

# LIFTING USED REACHED MECHANISM

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## ABSTRACT

Nowadays there is a requirement to paint the roof and plaster the wall, therefore to meet the requirement of the problems, and reduce the risk of life there is need to make a lifting mechanism, which can reduce the probability of accident in common day life. The present work meets the criteria to solve these problems by providing manual operation of handle to obtain elevated heights of required specification under application of minimal effort. This lift is manually operable with help of hand which is further moved by rack and pinion mechanism to convert the rotatory motion into linear motion to reach the elevated height. The present work has tremendous application in painting industry as well as in shop floor. Today lifestyle of man is not able to dedicate specific time for his health, importance is least given to exercise and body fitness due to time shortage and stressful life. To cope with time deficit, we can utilize the time spent on rotating the handle, which has health benefit.

**Key words:** Hand operated lift, Rack and Pinion mechanism, links, Chain drives, Worm drives, Journal Bearings

## I. INTRODUCTION

This work deals with lifting mechanism which could solve daily life problems in efficient and effective manner. Lift is a device used for achieving the required height based upon user's specification. The present work is portable in nature which can be carried to places as required. It is robust in design and cost effective in nature. Moreover there is no requirement of external power source for the said mechanism. Some mechanical equipments such as chain drive, handle, worm drives, rack and pinion, hinge joints and links are used to create the shape of present work.

## II. LITERATURE REVIEW

A. 2015-'Divyesh Prafulla Ubale': 'Design, Analysis and Development of Multiutility home equipment using Scissor Lift Mechanism'- In this paper authors have explained about the conventional method of using rope, ladder lift getting person to a height encounter a lot of limitation (time and energy consumption, comfort ability, amount of load that can be carried etc.) also there may be a risk of falling down in case of ladders. Hence hydraulic scissor lift is designed to overcome all these difficulties. The main aim of this paper is design and analysis and to construct a multi utility home equipment for senior citizens so that they can carry their daily activities efficiently. Also the equipment should be compact and cost effective. Lifting height achieved by scissor mechanism is of 1 m from bottom level. Buckling and bending failure analysis of scissor is also done in this paper. [1]

B. 2014-'Vitus M. Tabie': 'Weight Optimization of A Lift-Tipping Mechanism for Small Solid Waste Collection Truck'- In this paper authors have explained about optimization of a lift-tipping mechanism for a small solid waste collection truck. Finite element analysis was performed on a linkage mechanism that operates the tipping mechanism. The exercise involved validating the design changes made in the stress analysis environment.[2]

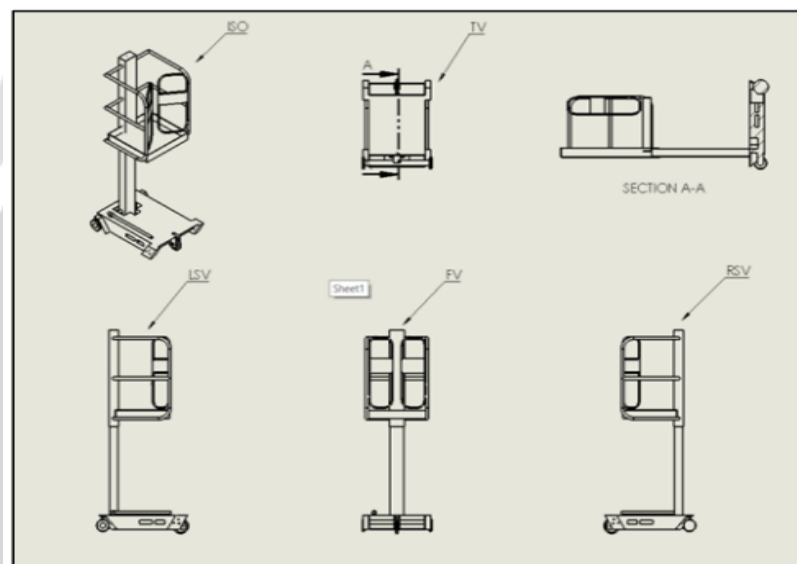
C. 2008-'Jovan Vladic': 'Dynamic Analysis of the Load Lifting Mechanisms'- In this paper have explained about problems of dynamic behaviour of load lifting mechanism (such as elevators). In the case of considerable lifting heights, high velocity devices are applied.[3]

D. 2013-'C.Veeranjaneyulu': 'Design And Structural Analysis of Differential gear Box At Different Loads'- In this paper, authors have explained about mechanical design and analysis on assembly of gears in gear box when they transmit power at different speeds. . Stress displacement is analyzed by considering weight reduction in

the gear box at higher speed. . Analysis is also conducted by varying the materials for gears, Cast Iron, Cast Steels.[4]

### III. WORKING PRINCIPLE

The present work is being done to reduce human effort for lifting themselves without others help. Here we have developed an idea of industrial vehicle which can be moved inside the industries and also the vehicle can be lifted by the help of handle provided with it. The components used in this project is that chain and sprocket, rack and pinion, worm gear arrangement and bearings. These components were mounted over the base frame which is provided with wheel for locomotion of the vehicle. This hand operated lifting vehicle can be moved towards the required area and can be lifted to a required height within the limit by rotating the worm gear. When the worm gear is rotated through the handle, the sprocket in the same shaft will be rotated and it will tend to rotate the pinion gear through chain drive. Hence the rack will be moved up and down with respect to the pinion gear rotation. This hand operated lift vehicle can be used in various industries.



**Fig. 1: Different views of Hand operated lift**

#### 3.1 Chain Drive

Chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles. The power is conveyed by a roller chain, known as the drive chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force. This is used in lift to transmit power from worm wheel to the rack and pinion arrangement.



**Fig. 2: Chain Drive being used in present work**

### 3.2 Rack and Pinion

A rack and pinion is a pair of gears which convert rotational motion into linear motion. The circular pinion engages teeth on a flat bar - the rack. Rotational motion applied to the pinion will cause the rack to move to the side, up to the limit of its travel. The pinion is in mesh with a rack. The circular motion of the pinion is transferred into the linear rack movement. Here the shaft is fitted in the pinion which is attached with the chain drive. The rotation is provided to the rack and pinion with the rotation of handle. So that arrangement will smoothly lift up to required height.



**Fig. 3: Rack and pinion being used in present work.**

## IV. ADVANTAGES

It is reliable

- Low maintenance
- Low power is enough.
- Can attain height upto 10 feet
- Design is robust
- Lift is portable, can be moved easily with less effort
- There is no requirement of skilled labour
- Cost efficient lifting system
- Operating cost is less
- Easy maintenance
- Has a health benefit

## V. APPLICATIONS

- It can be used in automobile service centres.
- It can be used by paint industries for easy paintings on the roof.
- It can be used by masons for doing plasters of wall at elevated heights.
- It can be used for cleaning Idols in temple at elevated heights.
- It can be for cleaning buses and cars effectively.
- It can be used by farmers for picking fruits from the trees.
- It can be used by electricity suppliers for fixing electricity circuits on electric poles.

## VI. CONCLUSION

This project is made with pre planning, that it provides flexibility in operation. This project is designed with the hope that it is very much economical and helpful to many industries. The present work helped us to know the periodic steps in completing the operations. Compared to other lifts present in the market our lift is economical and occupies less space, moreover it is portable in nature hence it can be moved from one place to another based upon user's requirement which is an added advantage to this lift. Thus this lift was designed with intent to provide the solution to daily life problems which can be painting the roof, doing the plaster on the backside of the walls etc., which this lift is able to give the solution. Hence, making it master key which open all the locks thus providing tremendous application. Thus the idea of providing lift at cheaper cost and maximum applications has been met.

## VII. SCOPE OF FUTURE WORK

The lifting is slow because it is operated by rotating the handle of lift which is attached with the worm wheel arrangement. In future to regulate lift fast motor arrangement used in the place of handle.

Presently the lifting is around 10 feets. To increase the height of lifting as required we can increase the height of rack so that we can achieve a lift to a required height. While lifting on inclined plane, lift is moving.

To stabilize this movement of lift we can use locking wheel so that while working with the lift, hassle free movement is achieved without any accident.

To providing the better base support we can increase the square base support larger than the lifting standing base. To minimise the effort leg throttle can be used.

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