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THREE AXIS DUMPING MACHINE

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INTRODUCTION

The material should be properly loaded, managed, stacked, transported and unloaded. The dumper carries the material, which is loaded from the site, where the material is initially stored.

The primary objective of using a material-handling system is to ensure that the material in the right amount is delivered to the desired destination at the right time and at the minimum cost. Material handling is an integral part of any industrial or commercial activity. The material handling cost component can form 10-80% of the total cost. Furthermore, the equipment is also prone to accidents. Thus, it is imperative that the material handling system is properly designed from efficiency as well as safety point of view.

Presently small distance material handling is done by carriers like trucks, tippers, tractor trailers etc. Long distance material transportation is done normally through railways which is the cheapest compared to this road transportation system. The material being loaded onto the trailer or the tipper by some mechanism like excavators or conveyors etc.

Un-loading of the material from these trucks is again mechanized by using lie lifter mechanism below the trolley which lifts the trolley from one side when pivoted at the other end. But the present system is having only one side lifting mechanism which may not be convenient which calls for the flexibility of the lifting mechanism.

It is then loaded to the dumper and transported to the required site and then unloaded. In most cases where road width is not enough, trailers face the problems while unloading the material. It takes a lot of time to unload a single trolley as all material cannot be unloaded at same place. Hence additional time is required for turning of vehicle in highly congested area. The dumper unloads the material in only one direction. But this in capability can be fulfilled by a new method mechanism as the unidirectional dumper. This mechanism is an approach to reduce the idle time to settle the dumper. The material is unloaded in any direction and hence can be boldly stated as “Unidirectional Dumper.” That is 180º axis the major outcomes of unidirectional dumper have overcome space requirement which often result in road blocking. This mechanism prevents blocking of road, saves time and enhances productivity at lowest cost. The automotive sector is fast booming section in India. There are variable in automotive

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industry light and heavy motor vehicle. Heavy duty vehicle support as the backbone and confront to the working. A dumper whose material can easily be unloaded in one direction that is mostly to its rear end. This inefficiency is been overcomes by the unidirectional dumper. The dumper unloads the material in only one direction. But this incapability can be full new method mechanism as the Multidirectional dumper. Gothic mechanism is an approach to reduce the idle time to settle the dumper. The material is unloaded in any direction and hence can be boldly stated as "Multidirectional Dumper." The major outcomes of Multidirectional dumper have overcome space requirement which often result in road blocking. Hence, we have inversion in the existing mechanism providing the unloading in 180 rotations. This mechanism prevents blocking of road, saves time and enhances productivity at lowest cost. The automotive sector is fast booming section in India.

This 3-axis mechanism can be applied to both industrial as well as domestic areas. The proposed mechanism used for unloading purpose is safe and efficient and could be used safely in different areas. A dumper is a vehicle designed for carrying bulk goods, often on building areas or construction side. Trolley is distinguished from dump trucks by configuration.

A dumper is usually an open Four wheeled vehicle with the load skip in front of the driver side, while a dump truck has its cab in front of the materials. The skip can tip to dump the load; this is where the name "dumper" comes from. They are normally diesel Fuel powered. The towing eye is fitted for secondary use as a site tractor. Dumpers with rubber tracks are using in special circumstances and are popular in some nations. The early dumpers had a payload of about a ton and were 2- wheel drive, driving on the front axle and steered at the back-side wheels. The single one-cylinder diesel engine was started by hand cranking. The steering wheel turned the back wheels, not front. Having neither electrics nor hydraulics there was not much to go wrong way. When the catch is released, the skip tips under the weight of its contents at pivot point below, and after being emptied is raised by hand. The dumper is an integral part of any construction working and hence its role is very important for completion of any constructional Ares. One of the problem are face with dumper in the time and energy for setting the dumper in the proper way to dump the material it in carrying and hence the need of the paper work riser which is about 3 direction way dropping dumper which can unload the material in any direction except the rental one without moving the truck in any direction. hydraulic cylinders each on front side, right side and left side of trolley to unload loose material on back side, left side and right side of trolley respectively. Some design modification is needed in existing system to work on multisided tipper tilting mechanism.

Objectives

The objective of this project is to modify and fabricate the modern three axis trailer for industrial application. To give additional two directional motions to the trailer. To develop mechanism for reducing time of loading and unloading, to provide easier of way dumping.

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Problem occurring in unidirectional dumper

Fig 1.0 unidirectional dumper

As shown in the above image of a unidirectional dumper in which it covers the whole road while dumping as well in dumping difficulties trolley, so we need turn the whole for smaller road thus three axis dumping machine over comes with these difficulties.

Literature survey

Design and Development of 3-Way Dropping Dumper:-

Modern 3 ways dropping dumper" has been conceived by observing the difficulty in unloading the materials. The survey in this regard in several automobile garages, revealed the facts that mostly some difficult methods were adopted in unloading the materials from the trailer. So, there will be 180 ° rotation of dumper so easy in unloading of materials. [1]

Development of three axis lifting modern trailer:-

Trailer has lots of applications in today's world. In industrial and domestic considerations, Tippers can pull a variety of products including gravel, grain, sand, fertilizer, heavy rocks, etc. By considering wide scope of the topic, it is necessary to do study and research on the Topic of tipper mechanism in order to make it more economical and efficient. In existing system, tipper can unload only in one side by using pneumatic jack or conveyor mechanism. By this research it is easy for the driver to unload the trailer and it reduces time and fuel Consumption. For making tipper mechanism with such above conditions pneumatic jack Mechanism can be used. [2]

Design and Fabrication of Unidirectional Dumper: -

The prototype of unidirectional dumper is thoroughly based on pneumatic system for lightweight load and for heavy weight load pneumatic system is suitable. This prototype model consists of oil compressor, oil reservoir, Pressure gauge, hydraulic cylinder etc. [3]

Design and Fabrication of 3 Way Tipper Mechanisms: -

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Hydraulic jacks use a plunger mechanism and non-compressible fluid, typically a hydraulic pump to create required pressure and resulting lifting capability. In this project hydraulic jack is attached below whole setup to lift the trolley for backside. [4]

Design of hydraulics study: -

Alley & McClellan Glasgow studied hydraulics was being incorporated into truck mounted dump bodies relatively early on, in which record shows one of the first hydraulic dump bodies was the Robertson Steam Wagon with a hydraulic hoist that received power for the truck's engine or an independent steam engine was developed another early hydraulic dump body in 1907 that was power-driven by steam. [5]

study of unloading the materials: -

Ganesh Shinde et al studied the Modern 3 Ways dropping dumper which has been conceived by observing the difficulty in unloading the materials. The survey in this regard in several automobile garages, revealed the facts that mostly some difficult methods were adopted in unloading the materials from the trailer. They have mainly focused on above difficulty. Hence a prototype of suitable arrangement has been designed.[6]

Research on 3-way tipper mechanism: -

Amboji Sudhakar R. et al studied that Tipper has lots of applications in today's world. In industrial and domestic considerations, tippers can haul a variety of products including gravel, potatoes, grain, sand, compost, heavy rocks, etc. By considering wide scope of the topic, it is necessary to do study and research on the topic of tipper mechanism in 3-Way Hydraulic Dumping Trolley order to make it more economical and efficient. In existing system, tipper can unload only in one side by using hydraulic jack or conveyor mechanism.[7]

Working principle

We are making a tractor shape and the trailer held on the pivots and pins and the center is pivoted with the center axle, worm gear which is having the rotating mechanism being actuated by the worm wheel and worm shaft being powered by the DC motor held on the base. This assembly is mounted by the tray which is pivoted at the rear end and is hinged to the cylinder ram yoke for lifting it. The tray which rests on the supports at the front portion is lifted by the cylinder actuation and the tray is pivoted at the rear end to be held and the front portion lifts. For rotations, the worm wheel and worn shaft is fixed on the base. the worm wheel or worm gear rotating by the worm shaft being powered by the motor, the assembly being held on the worm gear for rotation. The worm shaft being held within ball bearings, the worm shaft being coupled with the motor shaft, the motor rotations in clock wise direction will make the worm gear to rotate in clockwise direction as required to tilt the tray, to the required angle and controlled by the buttons and the polarity can be changed by the button to reverse the rotation of the tray. In the rotated position as per the angle required, the lift can be actuated.

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Fig 2.1 Three axis dumping machine

When need to lift tray to dump the material, the hand pump lever of the reciprocating pump is operated to pump the hydraulic oil from the pump to the outlet port to the single acting cylinder to lift the tray to required height and when required to return, the release valve of pump is operated to pave the path for return of the oil from cylinder by spring pressure back to the oil tank dropping tray to the normal level.

ADVANTAGES

- Man, control and convinces since the material can be dumped where every required for the ease of usage.
- Integrated work hour meter and maintains free.
- very helpful in any type of material handling.
- This system permits better utilization of the exiting space.
- The operating cost of this system does not increase then the present system of oneside lifting and maintains is much easier.
- Investment cost also is almost same the present system.
- Precise hydraulic controls allow fast, efficient control of lifting and holding the presser.
- Integrated tank with pump and cylinder and release valves suffix less space utilization and compactness.
- It is possible to generate high gain in force and power amplification.
- Weight to power ratio of hydraulic system is comparatively less than that for an electromechanical system.
- Hydraulic system is uniform and smooth, generate step less motion and variable speed

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and force to a greater accuracy.

DISADVANTAGE

- Increased complexity: As it requires complex mechanism for getting desired output.
- Cost increases: As more will be the complications to perform the operation, more will be the cost encountered with it.
- Maintenance increases: More parts in working leads to more maintenance.

APPLICATIONS

- This is used in automobile for material handling trucks and tippers.
- Can be used in industrial material handling trolleys also.
- It can be used in agriculture propose for loading and unloading of grains and crops.

FUTURE SCOPE

The process of unloading the trailer trolley in left and right direction can be made easier by implementing electric motor system instead of hand lever. Electric motor can be attached underneath the conveyor system and input power can be given to the roller with help of belt and pulley arrangement. Hydraulic jack can be implemented for backside unloading instead of hydraulic cylinder. This implementation will increase the trolley lifting angle up to 45 to 50°. World progressing at faster rate which demands efficient working equipment such as user-friendly machineries and hence the three-way dropping dumper may be used more than the two way or one way.

The work can be modified further more on following basis: -

- Dual stage cylinders can be used.
- Oil pump can be used instead of powered cylinder.
- Capacity can be increased.

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CONCLUSION

The project work thus constructed exhibits the expected results. As this concept saves time & energy as well this may lead to efficient working, which helps in the early completion of project. The constructional work or the infrastructural work demands of efficient and user-friendly machinery will lead to more and more use of the project work like three way dropping dumper. Mechanism to be used and its workability. Actual designing and balancing of system. Modifications to overcome the remedies. Comparative analysis of multisided tipper with the existing Tipper system.

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