

Spring Less Suspension using Rocker Bogie Mechanism

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Abstract: *The rocker bogie mechanism is a type of suspension system commonly used in robotic vehicles, particularly in space exploration rovers like NASA's Mars rovers. Unlike traditional spring-based suspensions, the rocker bogie mechanism relies on a system of pivoting joints and linkages to maintain stability and traction over uneven terrain. This mechanism allows the vehicle to traverse rough surfaces by distributing weight and adjusting wheel positions to accommodate obstacles. Its abstract nature lies in its ability to provide stability and mobility without relying on springs, making it well-suited for navigating challenging environments such as rocky terrain or steep slopes. Overall, the rocker bogie suspension system is well-suited for applications where stability, mobility, and reliability are paramount, making it a preferred choice for planetary exploration missions and other off-road vehicles operating in rugged terrain.*

Keywords: Maintain stability, Distributing weight, Suspension, Mobility, Adjusting wheels

I. INTRODUCTION

The rocker-bogie mechanism is a suspension system commonly used in rovers and vehicles designed for traversing rough terrain, such as those used in space exploration or off-road applications. It's often associated with the Mars rovers like Sojourner, Spirit. The rocker-bogie mechanism consists of a differential bar that connects the wheels on each side of the vehicle, allowing them to move independently. This mechanism provides stability and adaptability to uneven terrain by allowing the vehicle to maintain contact with the ground even when traversing over rocks or obstacles. While the rocker-bogie mechanism provides excellent mobility and stability, it doesn't inherently incorporate springs. Instead, it relies on the flexibility and geometry of its structure to absorb shocks and unevenness in the terrain. The design allows the vehicle to adjust its wheel positions relative to each other, effectively acting as a form of suspension without the need for traditional springs.

II. BACKGROUND

The rocker bogie suspension system was developed by engineers at NASA's Jet Propulsion Laboratory (JPL) to provide stability and mobility to robotic vehicles exploring challenging terrains, particularly on other planets like Mars. It features interconnected bogies with multiple wheels, allowing independent movement to adapt to uneven surfaces. This innovation has enabled rovers like Sojourner, Spirit, Opportunity, and Curiosity to navigate diverse landscapes and gather valuable scientific data on Mars, showcasing its effectiveness in planetary exploration and inspiring advancements in robotics for terrestrial applications.

III. OBJECTIVE

To design and develop for helping farmers in agriculture sector. The mechanism use for sowing. Due to the presence of springs in other vehicles suspension the deformation takes place but in our mechanism has spring less suspension is provided there for no deformation is happened The structure is light weight so it has high load carrying capacity. The mechanism doesn't have any deformation of springs so maintenance is low As small farmers can't afford heavy vehicles for sowing so this mechanism can be helpful

IV. MOTIVATION

In the world the maximum suspension in automobile are using springs suspension. As a secondary option there are hydraulic and magnetic suspension is available and the hydraulic suspension needs to change oil from time to time there for logically the maintenance is high magnetic suspension use in low scale because it's under research and deployment To wanted to make an alternative for small scale farmers who can't afford heavy vehicles for sowing

V. WORKING

In order to go over an obstacles, the front wheel are forced against the obstacles by the rear wheel the rotation of the front wheels then lift the from the front side and over the obstacles

The middle wheel is the pressed against the obstacles the obstacles by the rear wheel and pulled against the obstacles by the front, until it is lifted up and over

Finally the rear wheel is pulled over the obstacles by the front two wheels . During each wheels traversal of the obstacles forward progress of the vehicle is slowed or competitive halted

This mechanism move slowly and climb over the obstacles by having wheels lift each piece of the suspension over the obstacles

VI. ADVANTAGES

Reduces the dependency y of sprigs :- no any springs attachment so logically no deformation issues. Minimal Moving Parts: Compared to traditional suspension systems with springs and shock absorbers, the rocker bogie mechanism has fewer moving parts, reducing the risk of mechanical failure and simplifying maintenance requirements Improved Traction: The arrangement of multiple wheels, typically six, wheel configuration enhances traction and distributed . The rover's weight evenly across the wheels. This feature is crucial for navigating challenging terrain, including loose soil, sand, and rocky surfaces.

VII. CONCLUSION

This is a wide field of study and is very bless explored. So this gave us the motivation for the development of this spring less suspension rocker bogie system mechanism in a cost effective manner our concern during the development of the rover will be to optimize the speed such that the rover do not flip and may travel a little faster too and makes it cost effective with maximum possible rigidity and ruggedness with certain developed the spring less suspension system can be used for defense related operation and also in wheelchair for climbing for agriculture sector, military sector for spy. We studied about electronic components , linkage material strength market prices welding process and prices ,

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BIOGRAPHY

The rocker bogie suspension system, born out of the necessity for robust mobility solutions in planetary exploration, emerged from the collaborative efforts of engineers and scientists at NASA's Jet Propulsion Laboratory (JPL) and other institutions. Designed to navigate the rugged terrain of celestial bodies like Mars, this innovative mechanism features interconnected bogies with multiple wheels, allowing independent movement to adapt to uneven surfaces while maintaining stability and traction. Its application has been pivotal in space exploration, notably in NASA's Mars rover missions, including Sojourner, Spirit, Opportunity, and Curiosity, enabling these rovers to traverse diverse landscapes and gather invaluable scientific data. Beyond planetary exploration, the principles of the rocker bogie suspension system have inspired advancements in terrestrial robotics and off-road vehicles, reflecting its enduring impact on mobility solutions in challenging environments