

Design and Fabrication of Paper Cutting Machine by Using Geneva Mechanism

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Abstract- The design and fabrication of paper cutting machine using Geneva mechanism is useful to cut papers in equal and accurate dimensions. Geneva drive is an indexing Mechanism that converts continuous motion into intermittent motion, due to which paper is moved between the equal intervals of cutting period. Then the paper cutting is achieved by crank & lever mechanism. The cutter will be back to its original position by lever crank mechanism. The objective of this concept is to design the Geneva mechanism operated paper cutting machine which eliminates time required for paper marking and helps in feed equal dimension paper in each rotation. Due to its automatic work it saves time. This machine is useful for paper manufacturing industry, we can avoid the human errors and we can use this equipment in school, colleges, stationary shop's, paper stores, etc

Index Terms- Geneva, six slots, cutting.

I. INTRODUCTION

The main task of the mechanical designed is to synthesize particular mechanism that achieves a particular task and to remodel or to develop another mechanism with the help of two different mechanisms. One of the mechanisms we used was Geneva mechanism; it is one of the earliest of all the intermittent motion mechanisms. Geneva mechanisms are available on self-basis from several manufactures, in a variety of sizes and shapes. They are cheaper than cams and have good performance characteristics, depending on the load factor and design requirements. The other mechanism was slotted lever mechanism or slider crank mechanism. This converts the rotary motion into straight line motion by means of a rotating driving beam, a connecting rod and a sliding body.

II. LITERATURE REVIEW

1. A review on study and analysis of Geneva mechanism design by s. r. durairaju, arunkumar. c, karankumar. r, thiyagarajan. a. they found, according to the need of the user, the design and the specification of the Geneva mechanism could be changed and the required sizes of the wheels could be selected. Lubrication is not necessary. The high pressure is achieved in this wheel and the crank reduce the fluctuation of pin, so the best output can be achieved. It has been done with 4 slotted geneva mechanism
2. Automatic Paper Cutting Machine Using Geneva Mechanism by Sunil H V, et.al. The objective of this concept is to design the Geneva mechanism operated paper cutting machine which eliminates the most time taking process of paper marking and helps in feed equal dimension paper in each rotation. This machine is used to reduce the manual work of paper cutting, and also time saving. this machine is very useful for paper manufacturing industry also we can avoid the human errors and also we can use this equipment also in school, colleges, stationary shop's, paper stores, etc. It has been done with 4 slotted geneva mechanism
3. Design and Analysis of Paper Cutting Machine works on Geneva Mechanism by Vijay Kumar U, Ghanshyam Kumar, Dhareesh Bansod, Deepak Sahu, Aakanksha Suryawanshi rishabh Bendre, kinematic study of a mechanism incorporating a Geneva wheel and a gear train to achieve intermittent motion. Presented is a comparison of the position, velocity, acceleration, and jerk between the classical Geneva wheel mechanism and the proposed mechanism. reducing the

- extreme jerk of the Geneva wheel. Geneva drive is an indexing Mechanism that converts continues motion to intermittent motion It has been done with 4 slotted geneva mechanism
4. Design and analysis of geneva mechanism with curved slots by Jung-Fa Hsieh Department of Mechanical Engineering, Far East University, Tainan, The indexing mechanism has been derived utilizing the homogeneous coordinate transformation method and conjugate surface theory.analytical expressions have been derived for the slot profile with and without an offset feature by using 4 slotgeneva wheel
 5. Design, Cad Modeling & Fabrication of Geneva Operated Roller Conveyor by Mr M. V. Ingalkar , Mr A. R. Sonekar, Mr Y. D. Bansod, The transport time of the object to cover the entire conveyor 3D modeling of Geneva Operated Roller Conveyor by using CATIA V5 R20 Softwear , design of geneva wheel by using 4 slot geneva mechanism
 6. Cutting Mechanism by Giving Feed through Geneva Mechanism by P.KaliSindhur , Y.karthik, et. Al. Designed a belt drive with the help of Geneva mechanism. The length of the feed can be managed by changing the depth of the slots in Geneva wheel by 4 slot geneve mechanism
 7. To increase the Torque Capacity of a Pneumatic Paper Cutting Machine by AnupamChaturvedi, Hiren Trapasiya, JayeshSevra, Mitkumar Patel, Reduction in operation time is also possible with automation. The existing Pneumatic Crushing Machines take a lot of time for cutting the paper as well as they are very much noisy during their operation. Pneumatic Paper Cutting Machine with an increased Torque Capacity. With the help of this high pressure air willbe able to cut more bunch of paper at one stroke It has been done with 4 slotted geneva mechanism
 8. Intermittent Paper Cutting Mechanism by Giving Feed through Geneva Wheel by Ajay S. Parmar, Amar Singh, Avinash Singh, Avneesh Pandey, Kunal Singh, ManeeshUpadhyay, kinematic study of a mechanism using a Geneva wheel and a gear train to achieve intermittent motion. The feed is given by continuous rotation of circular disk in Geneva mechanism. It has been done with 4 slotted geneva mechanism
 9. Design and Development of Machine to Perform Stamping and Cutting Operation by Rakesh Prajapati ,Purvik Patel, Saurabh Modi,To reduce the time for marking and cutting the papers. Intermittent motion is useful in moving the paper between the cutting periods. It has been done with 4 slotted geneva mechanism
 10. Review on geneva mechanism and its application by ankur prajapati, chinmay patel, Dhwanit pankhania, brijen kanjia, aakash dubey, Geneva drive is also known as Maltese cross mechanism. It converts continuous rotation into an intermittent rotary motion. It has been done with 4 slotted geneva mechanism

III. WORKING PRINCIPLE AND COMPONENTS

This model parts are Geneva mechanism, motor, chain sprocket, roller, cutter and spring. Two rollers are mounted according to the required distance the belt is mounted on the rollers on which the paper is placed. The rollers shaft is coupled with the Geneva drive. The Geneva drives shaft is coupled with the motor shaft hence when power is supplied to the motor rollers rotate with a certain time delay according to the Geneva drive and the chain drive moves along the rollers. Motor connecting to the chain sprocket and sprocket connecting to the Geneva mechanism. Motor has been on to rolling the Geneva so that start to the paper roll. One roller has fixed on the try another roller connecting in Geneva wheel. Cutter fixed to the spring connecting to cutter. Motor shaft connect to cutter wire motor has been rotating cutter is upon down motion then cutting to the paper this is the automatic paper cutting machine by using Geneva mechanism. The following steps are followed for conduction.

- When cam pin is in extreme right position i.e. engage position, the crank shaft will be at extreme bottom position. Hence the cutter is in full open position.
- When cam pin is in extreme bottom position i.e. disengaging position, the crank shaft will be at extreme left position. Hence the cutter is in partial cutting position.
- When cam pin is in extreme left position i.e. disengage position, the crank shaft will be at

extreme top position. Hence the cutter is in full cutting position.

- When cam pin is in extreme top position i.e. disengage position, the crank shaft will be at extreme right position.

Hence the paper cutting is achieved by above four process of Geneva and cutter.

Components Used in Project

- Geneva Wheel
- Sprocket
- Roller chain
- Paper cutter or cutting blade
- Coil Spring
- Paper Roller Shaft

Experimental Setup



IV. CONCLUSION

The feed, which came from the Geneva mechanism carried by the chain drive, is cut by the crank lever mechanism, which is at the end of the chain drive. By using this model, we can get the same length of feed at same interval of time. The length of the feed can be managed by changing the depth of the slots in Geneva wheel and the path length of the crank can be increased by increasing the radius of the crank and the length of the lever cutter and by changing the number of slots on Geneva wheel. The angular velocity and angular acceleration can be observed for each link by designing the entire model in solid works and then calculated the analysis for each link.

Since we have found that all the existing projects had used the four slotted mechanism we will be carrying out the six slot Geneva wheel to get more number of cuts in one revolution.

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