



BOX SHIFTING MACHINE

¹Divate Amol Rajendra, ²Hegade Siddharam Basavaraj, ³Kulkarni Sudhir Jawahar, ⁴Mr. Paramshetti S.C
Department of Mechanical Engineering S.V.S.M.D's K.K.I. Polytechnic, Akkalkot^{1,2,3}, Lecturer in Mechanical
Engg. Department S.V.S.M.D's K.K.I. Polytechnic, Akkalkot⁴

ABSTRACT

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 the project is to produce a mechanism that delivers this stop and move motion using mechanical linkages. The advantage of the 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 Aluminum 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 -3kgs approximately.

Key words— Linkage, package, conveyor

INTRODUCTION
A linkage is a mechanism formed by connecting two or more levers together. Linkages can be designed to change the direction of a force or make two or more objects move at the same time. Many different fasteners are used to connect linkages together yet allow them to move freely such as pins, end-threaded bolts with nuts, and loosely fitted rivets. There are two general classes of linkages: simple planar linkages and more complex specialized linkages; both are capable of performing tasks such as describing straight lines or curves and executing motions at differing speeds. The names of the linkage mechanisms given here are widely but not universally accepted in all textbooks and references.

Linkages can be classified according to their primary functions:

Function generation: the relative motion between the links connected to
The frame Path generation: the path of a tracer point Motion generation: the motion of the coupler link

LITERATURE REVIEW

LINKAGE MECHANISM

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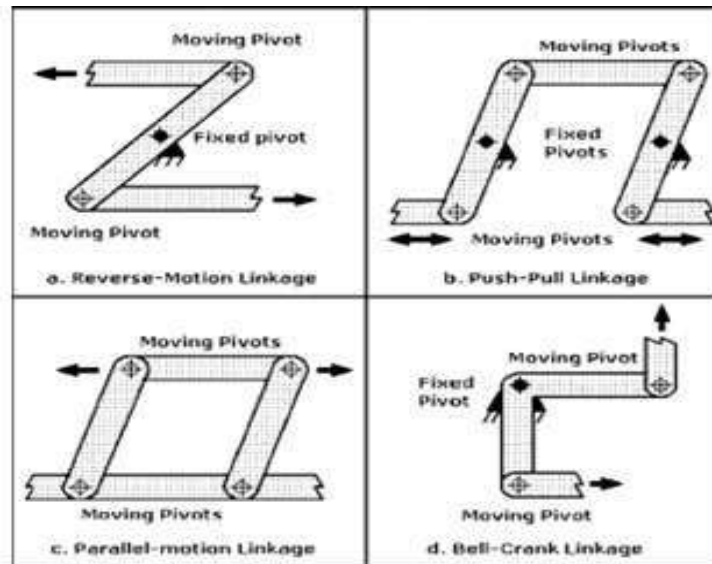
SIMPLE PLANAR LINKAGES

REVERSE -MOTION LINKAGE

Reverse -motion linkage, Fig. 2a, can make objects or force move in opposite directions; this can be done by using the input link as a lever. If the fixed pivot is equidistant from the moving pivots, output link movement will equal input link movement, but it will act in the opposite direction. However, if the fixed pivot is not centered, output link movement will not equal input link movement. By selecting the position of the fixed pivot, the linkage can be designed to produce specific mechanical advantages. This linkage can also be rotated through 360°.

PUSH-PULL LINKAGE

Push-pull linkage, Fig. 2b, can make the objects or force move in the same direction; the output link moves in the same direction as the input link. Technically classed as a four-bar linkage, it can be rotated through



360° without changing its function *Functions of four basic planar linkage mechanisms*

PARALLEL-MOTION LINKAGE:

Parallel-motion linkage, Fig. 2c, can make objects or forces move in the same direction, but at a set distance apart. The moving and fixed pivots on the opposing links in the parallelogram must be equidistant for this linkage to work correctly. Technically classed as a four-bar linkage, this linkage can also be rotated through 360° without changing its function. Pantographs that obtain power for electric trains from overhead cables are based on parallel-motion linkage. Drawing pantographs that permit original drawings to be manually copied without tracing or photocopying are also adaptations of this linkage; in its simplest form it can also keep tool trays in a horizontal position when the toolbox covers are opened.

BELL-CRANK LINKAGE:

Bell-crank linkage, Fig. 2d, can change the direction of objects or force by 90°. This linkage rang doorbells before electric clappers were invented. More recently this mechanism has been adapted for bicycle

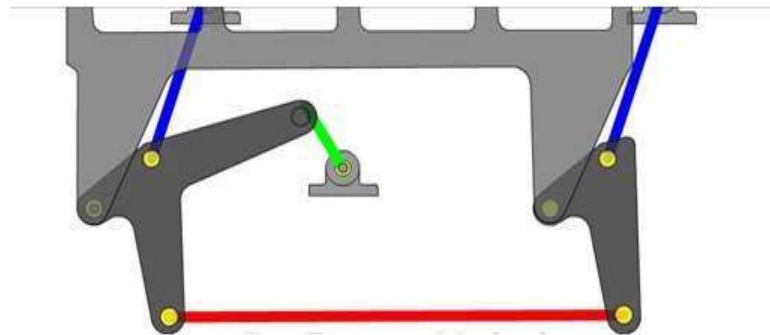
brakes. This was done by pinning two bell cranks bent 90° in opposite directions together to form tongs. By squeezing the two handlebar levers linked to the input ends of each crank, the output ends will move together. Rubber blocks on the output ends of each crank press against the wheel rim, stopping the bicycle. If the pins which form a fixed pivot are at the midpoints of the

cranks, link movement will be equal. However, if those distances vary, mechanical advantage can be gained.

CRANK-ROCKER MECHANISM FOR FOUR BOX TRANSPORT MECHANISMS:

The four bar linkage is the simplest and often times, the most useful mechanism. As we mentioned before, a mechanism composed of rigid bodies and lower pairs is called a linkage (Hunt 78). In planar mechanisms, there are only two kinds of lower pairs -revolute pairs and prismatic pairs.

The simplest closed-loop linkage is the four bar linkage which has four members, three moving links, one fixed link and four pin joints. A linkage that has at least one fixed link is a mechanism.



Crank rocker mechanism

This mechanism has four moving links. Two of the links are pinned to the frame which is not shown in this picture. In SimDesign, links can be nailed to the background thereby making them into the frame.

How many DOF does this mechanism have? If we want it to have just one, we can impose one constraint on the linkage and it will have a definite motion. The four bar linkage is the simplest and the most useful mechanism.

Reminder: A mechanism is composed of rigid bodies and lower pairs called linkages (Hunt 78). In planar mechanisms there are only two kinds of lower pairs: turning pairs and prismatic pairs.

THE MAIN COMPONENTS USED

Wiper motor

A wiper generally consists of a metal arm, pivoting at one end and with a long rubber blade attached to the other. The arm is powered by a motor, often an electric motor, although pneumatic power is also used in some vehicles. The blade is swung back and forth over the glass, pushing water or other precipitation 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.



BATTERY 12 V

It supplies electric current to operate lighting system and accessories system. It is often call the part of the electrical system. The battery stores energy in a chemical form. The chemical reaction

takes place inside the battery when any electric consuming devices like lights, horns, etc...., is connected to the battery, which produces a flow of current.



Nuts and bolts

A nut is a type of fastener with a threaded hole. Nuts are almost always used in conjunction with a mating bolt to fasten two or more parts together. The two partners are kept together by a combination of their threads' friction (with slight elastic deformation), a slight stretching of the bolt, and compression of the parts to be held together.

In applications where vibration or rotation may work a nut loose, various locking mechanisms may be employed: lock washers, jam nuts, specialist adhesive thread-locking fluid such as Loctite, safety pins (split pins) or lock wire in conjunction with castellated nuts, nylon inserts (Nylon), or slightly oval-shaped threads. The distinction between a bolt and a screw is unclear and commonly misunderstood. There are several practical differences, but most have some degree of overlap between bolts and screws.



The defining distinction, per Machinery's Handbook, is in their intended purpose: Bolts are for the assembly of two unthreaded components, with the aid of a nut. Screws in contrast are used with components, at least one of which contains its own internal thread, which even may be formed by the installation of the screw itself. Many threaded fasteners can be described as either screws or bolts, depending on how they are used.

Bolts are often used to make a bolted joint. This is a combination of the nut applying an axial clamping force and also the shank of the bolt acting as a dowel.

Pinning the joint against sideways shear forces. For this reason, many bolts have a plain unthreaded shank (called the grip length) as this makes for a better, stronger dowel. The presence of the unthreaded shank has often been given as characteristic of bolts vs. screws but this is incidental to its use, rather than defining.

PROCEDURE

First of all we have prepared the drawing for the equipment. A frame is made with angles by cutting them with the help of a cutting machine. Arc welding method is used to join the cut pieces to get the final frame of the mechanism. Mild steel plates were used to prepare the seating for the boxes on the conveyor. The shaft and hanger were machined as per the dimensions on the lathe. Holes were drilled as per the drawing with the help of a drilling machine. The shaft which takes the boxes to the next level is prepared. All the welded joints were given finishing look with the help of a flat file. The electric motor is then fixed on the bed which drives the whole mechanism. Then the crank and hanger were fixed and connected to the motor. The box transport mechanism is ready.



CONCLUSION

The box transport mechanism plays a major role in industries. The process of transporting products from one place to another was to be maintained by conveyor only. So we just successfully altered this with a box transport mechanism using the kinematic links and motor. We had just implemented our basic mechanical knowledge and designing skills for design and fabricating this project successfully

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