DEVELOPMENT OF A PROTOTYPE OF INDUSTRIAL CONVEYOR USING FOUR BAR MECHANISM

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ABSTRACT

In this paper, the development of a “Four Bar Mechanism Conveyor” prototype is given in detail. The conveyor has many applications, with respect to material handling. The DC motor is used to actuate the four-bar mechanism. Then four bar mechanism will be utilized to develop the conveyor. This device is very useful for material handling purpose in engineering industries, where automation plays an important role. In this device, the DC motor is used to drive the conveyor. The materials, which are to be transported from one place to another place, can be done in a simple and cost-effective way by using this conveyor. The specialty of this is that some tilting levers are placed on the top of the conveyor. These levers cause the actual movement of the material to be handled from one place to another place in a faster way and also in the stipulated period. This device overcomes the shortfalls of the existing traditional system, i.e. the manual effort can be completely avoided by using this device.

1. INTRODUCTION

This conveyor is basically works on the principle of Four Bar Mechanism. In any organization, whether it is big or small in size and involving manufacturing or construction type work, the materials have to be handled as raw materials, work-in-process, or finished goods from the point of receipt and storage to finished goods warehouse and dispatch points. Various examples of commonly used material handling equipments include conveyors, containers, carts, forklifts, automated-guided vehicles (AGV), cranes, storage and retrieval equipments, etc.

Conveyors are basically defined as the devices, which are used to transport various items with least manual effort. These conveyors are either manually operated or electrically operated devices. These are used for moving bulk and huge materials. These conveyors can be classified as belt conveyors, bucket conveyors, vibrating conveyors, and fin overhead conveyors.

2. SELECTION OF CONVEYORS IN INDUSTRIES

Selection of a suitable Conveyor depends upon the type of products to be handled, throughput or speed, elevation change, and in some times their selection is industry oriented. For instance, Belt conveyors are available in various ranges and sizes. Conveyors are either manually operated, pneumatically operated or electrically operated. These electrically operated devices are driven by either by AC or DC motors. Sometimes reduction gears, chains or sprockets can be used to adjust the speed of the movement of conveyor.

Products to be transported are generally carried on the top surfaces of the conveyors.
Of course we can find some exceptions for this. Overhead conveyors used at dry cleaners, suspend their loads from trolleys which are taken along the overhead tracks. The conveyors such as screw and pneumatic types transport the items through semi-enclosed tubes. Generally, these conveyors used to transport dry products and powders. Few types of conveyors are designed to transport the items between various production operations. Walking beam conveyors can be cited as an example for this type of conveyors. Some conveyors are used to transport hard to handle products, through fillers, labelers, etc. by holding each container in individual pallets.

Sometimes conveyors are designed from modular components such as straight-aways and curves, etc. Makers of such devices often provide the assistance of design expertise and installation. In general, electrically operated conveyors employ head shafts and tail shafts where the head end provides the arrangement of drive and the tail end facilitates the adjustment of the belt tension.

3. WORKING PRINCIPLE

This material handling system uses a four bar mechanism, which follows a coupler curve and has a better merit than the present existing system of transport of materials in a factory. These materials are transferred from one production place to another at a specific time period, which is based on the linkage movement. The proposed model of Industrial Conveyor by using four bar Mechanism mainly consists of DC motor and various links of Four Bar Mechanism. The link which gets activated initially by DC motor is known as crank and this crank gets motion by the actuation of DC motor. This motor is coupled to the Battery, which supplies power to the motor. Then crank rotates and crank transforms movement to the coupler. Coupler is nothing but the link, which transforms motion to the other link. This coupler is directly connected to the conveyor. This coupler motion causes the siding motion of conveyor. Hence, conveyor will slide within the limits of guide way. An L shaped tilting lever is used to move the jobs which are in the queue list. These L shaped tilting levers are placed in a sequence at equal distances. The material to be handled is pushed by first tilting lever and then by second tilting lever. In the similar fashion, the material is transported to the desired place by the sequential tilting levers. The two dimensional and three dimensional diagrams of the developed conveyor is shown in Figures 1 & 2.
4. ADVANTAGES

The various advantages of this material handling system over the regular traditional system are mentioned as follows.

a. The additional effort required to transfer the material from the main transport system to a work station is removed.

b. Electronic control is not required

c. There is a great reduction in time required for assembly.

d. The efficiency of the system will increase, when friction less components are more.

e. The timing of the system is application oriented

f. The design of the system is economical.

g. This system uses kinematic linkages for timing the transportation

5. INDUSTRIAL APPLICATIONS

The movement of job from one station to another is achieved by a belt conveyor in this process. This belt conveyor system uses a continuous electric drive. Hence this material handling system is very much useful in large scale industries, where job feeding systems are available. They are also very much useful in continuous assembly plants especially packaging industries.

6. CONCLUSION

The lightening of labour-intensive operations is resulted from the effect of this four bar mechanism process. The perfect procedure of load's conveyance is thought to be basically possible by utilizing the developed system.

7. REFERENCES


