

## Mini Conveyor using Geneva Mechanism

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**Abstract**— Geneva mechanism is a system to convert continuous circular motion into fixed step circular motion. Fixed step circular motion in other words means a circular motion produced in equal spaces of time and resulting in the same displacement which is a requirement in many automation industries. A conveyor belt is simply a linear belt mostly made up of rubber (of greater stability). It has a basic function of transporting raw material/ material in process of manufacturing. A simple Geneva mechanism consists of a drive wheel and a driven wheel. The drive wheel is a disk with a pin or a shaft near its circumference. The driven wheel consists of several slots. The drive wheel is kept next to the driven wheel in such a way that when the drive wheel is rotated, the pin or shaft fits inside the slot. As it reaches the bottom most point of the slot, the pin exerts a force on the driven wheel. As the driven wheel is pivoted from the center, there will be a generation of a moment. This causes the generation of a torque which rotates the driven wheel. Hence there is a fixed step circular motion. There are several types of Geneva rotator such as external Geneva rotator, internal Geneva rotator and spherical Geneva rotator. Geneva mechanism is one of the most simple and inexpensive mechanisms. The mechanism used for conveyor belt is an external Geneva mechanism. This mechanism gives out production of jerks or instantaneous change in acceleration. The mechanism has various applications in many industries especially the automation/automobile industry. Modern day film projectors use a variation of this mechanism to power a motor which is used for fast forwarding. In short the Geneva mechanism converts continuous rotatory motion of the drive wheel to intermittent rotatory motion of the gear. A cheap, convenient and a simple mechanism with a variety of applications.

**Keywords:** Conservation of Energy, Speed Control

### I. INTRODUCTION

The Conveyor Belts are used in Industries to carry heavy objects or material from one place to another place. They are heavily used in all fields. But the conveyor belts require a lot of energy to work.

Geneva drive is a gear mechanism that converts a continuous rotation into an intermittent rotatory motion. The rotating drive wheel has a small rod that reaches into a slot of wheel advancing it by one step or round. The drive wheel also has a raised circular disk used for blocking, that is it locks the wheel in position between the steps.

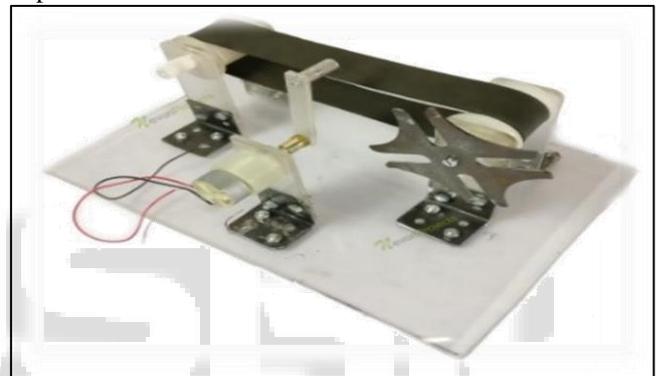
Nowadays the conveyor made using Geneva mechanism holds a very important place in factories as the Geneva mechanism has many advantages. It is the simplest and most economical system in all intermittent motion mechanisms and thus is of great advantage in current time. They have various sizes and are used in automobile industry, electronic industry, building sites, film projectors, etc.

The most important advantage in the conveyor belt using Geneva mechanism is that we can control the speed and direction of the belt by just adjusting the length of the rod attached to the servo motor being used.

In this paper, we will discuss about the working, applications and advantages of Geneva mechanism by making a conveyor belt following Geneva mechanism principle.

### II. WORKING

The Geneva mechanism is a system to convert continuous circular motion into fixed step circular motion. Fixed step circular motion in other words means a circular motion produced in equal spaces of time and resulting in the same displacement.



Simple Geneva mechanism consists of a drive wheel and a driven wheel. The drive wheel is a disk with a pin or a shaft near its circumference. The driven wheel consists of several slots. The drive wheel is nothing but a motor which has a plastic rod with a small rod extruded at its apex. The drive wheel is kept next to the driven wheel in such a way that when the drive wheel is rotated, the extruded rod fits inside the slot. As it reaches the bottom most point of the slot, the rod exerts a force on the driven wheel. As the driven wheel is pivoted from the center, there will be a generation of a moment. This causes the generation of a torque which rotates the driven wheel. Hence there is a fixed step circular motion. The mechanism used for conveyor belt is an external Geneva mechanism. This mechanism gives out production of jerks or instantaneous change in acceleration. In short the Geneva mechanism converts continuous rotatory motion of the drive wheel to intermittent rotatory motion of the gear.

### III. EQUATION

Let the power, angular velocity, torque of the motor be  $P$ ,  $\omega$ ,  $T$  respectively.

Hence, torque generated by motor will be:

$$P = T \times \omega$$

$$\therefore T = P / \omega$$

Let the radius of the driven wheel be  $r$ .

displacement of conveyer belt per rotation (say  $x$ ) of driven will be

$$2\pi r = x$$

#### IV. CONCLUSION

Geneva mechanism is the simplest and least expensive of all intermittent motion mechanisms. They have a huge variety of sizes, with various applications. They have a better motion curve characteristics compared to ratchets. They are very useful in production, automobile and electrical industries for mass production. Thus, the use of Geneva mechanism in conveyor belt helps in saving excess energy and control the speed of conveyor belt and making the production and handling comfortable.

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