

Fabrication of Stair Climbing Wheel Mechanism: Alternate for lifting goods

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Abstract - The project aims to develop a mechanism for easy transportation of heavy load over stairs. The need of such system have raised from day to day requirement in our society. Using of this vehicle the labor cost can be reduce as well as large amount of load can be transfer uniformly with less power consumption thus our project introduces the new alternative for transportation of load over the stairs. It has designed in such a way that it can be climb a stepped path with its modified wheel structure.

putting minimal strain on the user. To produce a successful product, these other design options must be examined more closely. Future work on this product should involve design and construction of other prototypes which use different stair-climbing strategies.

Also, the possibility of a design that does not rely on an electrical power source should be investigated thoroughly.

1. INTRODUCTION

The project is about design and fabricates a new product of trolley that has multifunction. The vehicle is designed in such a way that it has three wheel on each side. They are set in triangular pattern. This thesis focuses on the maximum ergonomically beneficial to human being. The present project related to load carrying equipment of a type that is manually operated of moving upwardly and downwardly on flight of stairs. Load carrier is a wheeled mechanism device, is generally used to carry a loads. It is use to reduce human efforts. Load carrier at its inception is hand truck.

1.1 PROJECT BACKGROUND

Trolley is equipment used to move heavy loads from one place to another. It can reduce the human burden in their daily lives. This device is commonly used by a large number of industries to transport physical products. trolleys are often used by those who organize and stock merchandise in retail stores restock. when used properly, trolley can protect people from having back injuries and other health problems that can result from lifting and carrying heavy loads.

2. LITERATURE REVIEW

Purpose of Research the purpose of this research is toward increasing the autonomy of person's reliant on mobility assistive devices, and to reduce the load on care workers in providing such mobility.

The objective of this thesis was to designed and test a consumer-grade hand truck capable of climbing stairs. Several designs were conceived that would allow a non-industrial hand truck to travel over stairs, curbs, or uneven terrains while

3. DESIGN CONCEPT

3.1 Comparison

Old design concept	New design concept
1. In the initial design each single or Double wheel set on either side is only capable of moving vehicle on flat surface.	1. In this concept we attached set of three wheel on either side of vehicle rather than single or double wheel.
2. The plate which is mounted on the Base is not movable.	2. The plate which is mounted on the base is movable.
3. It required more human effort.	3. It required minimum human effort.
4. It was unfold able cart and difficult to carry.	4. It is compact in size and easy to Carry.

3.2. DESIGN OBJECTIVES

- The device should able to bear weight of up to 100 kg.
- A man can lift average weight 40-50 kg.
- The cost of device should be comparable that of conventional consumer grade hand truck.
- The product should be ergonomic and easy to use.
- The weight of product should be comparable that of conventional models.
- The product should be intuitive to use.

3.3. ADVNTAGES OF MODIFIED DESIGN

- Power transmission to wheel is not wasted.
- More load bearing capacity.

- Easily handle able and maintenance free.
- Ergonomically good as it can be handle by any age of people with ease.
- Less stress develops on the muscles.

4. MATERIAL SELECTION

4.1. MILD STEEL ROD

General purpose steel bars for machining, suitable for lightly stressed components including studs, bolts, gears and shafts. Often specified where weld ability is a requirement. can be case-hardened to improve wear resistance. Available in bright rounds, squares and flats, and hot rolled rounds. Can be supplied in sawn blanks, and bespoke size blocks.

4.2. MILD STEEL METAL SHEET

Sheet metal is metal formed by an industrial process into thin. flat pieces. It is one of the fundamental forms used in metalworking and it can be cut and bent into a variety of shapes. countless everyday objects are constructed with sheet metal. Thicknesses can vary significantly; extremely thin thickness are considered foil or leaf, and pieces thicker than 6mm (0.25 in) are considered plate. Sheet metal is available in flat pieces or coiled strips. The coils are formed by running a continuous sheet of metal through a roll slitter.

The thickness of sheet metal is commonly specified by a traditional, non-linear measure known as its gauge. The larger the gauge number, the thinner the metal. Commonly used steel sheet metal ranges from 30 gauges to about 7 gauges. Gauge differs between ferrous (iron based) metals and nonferrous metals such as aluminum or copper; copper thickness, for example are measured in ounces (and represent the thickness of 1 ounce of copper rolled out to an area of 1 square foot).

4.3. BEARING

6203-2Z SKF



Figure 4.3. Deep groove ball bearing

4.4 FEATURES

- Single row deep groove ball geometry for high speed and supporting both for radial and axial load.
- Stainless steel for durability resistance to deforming under heavy load.
- Normal radial internal clearance for application that do not involve thermal expansion or typical precision.
- Metal shield on both side of the bearing keep the lubricant in and contaminant out.

5. MACHINING OPERATION

5.1 CUTTING OPERATION

Slitting is carried out with a pair of circular blades. the rotary cutters slit the sheet along straight line or along straight line or along a closed contour. The blades or either rotated by power or kept idling through which the sheet is pulled. Trimming is a finishing operation in which a previously formed part is finished in its contour by shearing off of the burr excess material.

Shaving is a finishing operation in which shearing off of burrs from the cut edges is carried out in order to make the edges smooth and also impart dimensional accuracy. Cut off operation involves removal a blank from a sheet metal by cutting on opposites sides, sequentially

5.2 PIPE BENDING

Bar bending Machine is a semi-automatic, durable fast and cost effective machine, used for bending reinforcement bars and various forms of round bars. we are branded for our excellent quantity of raw material used in the manufacturing process of Rebar Bending machines as well as outstanding after sales service for the aforementioned product. this machines effectively increases the production capacity of your steel yard, minimizing the use of manual labor. TMT bending machine, also known as, Bar bending Machine are boisterously designed for lifelong operation making them uncomplicated to use and extremely user friendly.

5.3 WELDING

One of the most common types of arc welding is shielded metal arc welding (SMAW), which is also known as manual metal arc welding (MMAW) or stick Welding. An electric current is used to strike an arc between the base material and consumable electrode rod or stick. The electrode rod is made of a material that is compatible with the base material being welded and is covered with a flux that gives off vapors that serve as a shielding gas and provide a layer of slag, both of which protect the weld area from atmospheric contamination.

The electrode core itself acts as filler material, making separate filler unnecessary. The process is very versatile, requiring little operator training and inexpensive equipment.

However, weld times are rather slow, since the consumable electrodes must be frequently replaced and because slag, the residue from the flux, must be chipped away after welding.

6.1 ADVANTAGES

- Stair climbing is Autonomous operation on stairs, slopes and irregular terrain.
- This project is more Economical.
- This is more efficient.
- The stair climbing is suitable to almost all stairs.
- stair climbing ability with a less power consumption.
- Compared to other wheel load carrier the effort required is less with this type.
- This load carrier makes it possible to move unit loads cost effectively, safely and ergonomically.

6.2.APPLICATION

- The stair climbing is used for material handling.
- This mechanism can be used as stair climbing mechanism for material handling.
- It can be used in transportation of luggage from one floor to another on stairs in hotels, malls, hospital etc.
- It can be used in building construction.

6.2 CONCLUSION

- The main aim of the project is stair climbing mechanism for load carrier with decreasing effort.
- Doing better work with lessor effort has been the main objectives of human beings in any field.
- The main project as platform we try to present mechanized stair climbing load carrier with reducing effort.
- Stair climbing mechanism in stair case load carrier which helps to carry the loads with help to carry the loads with stair case.
- We completed the project to our best.

6.4 FUTURE SCOPE

1. Better wheels can be selected by analyzing the wheel contact is specific.
2. Internal breaking system is used as effective breaking system.
3. The same mechanism can be used for wheel chair providing high head motor along with more rigid structure is used.

7.COST ESTIMATION

Sr. No	Material used	Quantity	Rate(INR)
1	Wheels	6	300
2	Bearing	2	150
3	MS round bar	1	500
4	MS metal sheet	-----	150
5	Welding rod	10	100
6	Coloring work	-----	100
7	Nut & bolt	-----	100
	Total		1400

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