

Lifting Wheelchair

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Abstract

Our Project relates to a Scissor Lifting wheelchair working on the Lead Screw Mechanism. It is a lifting mechanism, operated by Sliding Lead screw Scissor mechanism as well as by Mechanical Means. Our Research relates to the accessories that should be included in the Design of a Sliding Scissor Lift, which will increase its Efficiency, Power, Safety and Easy of Working, A Controller Mechanism for the Effective Movement of the Scissor Lift.

A wheelchair with a lifting function is designed to assist a caregiver when transferring a wheelchair user not only indoors but Also outdoors. With the increasing levels of technology, the efforts being put to produce any kind of work has been continuously decreasing. The efforts required in achieving the desired output can be effectively and economically be decreased by the implementation of better designs.

This type of Wheelchair use for daily works in home and office because the function of lifting with required position.

Key points: Lifting Wheelchair, Scissor mechanism, sliding roller, lead screw.

1. Introduction:

Persons with disabilities attributable to the lower limbs are becoming increasingly numerous worldwide. Most of them use wheelchairs in daily life. Representative nursing care in daily life entails basing, evacuating, and feeding.

This paper presents a wheelchair with a lifting function that is intended mainly for use by an electric wheelchair user with disabled upper and lower limbs. This equipment has good maneuverability. Moreover, it can move over a step because of the front driving wheels. It realizes easy and safe transfer from to a bed and a toilet Seat by virtue of the opposite wheel allocation of a usual wheelchair.

Furthermore, the mechanism of folding the frame for Lifting allows this wheelchair to travel on public roads. We demonstrate its design effectiveness through several indoor and outdoor experiments. The Mechanically Operated Scissor Lifts can be operated using two different Mechanisms, i.e. Rack & Pinion Method as well as Lead Screw Method. The Mechanical Methods gets Power from Electricity, basically an Electrical Motor which converts the Electrical Energy of the Motor into Kinetic Energy of the lift, which elevates the structure of the Wheelchair Platform in upward and downward position. The present invention also demonstrates the Dynamic as well as Static Stability of the Scissor Lift and a Brief Design Procedure of the Mechanically Operated Scissor Lift working on the principle of Lead Screw. The present invention will increase the Safety Measures, Reliability, Efficiency as well as Performance of the Wheelchair Scissor Lifts to a certain extent.

2. Problem Statement:

Today, there are many types of wheelchair in market. And there is Wheelchair which can adjust height according to the sitting person. Name is **Merits P327**. This device price is approx. 29 lakhs, which is not in budget of middle Class person.

A person always required for care and transfers one place to other place.

3. Objectives:

1. To make comfortable and easy to Available the Wheel Chair At lowest Price.
2. To design a power scissor Lifting Wheelchair which is safe and reliable to raise and lower the load easily.
3. Make better life of handicapped person.
4. Live free without depending other.

4. Conceptual Design

We assume a single caregiver for the use of this wheelchair. It helps alleviate the burden of the caregiver when a disabled person moves between the wheelchair and toilet/bed easily and safely. We presuppose that the target users for this equipment will be able to take a seating position

(1) The wheelchair has a lifting function. The lifting mechanism comprises a lifting frame, and a winch such as a conventional lift. The lead screw is driven by an electric motor that a caregiver operates using an up/down switch. Therefore, this design is safe: the previous state remains even if the power source is cut off.

(2) Large driving wheels are located in front of the body, and the seat can be folded. As a result, this equipment can lift a user easily and safely. Furthermore, this location: front driving casters are rigid and rear wheels are power wheels, has good Maneuver ability resembling that of a seating person.

There are three main mechanisms are as follows:-

1. Sliding –Roller Mechanism
2. Scissor Mechanism
3. Screw Mechanism

Sliding Roller Mechanism:-A high number of rollers continuously in contact with surface, increasing contact area which increases the slide load rate capability and decrease the friction.

Scissor mechanism:-it is device used to extend or position a platform by mechanical means.

Lead screw mechanism:- A lead screw turns rotary motion into linear motion combining a screw and a nut where the screw thread is in direct contact with the nut thread.

5. Raw Material Required

Lead Screw

Angles, Pipes of
Iron Small Screw
and nut Washers
Bearings and thrust
bearing Old Chair

Wheels Front and Back

Wiper Motor and Self start
motor Battery

Control System

6. Major Components:

Lead screw is known as power screw or translation screw.



Figure-1: Lead screw

Thrust bearing is a particular type of rotary bearing use for to support a predominantly axial load.

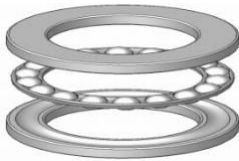


Figure-2: thrust bearing

Wiper motor is suitable for various land robots and high powered project. Motor speed is 55 rpm.



Figure-3: Wiper motor

Construction of lifting Wheel chair:

First of all cut the 1*1 foot of iron square pipe in 8 pieces (42 cm). Drill all pieces and make cross scissor mechanism and make frame by iron angle (45cm*25cm) as shown in figure 1.



Figure-4: Frame and scissor pipe

Assemble both for making sliding roller scissor mechanism (ball bearing use as roller) shown figure 2



Figure-5: Sliding roller scissor mechanisms

After structure assemble the lead screw for motion in lifting of seat. (Shown in figure 3)



Figure-6: whole lifting mechanism

The wiper motor is used as rotation in lead screw. In the second part joint an old chair on mechanism and after joint the rear wheel with motor or front caster wheel. Make a side battery pocket. And connect all controls with motor.



Figure-7: final product similar this picture

Dimension and calculation:

Iron angle 4*45 cm, 4*25cm

Iron square pipe 8*40 cm

Lead screw 20mm diameter* 30 cm long

Rear wheel diameter 30 cm

Whole body weight= 36 kg

Force of body = $36 \times 9.8 = 352.8\text{N}$

Weight of human = $120\text{kg} = 1177.2\text{N}$

Wight of lead screw = $0.4 = -3.92\text{N}$

Whole force = $(352.8 + 1177.2 + 3.92) = 1533.92\text{N}$

Force on each wheel = $1533.92 / 4 = 383.48\text{N}$

7. Result:

Our project used for making comfortable of handicapped at working time.

The budget of wheelchair is almost near the other wheelchair price. The wheelchair price is almost near 14000 RUPEES.

Application:

1. Change height of seat easily.
2. Use anywhere at home and office.
3. People at old age homes can use this chair as per their requirement.

Advantages:

1. Self locking due to lead screws more safe.
2. Easy to transfer bedroom, toilet and vehicle.
3. Low maintenance required

4. In budget of middle class people.
5. Easy to control.
6. Stable wheelchair
7. Construction design is simple.

Limitation:

1. Required dc power for up down chair
2. Braking system performance low.
3. No suitable for 120 kg above person.
4. Noisy in lifting.
5. Not easy to turn.
6. No back movement.

7. Conclusion:

The project was carried out successfully according to the project plan. The mechanism is designed and developed in order reduce the human fatigue. We proposed a novel wheelchair with a lifting function for an electric wheelchair user with disabled upper and lower limbs.

This equipment facilitates easy and safe transfer from to a bed and a toilet seat by virtue of the opposite allocation of wheels from that for a usual wheelchair. We presupposed that the target users for this equipment will be able to take a seating position. The proposed equipment can lift a person who is lying on a bed. With the help of current research, we briefed out the basic Design Procedure of the Mechanically Operated Scissor Lift working on the principle of Lead screw. After completed this project, I have gained some skills and knowledge in this field. I have learnt many things in terms of utilizing engineering mechanisms in a proper manner. Finally, the experience I have obtained throughout this project will certainly help me to be a creative engineer in the future. In future works, we plan to improve this system for better practical use, mechanical strength, and design. We are planning to add a headrest to the backrest frame. Better seating, safety, and comfort will also be required. We intend to produce this system to have a similar price to that of an electric wheelchair that has some additional functions, such as a reclining

function. In addition, we are considering a manual winch to reduce costs and pricing.

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