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Lead Screw Mechanical Lifting Mechanism

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A B S T R A C T

Our Project relates to an "Mechanical Lifting Mechanism" performing on the Lead Screw Mechanism. Lift may be a simple automaton that raise element or object from ground level to a particular height to perform a selected work with maximum load and minimum efforts. This project describes the analysis of a mechanical lifting mechanism which works on the principle of Lead Screw Mechanism. The design is developed keeping in mind that the lift is operated by mechanical means in order that the cost of the lift is reduced. Also, such design can make the lift more compact and is suitable for medium scale work. Conventionally a Mechanical lifting Mechanism is employed for lifting a vehicle, Material handling in industry, Building elevator, home lift, and lots of other applications. Our Research relates to the accessories that will be included within the Design of a Mechanical Lifting Mechanism, which is able to increase its Efficiency, Power, Safety and easy Working.

I. Introduction

Considering the present Industrial Scenario, the Aerial Work Platforms employed into application are giving the acceptable performance with their apparatus. Industries at the moment are using Hydraulic as Pneumatically Operated Lifts. But as far as Cost and Safety is concerned, the Hydraulics as Pneumatic Lifts lack in them. Thus, it becomes necessary for some Accessories, Safety Measures use as an Alternate Mechanism to control the Lifts.

The Mechanically Operated Lifts is operated using two different Mechanisms, i.e., Rack & Pinion Method in addition as Lead Screw Method. The Mechanical Methods gets Power from Electricity, basically an Electrical Motor which converts the electricity of the Motor into K.E. of the lift, which elevates the structure of the Platform in upward and downward position. The Accessories included within the present invention consists of a Saddle Plate, A Blocking Mechanism, A Self-Locking Pair, and Providing Multiple Sections for the Lifts similarly as A Controller Mechanism. the current invention also demonstrates the Dynamic in addition as Static Stability of the Lift and a short Design Procedure of the Mechanically Operated Lift performing on the principle of Lead Screw. the current invention will increase the security Measures, Reliability, Efficiency yet as Performance of the Mechanical Lifts to a particular extent.

II. Literature Review

An elevator comprising lift shaft means defining a vertical elevator shaft, a cabin including at least one vertical wall position to move up and down for the elevator shaft, guide rollers arranged perpendicularly fixed to said cabin and riding on said guide rails, a screw vertically mounted on lift shaft means adjacent to the middle of the vertical wall of cabin, beam means mounted to the outside of vertical wall in the plane of screw and given a gap through which the screw passes, a nut fixed on said beam means and threadedly engaging said screw, and a motor rigidly fixed relative to said nut and operatively connected to drive said nut up and down said screw.

This invention relates to a lift or elevator, which comprises a nut which is axially fixed to the car and movable up and down along an axially stationary screw, and an electrical motor for driving the nut or screw.The various screw-driven lifts or elevators are disclosed within the literature. Such lifts or elevators have been used in practice just for the handling of products. In most present-time lifts or elevators, particularly in residential buildings

III. Components

All tables should be numbered with Arabic numerals. Every table should have a caption. Headings should be placed above tables, left justified. Only horizontal lines should be used within a table, to distinguish the column headings from the body of the table, and immediately above and below the table. Tables must be embedded into the text and not supplied separately. Below is an example which the authors may find useful.

1. Induction Motor

An electric motor is an electrical machine that converts electrical to mechanical energy. The reverse of this could be conversion of mechanical energy into electrical energy and is done by an electrical generator. In normal motoring mode, most electric motors operate through the interaction between an electrical motor's flux and winding currents to get force within the motor. In certain applications, like transportation industry with traction motors, electric motors can operate in both motoring and generating or braking modes to also produce electrical to mechanical energy.

2.Lead Screw

A lead screw is a screw which translates rotary motion into linear motion. Normally used as the driving mechanism in horizontal or vertically driven applications aided by linear guides for supports. They are described by diameter and pitch or lead. The pitch or lead is the amount of travel you get, or distance the nut travels along the screw for every complete revolution. They can be operated manually or motorized.

3.Linear Guide Way

Linear motion systems are ready-to-install drive and guidance units. This makes it easier for users to design and assemble their applications. It's not necessary to calculate and dimension the individual components, since the linear motion systems are installed as complete units. The primary linear motion systems built by the former “Deutsche Star” consisted of linear bushings and shafts and a ball screw or pneumatic drive. These transfer tables were also offered as two-axis X-Y tables. Meanwhile, many alternative guide and drive unit variants are incorporated into linear motion systems.

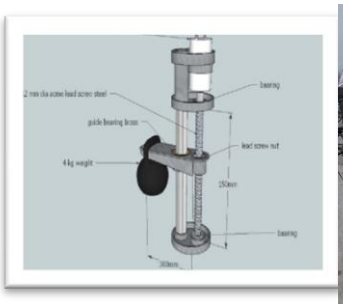
4. Rollers

The Roller Follower is a compact and highly rigid bearing system. It contains needle bearings and is used as a guide roller for cam discs and linear motion. Since its outer ring rotates while keeping direct contact with the mating surface, this product is thick-walled and designed to bear an impact load. Inside the outer ring, needle rollers and a precision cage are incorporated. This prevents the product from skewing and achieves a superb rotation performance. And, as a result, the product is capable of easily withstanding high-speed rotation.

The Roller Follower is used in a wide range of applications such as cam mechanisms of automatic machines, dedicated machines as well as carrier systems, conveyors, bookbinding machines, tool changers of machining centers, pallet changers, automatic coating machines, sliding forks of automatic warehouses

IV. Working of Mechanical Lift

A screw lift system for an elevator includes a rigid vertical frame having at least one rigid vertical rail; and a single elongate screw having an inclined helical flight. The screw is rotatably vertically mounted to the frame at opposite ends of the screw. A motor mounted to the frame rotates the screw. A carriage is mounted to the vertical rail for vertical translation. An elevator platform is mounted to the carriage. Four wheels are rigidly mounted cantilevered from the carriage. The wheels engage and bear down on the helical flight of the screw for rolling translation there along when the screw is rotated about its longitudinal axis so as to raise or lower the elevator platform**.**



V. Conclusion

In this research, a novel design for a Mechanical lifting Mechanism driven by a Lead screw mechanism has been designed and fabricated. The design equations for lead screw selection, ratios and mechanism forces have been derived from its geometry. Kinematic analysis has been performed. A design example has been given for illustrating the design process. The detailed working diagram has been explicitly explained equally. To verify the feasibility and accuracy, a prototype has been made, and then an experiment has been conducted. The proposed mechanism is capable of increasing capacity; reducing input effort; saving cost of operation and requires simple maintenance compared to hydraulically and rope driven lifting mechanisms of Mechanical lift.

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