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Review on Modification of Roller Shutter by Using Chain Drive Mechanism

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ABSTRACT

This paper gives roller shutters have been use for security purpose with opening and closing feature in every commercial as well as housing areas like garages, shops, schools, prisons and warehouses, workshop, if not maintained properly it gets blemished, and it takes a lot of effort to lift them, usually this effort is so high that it can cause back injury to the operator. Even for large size shutters it is impossible to lift them without any mechanism. Considering these problems, it is important to design a motorized system which can facilitate the opening and closing of shutter by the RF switch and thus reduce the back injuries. Thus it is important to design such mechanism for safety purpose. we have designed gear motor system assembly to automate the rolling shutter operation that can provide safety to the operator.

Key words: Induction Motor, Gear Box, Chain, Sprocket

INTRODUCTION

The roller shutter is made up number of slats interconnected with each other. The shutter is raised to open and lowered to close. The shutter rolls over the pipe when opened and when lowered to close the shutter forms a protective curtain. The guide channels are provided on the either side of the curtain for the travel or movement of the shutter curtain during opening and closing. The shutter is pull-push type or electrically operated. The use of the mechanism for the function of the shutter depends upon the size of the shutter. On the bottom slat of the shutter a locking arrangement is provided. The place where the shutter are being used are also important as in malls the shutter curtain are provide with the grills where as in small shops and warehouses the curtain just consist of the slats with no grills. Thus the Rolling Shutter we are investigating will be designed as per the requirement and then analyzed. Once it is analyzed it will be modified either to increase durability or to reduce weight and cost or both.

METHODOLOGY

Induction Motors

Ac Induction motor is a distinguished by a rotor spinning and coil passing magnets at the same rate as the alternating current and resulting magnetic field which drives it.

Fig. 1 Induction motor

Speed is independent of the load provided and sufficient field current is applied. Accurate controlling speed. This motor power factor can be adjusted to unity by using a proper field current relative to the load. Motor converts electrical power to mechanical power in its rotor.

There are several ways to supply power to rotor. This ac motor power is induced in the rotating device. Since motor has no significant current rise on starting, this motor is ideal to an application which requires six or more starts per minute. One winding to other results reversal of motor direction. Single pole three position switch can be used for Forward, Reversed & Off control as show in following diagram. Metal visitor oxide may be used to minimize the switch contact arcing.

Bevel Gears

Fig. 2 Bevel gear

Bevel gears are gears where the axes of the two shafts intersect and the tooth-bearing faces of the gears themselves are conically shaped. Bevel gears are most often mounted on shafts that are 90 degrees apart, but can be designed to work at other angles as well. The pitch surface of bevel gear is a cone. Independently from the operating angle, the gear axes must intersect. Bevel gear lifts floodgate by means of central screw. The pitch angle of a gear is the angle between the face of the pitch surface and the axis. Bevel gears that have pitch angles of grater then 90 degrees have teeth that point inward are called internal bevel gear.

Roller Shutter

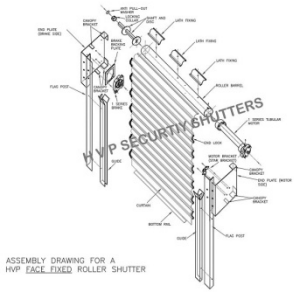

Fig. 3 Roller shutter

A roller shutter, roller door or sectional overhead door is a type of door or window shutter consisting of many horizontal slats (or sometimes bars or web system) hinged together. The door is raised to open it and lowered to close it. On large doors, the action may be motorized. It provides protection against wind and rain.

Fig. 4 Roller chain

The roller chain design reduces friction compared to simpler designs, resulting in higher efficiency and less wear. The original power transmission chain varieties lacked rollers and bushings, with both the inner and outer plates held by pins which directly contact the sprocket teeth and the plates where they pivoted on the pins.

This distributed the wear over a greater area however the teeth of the sprockets still wore more rapidly than it is desirable, from the sliding friction against the bushings. The addition of rollers surrounding the bushing sleeves of the chain and provided rolling contact with the teeth of the sprockets resulting in excellent resistance to wear of both sprockets and chain as well.

Gear Box:

Fig. 5 Gear box

A speed reducer or reducing gearbox is used to reduce the input velocity of a motor while increasing the torque produced by the input. The reducing gearbox or reduction gearbox has teeth on the pinions and wheels that mesh with each other to transfer power from the driver shaft to the driven shaft to reduce speed.

CAD MODEL

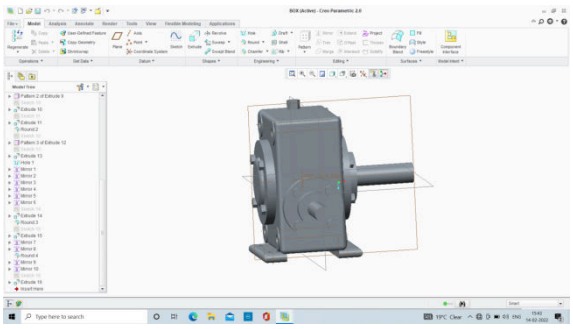

Fig. 6 CAD Model

RESULT

After working on this project, it can be concluded that among various heavy weight shutters available, motorized shutter door is the most efficient, convenient, useful and requires less man effort for working of shutter. Various mechanisms for the operation of motorized shutter are studied. CAD model of various parts of the shutter is designed and also the parts are assembled to form the final product. Finally, the motorized sprocket chain mechanism working shutter is developed. Proper evaluation of the design will be performed and will be created even better mechanism in next paper.

CONCLUSION

The objective is to reduce the human fatigue and back injuries due to shutter operation. Considering problem we have designed & fabricate model of the motor driven sprocket and chain assembly to automate roller shutter and to validate it. Finally, we conclude that newly design mechanism of gear motor assembly will cheaper and even better than other existing machines and the analysis will be the part of next paper.

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[3]. Vipin Khandar[1] Dr. AV. Vanalkar “Design Analysis for Gear motor aystem assembly to automate the rolling shutter operation” To design such a mechanism which is economically low cost, easily mountable on existing shutters.