

REVIEW ON DESIGN AND FABRICATION OF PNEUMATIC OPERATED STAIR CLIMBING MACHINE

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Abstract:

In today world, Machineries automation system play a vital role, it is actually and arrangement of different elements in order to regulate, direct, sense and command itself to achieve the desired result. Machines has widely been used for a wide number of tasks. But a very promising use of Machineries lies in goods transport. The problem in using Machines transport is that they cannot climb stairs and cannot go through rough terrains. But if a Machine can do that then the application of machineries are beyond our imaginations. Most Machines use either a wheeled or a tracked mechanism for mobility. While wheeled mechanisms offer impressive speed and a significant advantage in steering, this often proves to be difficult to use in off-road conditions and for climbing over obstacles. While tracked Machines offer a significant advantage in rough terrain, these still get stumped when it comes to climbing stairs. Apart from the two tracks it uses for horizontal mobility, this Stair Climber Machine has dual tracked retractable arms that have been designed specially to help it climb stairs and large obstacles with ease.

Keywords — Pneumatic machine, Machineries, Stair Climbing Machine, Stair climb.

I. INTRODUCTION

Three types of mechanism are categorized in mobile Machines world to get a destination mobility they are leg, track and wheel mobile Machines which are based in design of desired mobility. The result from research and development of the Machines which support and help people tasks in our daily lives comes out solutions. Wheeled or crawler type climbers are useful to carry heavy load and people for disability. This is because those types of vehicles have much more capacity to payload than legged-walking Machines have.

On the other hand, a cart is utilized in horizontal carrying of heavy load instead of climbing to high with heavy objects. In realistic it is needed to climb the higher place with heavy load as well as

traversing stairs are seen in every place. Therefore Mobile Machines are built in different environment to get the destination output move with versatility, smoothly and high efficiency. To save people life it is effective and essential as the Machine can move over irregular terrain of collapsed and destroyed buildings. The Machine for climbing purpose is a fully-automated vehicle, which has designed to climb the stair easily. It is one of the well-known performance mobile Machines. They are focused on two things, one is for climbing the high place and other is to carry heavy loads. Therefore engineer and people who are interested in designed and built that kind of Machines implement in places where is difficult to climb and carry to bring something. This project is based on the existed semi-automated stair-climbing Machine; the advantages and disadvantages between different types of stair-

climbing Machines are compared and summarized, in order to make new design overcome those disadvantages.

This project includes realizing how much height is negotiable to get step, controlling the gravity of object to keep the ground centre point, climbing up speed, and carrying out the load how much can support. One of most important to design mechanism in build mobile Machine to climb high place is that maintain the less weight of Machine and power consumption in which it is used. This project is considered the total load 60 kg to carry and the motor torque which has 120 kg. cm will be used for mechanism. This stair-climbing Machine will be utilized for angle between 30 degree and below 30 degree.

II. LITERATURE REVIEW

1] Arish Ibrahim. “Design and Fabrication of Ramp Attachment for Wheelchair”

The paper proposed an economic way of improving the capabilities of manual wheelchair that eliminates the difficulty of climbing over curbs. The design can be implemented with less production cost and can be included to the existing designs. This climbing aid need to be undergo various field tests and analysis to improve the stability and durability

2] Dr. P.V. Sanjeeva Kumar, Dr.A.Hemanth Kumar, Dr.P.Varaprasad” “Design and Fabrication of Motorised Stair Case Climbing Trolley”

The main benefit of the project is stair climbing mechanism for load carrier with decreasing effort. Doing better work with lesser effort has been the main objectives of human beings in any field. This project as platform we present motorizedstair case climbing trolley with reducing effort. The future enhancement of our project is we have to rectify the problemsthat we have encountered during descending of the trolley instairs. We had a smooth travel while ascending but whilecoming down from the steps, we found some vibrationproblem and to overcome this we have planned to installsprings and

braking system, so that trolley will be in a goodcontrol while descending also.

3] Prof. DarshikaKawase, Ms.SajeshwariBhagat, Mr.Rushikesh Humane, “Design and Fabrication of Stair ClimbingMechanism to Lift Load over Stair”

Stair case slider can be adapted for its sheer use simplicity and economy. In our projects making a cost friendly Stair lift which is having some limitations but more advantage, it was a good and challenging project for us. During the test run of this project, it was realized that it would capable of carrying heavy load without any difficulty and any deformation. Though the initial cost of the project seemed to be alittle bit higher but it is accurate. Manufacturing would shorten this. Stair lift has distinguished advantages and benefits.

4] AkashAsalekar, AkashChorage, BhushanJagdale, “Design and Fabrication of Staircase Climbing Machine”

This work shows how eight-wheel machine works ondifferent surfaces. As per the different weight acting onlink determines torque applied on it. By assuming accurate stair dimensions, accurately dimensioned eight machines can climb the stair with great stability. Also we tested for the Web cam with AV recording mounted on eight-wheel system and found satisfactorily performance obtains during this test camera 3.

III. CONSTRUCTION MATERIAL

Following are the main components used in project-

- Pneumatic actuator
- Pneumatic valve
- Direction control valve
- Flow control valve
- Hose and tubes
- Battery

Constructional arrangement

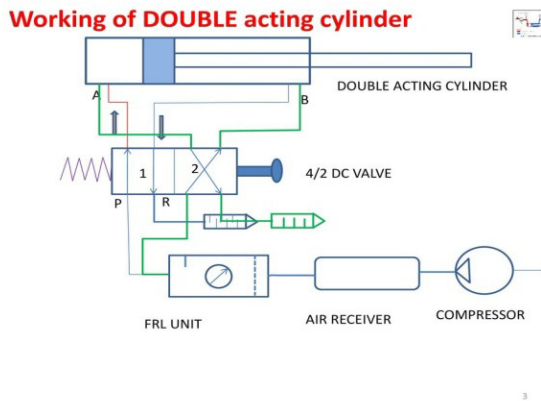


Fig. 1 working of Double acting Cylinder

IV. PROBLEM IDENTIFICATION

1. To carry more load like 50kg or more we need more human effort to climb stairs.
2. Time is wastage of many people to carry load.
3. Pneumatic system are made are not so economical so We need an economical setup.
4. Earlier setup made are electronically operated and carries more number of sensor and cameras which is not economical small scale setup

Objectives of project

To develop the intelligent of automated stair-climbing Machine which can measure and detect stair and also carry heavy load on the stair

- To develop the more efficiency climbing and landing performance by using the process of pneumatic control system
- To develop the auto driving and manual driving modes
 - To design a simple pneumatic circuit which will used to make a machine in economical manners.

V. METHODOLOGY

- Design the shape and size of model of project.

- Selection of material and components utilized in fabrication of innovative project .
- Finding the requirement of equipments for measuring the different parameters.
- Fabrication of different components for experimental set up according to design.
- Performance on the experimental set up.
- It Consist of main body which is a right angle triangle support structure which holds and supports all the parts. All the load of the body and element is sustained by adjustable stand.
- Motion to the treads is provided with the help of pneumatic & mechanical linkages structure, which are mounted over the frame. When we apply switch on the solenoid valve which is directly translated to the motion of the treads.

Advantages

- Clean and non – pollutant.
- Transportable over long distances.
- High speed operation.
- Relatively low cost to fabricate.
- Technology can be easily learned.

Disadvantages

- The Machine can avoid some object when it moving on the plane ground and the stairs considered will only be full-frame stairs, i.e. without gaps and holes.
- The Machine will have limitations related to maximum allowed load, maximum step height maximum stair slop.

VI. CONCLUSION

In this Project, the Machine is designed as combination of leg-type and track-type. For the leg type, the pneumatic system is used in this Machine

design that performed for lifting the one side of Machine to reach a first step of stair and also supports for climbing down.

The Machine will be climbed stair with heavy load. Furthermore, the Machine can parallelize to the ground while climbing a stair by the using of pneumatic system which also can prevent the effect of backward force. Also, belt tension mechanism includes for reducing the friction between wheels and belts while climbing.

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