel stand and wooden pieces. In this steel frame build by using rectangular hollow pipes and steel rods these are connected by welding operation. The hylem boards are cut by using cutting operation. The dc wiper motor fitted on the frame by using bolt and nut joint. Power supply given from the dc battery (12volts and 7amps) through copper wires.

1. Linkages

A mechanical linkage is an assembly of bodies connected to manage forces and movement. The movement of a body, or link, is studied using geometry so the link is considered to be rigid. The connections between links are modeled as providing ideal movement, pure rotation or sliding for example, and are called joints.

A linkage modeled as a network of rigid links and ideal joints is called a kinematic chain. Linkages may be constructed from open chains, closed chains, or a combination of open and closed chains. Each link in a chain is connected by a joint to one or more other links. Thus, a kinematic chain can be modeled as a graph in which the links are paths and the joints are vertices, which is called a linkage graph.

The movement of an ideal joint is generally associated with a subgroup of the group of Euclidean displacements. The number of parameters in the subgroup is called the degrees of freedom (DOF) of the joint. Mechanical linkages are usually designed to transform a given input force and movement into a desired output force and movement.

The ratio of the output force to the input force is known as the mechanical of the linkage, while the ratio of the input speed to the output speed is known as the speed ratio. The speed ratio and mechanical advantage are defined so they yield the same number in an ideal linkage.

2. Dc motor

A windscreen wiper or windshield wiper is a device used to remove rain and debris from a windscreen or windshield. Almost all motor vehicles, including trains, watercraft and some aircraft, are equipped with such wipers, which are usually a legal requirement. A wiper generally consists of an arm, pivoting at one end and with a long rubber blade attached to the other.

The blade is swung back and forth over the glass, pushing water from its surface. The speed is normally adjustable, with several continuous speeds and often one or more "intermittent" settings. Most automobiles use two synchronized radial type arms, while many commercial vehicles use one or more pantograph arms.

3. Dc battery

A battery is a device that can create electricity using a chemical reaction. It converts energy stored in molecules inside the battery into electricity. They produce direct current (DC) electricity (electricity that flows in one direction, and does not switch back and forth). Using the electricity from an outlet in a house or building is cheaper and uses less energy, but a battery can provide electricity in areas that do not have electric power distribution. It is also useful for things that moved around and cords would get in the way.

4. Steel Frame

Steel frame is a building technique with a "skeleton frame" of vertical steel columns and horizontal I-beams, constructed in a rectangular grid to support the floors, roof and walls of a building which are all attached to the frame. The development of this technique made the construction of the skyscraper possible.



Fig.2.1 Four bar linkage

2.2 PROCEDURE

- First of all we have prepared the drawing for the machine transporter machine.
- Then we make the measurement for the bed of the box transport machine.
- We took the iron angles and cut them in the given measurements using the cutting machine.
- Then we took that pieces and weld them in the prepared shaped drawing.
- After making the welding of the iron angles bed for the machine was ready.
- Then we took the mild steel plate and then taking the measurement of box transport machine we cut the pieces in the given length.
- After cutting the plate in the given size we put it in the lathe machine for giving it the shape of shaft as shown in the figure 7, 8. We also prepared the hanger and crank using the lathe machine as per of dimension as shown in figure 9.

- After preparing the shaft, hanger and crank we take it over the drill machine to make the holes in them as the given dimension in the drawing.
- After this we had prepared the shaft which is going move the boxes to the next level with using it edges on the top of it. We cut the mild sheet plate in the given dimensions and then edges also, after cutting we make the welding to attach these edges with the plate on the given distance dimensions. Then with the help of file we rub these welding points to give them a good look.
- Now all of the things for the machine are prepared.
- On this step we took the electric motor and fix that on the bed of the machine on the given place.
- After fixing the motor we fixed the crank with it from one side and other side was attached to the shaft 1 as shown in the fig 6.
- Then we took the hanger link and attach it with the shaft 1, while the other edge of the hanger link is attached to the shaft 2, fig 7.
- Then both of the shafts were attached to the transporting shaft as shown in fig 3.
- Two other hanger links was also attached to the shafts.
- Other two hanger link and transporting shaft was attached to the top of the bed in the bearing gear.
- Out box transporting machine is ready now.
- We give the current to the electric motor and put the boxes on the top of the machine for testing it.
- It was working well and boxes are moving to the next level.

3 RESULT AND DISCUSSION

Four-Bar Chain: The four bar chain is the most fundamental of the plane kinematic chain. It is a much preferred mechanical device for the mechanization and control of motion due to its simplicity and versatility. Basically, it consists of four rigid links which are connected in the form of quadrilateral by four-pin joints.

When one of the links is fixed, it is known as a linkage or mechanism. Link that rotate complete revolution is called the crank, the link opposite to the fixed link is called the coupler, and the fourth link is called the lever or rocker if it oscillates or another crank, if it rotates

4 FUTURE SCOPE

Dynamic analysis is one of the very important phase in design the systems. A computer base modelling and simulation gives better understanding regarding rigid system parameters. There is much scope in development of an accurate mathematical model and subsequent simulations for the kinematic and dynamic analysis of the mechanical systems for the precise application in the industry.

5 CONCLUSION

The crank unit is defined in this paper, and the important role of the crank unit is discussed in the process of modular design and production of the Crank-group Driving Mechanism. A method achieving inertia force balancing of the Crank-group Driving Mechanism is proposed according to the special structure of the mechanism. The factors influencing mass moment of the balancing weights and its calculation method are elaborated. The study provides the theoretical basis for the modular design of the Crank-group Driving Mechanism.

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