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Cam-Follower Mechanism Using a Barrel Cam

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Abstract— *The design of a novel transmission to convert rotational into translational motion, is reported in this paper. The transmission is based on a cam mechanism with roller mounted on a translating follower. This feature thus provides pure-rolling contact, by using the rollers on the sliders. Moreover, a provision is made to allow for the elimination of backlash. The design relies on a unified methodology for indexing cam mechanisms, whereby the same procedure is used to design planar, spherical, and spatial mechanisms.*

Keywords—*Barrel cam, follower, mechanism, rolling motion, translatory motion.*

I. INTRODUCTION

These Rack-and-pinion transmissions are broadly accepted means of power transmission between a rotating motor and a translating load. Their technology is well established within the framework of gearing. For decades, this transmission went unchallenged, that is, until the advent of highly accurate manufacturing processes that gave rise to more accurate, smoother, and more reliable alternatives, such as ball screws and linear actuators. Modern applications in robotics and mechatronics, whereby motion is controlled using a piece of software, the conversion of motion from rotational to translational is usually done by alternative means. Of these alternatives, ball screws are gaining popularity, one of their drawbacks being the high number of moving parts that they comprise, for their functioning relies on a number of balls rolling on grooves machined on a shaft; one more drawback of ball screws is the low load-carrying capacity by virtue of the punctual form of contact by means of which loads are transmitted. Linear bearings solve these drawbacks to some extent, for they can be fabricated with roller bearings, their drawback being that these devices rely on a form of direct-drive motor, which makes them expensive to produce and to maintain. Hence the motivation behind the work reported here. Upon considering the foregoing alternatives to rack-and pinions, along with their drawbacks, we decided to try to replace these transmissions with cam mechanisms.

II. MECHANISM SYNTHESIS

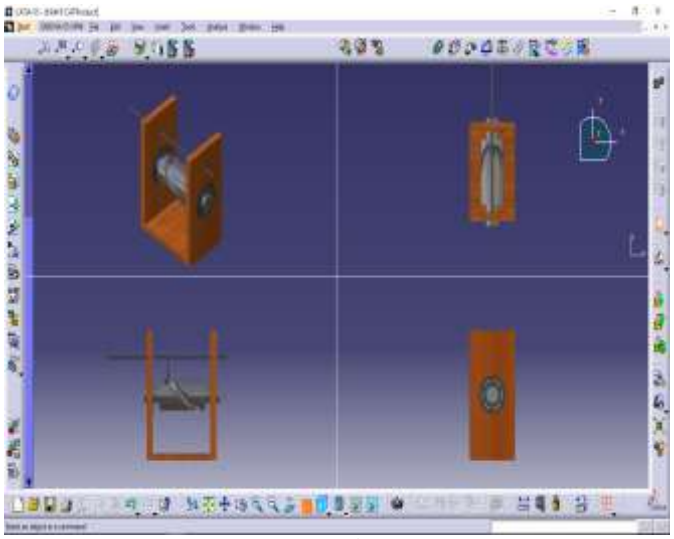
The mechanism is based on the cam follower. It converts the rolling motion to the translating (sliding) motion and the method used for this is the rollers are used on the sliders to avoid friction. It is designed in such a way that the cylinder is taken that is used for the rolling motion production. This rolling cylinder contains groves on it. The groves are made for to fit the roller balls. The groves are made in such a way that when the cylinder roll then the roller balls slides on them. The balls are connected to the plane sliders so it can do translational motion.

This type of cam follower mechanism is used in automation of a machinery, gear cutting machines, screw machines, printing press, automobile engine valves, conveyors, pallet changers, sliding fork in warehouses and in IC engines, etc.

III. MODELLING AND DESIGNING

Before creating a prototype, we had designed the whole setup in CATIA. There are some pictures below.

To test Cam Follower mechanism the above CATIA model was designed.



Isometric view of Final setup.

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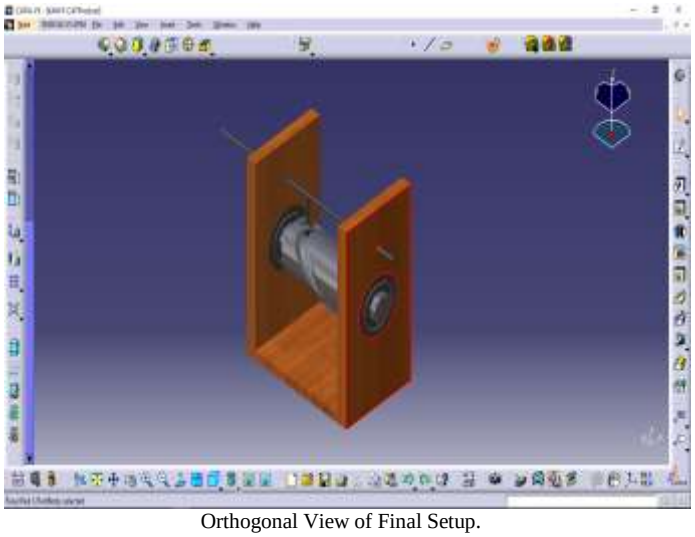

Orthogonal View of Final Setup.

IV. PROTOTYPING AND TESTING

While making prototype we had many challenges like there were no Grove cutting machines available near us, so we have to change the material. We had use wood to make prototype of your barrel cam and we had tested its working by using Dc motor and manual Hands, there is slight vibration in our model due to uneven surface of our groove and due to material used i.e. wood which can be removed by proper greasing

V. MANUFACTURING

We are using the material that is the wood but the low friction in Slide-o-Cam is to be highlighted as a major advantage of this transmission: low friction means that the life of a transmission with plastic elements can be greatly increased if it is based on Slide-o-Cam. The alternative would be a plastic rack-and-pinion, which is of the spur type, and hence, exposed to friction and, as a consequence, to excessive wear. Friction losses, of course, cannot be completely eliminated. These are still present in Slide-o-Cam, but confined to the rollers mounted on the follower. As the friction is considered the plastic is more efficient but it is not capable of handling the high pressure. Another factor that comes in to picture is the cost as metal is considered it is costlier than the plastic or wood.

VI. PICTURES OF ACTUAL MODEL

VII. CONCLUSION

We introduced here a novel mechanical transmission, for the conversion of rotational into translational motion, or the other way around. Hence, this transmission is proposed to use as the respective mechanism in the cam follower. The morphology of this transmission stems from that of pure-rolling indexing cam mechanisms.

VIII. ACKNOWLEDGMENT

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