

Hill Trolley

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1. The context of use

People in the mountains face the problem of transporting large quantity of firewood that they need and carrying the load on the head and negotiating sloping surfaces is a major problem. No suitable trolleys are available to meet these topographical needs.

To meet this specific context, the innovator, a student has designed a trolley with a unique wheel mechanism to address the uneven topography.

2. Working principle

It is a trolley with three cast iron wheels and adequate load carrying, turning and braking capability, the trolley handles uneven topography by its unique mix of front wheel combination sets and swiveling back wheel. The spring loaded handle actuates the drive to the front wheels to move forward.

When the trolley hits a boulder on the ground, the equilateral triangle with three wheels at its vertices pivots over the bottom wheels and the top wheel tips over the boulder .

Even if the handle slips or it is left free, the weight of the hook shaped bar causes the spring to go to normal position and the braking is automatic and the bar digs into the ground and the trolley stops.

A force of 50 N is needed to actuate the handle and move forward. For loading the wood logs, the smaller ones are placed at the bottom and the larger at the top and the end hooks can be used to fix a covering sheet across the top.

3. Innovation highlights

The innovativeness lies in having the front frame fitted on either side with an equilateral triangle frame fixed with three wheels at the vertices, this unique three in one rotatable wheel arrangement contributing to running over boulders and uneven topography and this is coupled with a free swivel wheel at the back suited to turning.

4. Compare innovation to competing products by efficiency, cost and utility

Compared to the painful way of carrying 10 kgs on the head, this trolley can handle upto 40 kgs and is estimated to cost Rs 750 for a cast iron/steel based trolley solution. Current steel based trolleys in market are in the range above Rs 1500.

The entire trolley collapses into a box, which can be transported easily. Resting on three wheels makes it a stable propelled transportation device.

The trolley is fully compact, with convenient handle bar and can be carried easily when not in use. It has a spring loaded braking system whenever it goes out of control and has easy turning mechanism and special wheels to handle boulders upto 20 cms height and uneven topography

5. List the current and proposed applications of innovation

Other than for firewood, the trolley can be used to transport fruits and flowers, harvest produce, water pitchers and also considered for transporting old or sick people.

6 Brief description of construction mentioning major parts

The major components of the trolley include vertical and horizontal plates, hooks and hinges to connect the plates, two sets of triangular frames with front wheels along with swivel wheel, two handle bars, two springs to govern braking, braking rod, wire, wheel shafts and support.

7. Current design shortcomings and further work planned

The prototype has to be made and tested on mountain topography. The braking , turning and movement over topography has to be specifically seen. The costing has to be verified for a steel/cast iron option and FRP option.

8. List of accessories if any and their functions

None

9. What is the need/benefit of this product for local community?

Once fully developed to the desired efficacy, it will be a valuable unit to transport firewood and harvest produce in the mountains.

10. Any special highlights of the innovation or additional information such as evolution

The student innovators are exploring both cast iron/steel as well as FRP based material option to get maximum strength while having lower cost.