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Design and Fabrication of Mechanized Stair

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Abstract - *Generally at many places there is no provision for disable people to climb the stairs with the help of this mechanized stairs the person will able to do it. The objective is to transmute the staircase into ramp or platform, so that lame or disable people can make use of it. It is a amalgamation of stairs and ramp so it can use alternately whenever needed, it is a type of portative stairs. Involvement of such mechanized things will help to reduce human work. The main rationale behind working on this topic is to reduce human effort in day to day life and vanquish the difficulties. The work is done to bring the conceptual idea into reality.*

Key Words: **Transmute, Amalgamation, Portative, Requisite, Ergonomically.**

1. Introduction

Today's world is of new technology, development and evolution so rapid working machine and equipments are requisite. New contraption and techniques is being incessant developed to manufacture effort reducing products at cheaper rates.

A Stair is a combination of steps by which people may pass from one level to another. It is a contiguous set connecting two floor or surface on different level. Stairs are constructional design to bridge up the two platforms which are not on the same level. Stair case may be of different design like straight, circular as per execution or constructional design they are used. Some alternatives to stairs are elevators, stair lifts and inclined moving walk ways. Ergonomically and for safety perception, stairs must have good construction so that people can comfortably utilize them.

1.1 Concept of Mechanized Stairs.

The main concept of mechanized stairs is create a combination of stair and ramp by implementing mechanical linkages, different mechanism so that it can be use simultaneously as a stair or ramp as per use or need. As per contemplate there is a major predicament for disable people for climbing stairs so this idea was conceptualized by integrating with mechanical systems. By considering the concept the fabrication was carried out to prepare the stairs by fulfilling three basic requirements economic viability, technical feasibility and social acceptance.

Fig:1 Conceptual Design.[1]

2. Constructional factors and working.

It consists 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 worm gear, which are mounted over the worm rod, which is supported by the bearings at both ends. Each worm is locked with the help of keys at particular distance, motion carried by worm is then transfer to the spur gear. Spur gear motion is directly translated to the motion of the treads.

Fig:2 Fabricated Stairs

Stairs are totally based on simple mechanism which provide up and slant motion to the tread. In general condition it can be used as normal stairs, when crank or motion is provided to the worm rod and the same motion is

gained by the worm which is meshed with the spur gears. As the spur gear is attached with tread rod the same motion is obtained by the tread frame and its start converting to ramp. Same time the links are also operated due to the motion of tread which give rigid construction to the stairs. On converting into stairs it is provided with the self locking system with the help of worm mechanism.

Fig:3 Converted Ramp.

2. 2 Fabrication Specification.

Sr. no	Name of parts	Material used	specification
1	Frame	Mild steel	L- shaped m/s angle frame =2, L-shaped bar 164cm, Frame used for treads having square cross section 3×3cm^2, m/s bar used for connecting two stands is made up of rectangular cross section 5×2.5cm^2
2	Treads	Plywood	Rectangular tread of 76×33cm^2 having of thickness of 2cm, surrounded by tread frame of 82×38cm^2. Vertical distance between two steps 21cm.
3	Spur gear	SAE 1045	Number of teeth=15, Module=1, Bore diameter 1.4cm, Hub diameter=2.5cm, Number of spur gear used 8.
4	Worm gear	SAE 2320	Length of worm 5.5cm, Type of worm single threaded, Single enveloping, Pitch 0.4cm, Face width 2cm, Bore diameter 2.4cm, Number of worm 4.
5	Bearings	Tin base babbits	Deep groove ball bearing, Bearing diameter 5.04cm, Bearing number 0310
6	Rod	Steel rod	Tread rod diameter 1.6cm, Length of tread rod 86cm, Worm rod diameter 1.4cm, Length of worm rod 130cm.
7	Links	Mild steel	Two bar link mechanism is used, All links are connected to master link, Length 110cm, Width 3cm, Thickness 0.4cm. First tread consist of two links 1st link length17cm, 2nd link length22cm. Second tread link length 22cm, Third tread link length 22cm, Fourth tread consist of two links 1st link length 15cm, 2nd link length 23cm.
8	Frame stand	Mild steel	It is type of adjustable stand which height can be adjusted, Original length 78cm and can be converted up to 55cm.

Table no.1 Fabrication specification

3. Result

Overall stairs can sustain a load of 90 to 105kg, by knowing the exact dimensions of upper and lower platforms stairs with exact dimensions can be produce. The load bearing capacity can be increased by using suitable materials, durable stairs can be produce and also weight of the stairs can be reduce by using materials like aluminum alloys and carbon fiber.

4. Conclusion

Experience through recent studies reveals that ramp and stairs are used separately, by introducing mechanized

stairs it can be used with ease and it is practically beneficial. Various other mechanisms can also implement for the same process, it can be automated by using electric motors for giving motion to worm rod. By using different materials strength, load bearing capacity, resistant to weather can be improve. Sensor and alarms can be installed for safety purpose.

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