

CONSTRUCTION AND WORKING OF MULTI-DIRECTIONAL DUMPING TRAILER

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Abstract— We have taken up this project as real challenge, as we have no practical experience in the field. Modern 3 ways dropping dumper' has been conceived by observing the difficulty in unloading the materials. The survey in this regards in several automobile garages, revealed the facts that mostly some difficult methods were adopted in unloading the materials from the trailer. In Geneva mechanism of intermittent gearing rotary motion is obtained from continuous rotation. In this paper, Geneva mechanism will be defined by designing parameters such as driving cranks, number of slots, wheel diameter, pin diameter, etc.

Keywords—dumping trailer, Geneva.

I. INTRODUCTION

A dumper is a vehicle designed for carrying bulk material. Dumpers are distinguished from dump trucks by configuration: a dumper is usually an open 4-wheeled vehicle with the load skip in front of the driver, while a dump truck has its cab in front of the load. The skip can tip to dump the load; this is where the name "dumper" comes from. They are normally diesel powered. A towing eye is fitted for secondary use as a site tractor. Dumpers with rubber tracks are used in special circumstances and are popular in some countries. Early dumpers had a payload of about a ton and were 2- wheel drive, driving on the front axle and steered at the back wheels. The single cylinder diesel engine (sometimes made by Lister) 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. The skip was secured by a catch by the driver's feet. 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. Modern dumpers have payloads of up to 10000kg and usually steer by articulating at the middle of the chassis.

II. CONSTRUCTION & WORKING

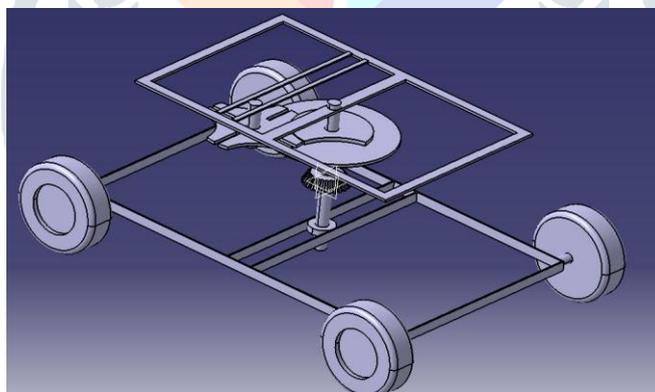


Fig 1-3D model of mechanism

In modern multidirectional dumping trailer there are some major parts from that few are tandem cylinder and hydraulic pump. In multidirectional dumping trailer major parts like trolley, chassis, bevel gears [3], Geneva mechanism [4] and lead screw [6], etc. Geneva mechanism [4] is mounted on trailer supporting frame and run with vertical shaft. Other parts of trailer of body are mounted on the chassis in which bevel arrangement is mounted at bottom with support having capacity is depend on trailer size. Bevel gear arrangement consists of pinion and driven gear is mounted on perpendicular shafts.

Two perpendicular shafts, one of them is connected to pinion and acts as input to the system and other is connected to one of Geneva disk. Raw material is carried by a rectangular trailer, the angular lift of which is changed according to load applied at lead screw. Lead screw is mounted on chassis and the force is transmitted to the trailer. Locking agreement is given to trailer body to unlock the remaining two sides while unloading in one side through Geneva mechanism.

WORKING

Mechanized cart for multi actions like tilting / lifting. Here a cart is made with two wheels at rear end and two wheel at front end to this we are adding the tray with rotating base being actuated by the bevel gears and pivots and handle, the lifting of the tray to dump the material in the required place at the rotated angle which is possible by the nut and bolt mechanism, to effect the dumping of the material in the required place which is helpful for material handling. All are mechanical mechanisms which will ease the use of cart for material handling and dumping the required material through manual lever mechanism without using any powered source.

It is mainly based on rotation of tractor trolley and divided in two parts Rotation and Dumping. For rotation of tipper, we used bevel gear and Geneva mechanism. Bevel is directly coupled with shaft to be rotated which is at horizontal position. On the other side, the bevel gear 1 is meshed with pinion 2. On the surface of the pinion, pin is attached and Geneva wheel has 4 slots with an interval of 90 degree.



Fig 2- Developed Model

As handle is rotated, the shaft starts rotating the Bevel gear. And also rotates the pinion with a 2.5 times the speed of bevel gear. The pin come in contact with the slots and helps to rotate the trolley. The vertical shaft which is connected directly to the centre of tipper trolley, the rotating direction of trolley is changed or reversed by rotating handle in reverse direction.

ADVANTAGES:-

- Environmental friendly
- Easy maintenance
- Simple construction
- Easy operation
- Can be used in very compact places
- Manually operate
- Handling is easy
- Replacement of parts are easy
- Less skill technicians is sufficient to operate.

III. FUTURE SCOPE:-

As the world progressing at faster rate we meet mover and mover huge construction which had to be big amount of earth and thus more efficiently working equipments are to be required and hence the development of multi-directional dumping trailer may be used more than the two way or one way.

The device affords plenty of scope for modifications, further improvements & operational efficiency, which should make it commercially available & attractive and will be accepted in the manufacturing and agricultural sector.

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

- Precision control over the positioning of the trailer can be achieved by incorporating proper sensor arrangement.
- Wheel steering can be adopted for avoiding the lifting of vehicle.

IV. CONCLUSION:-

We have developed model of Multi-directional dumping trailer and it exhibits the expected results. Various parts of trailer were studied and their performance was analyzed in terms of the work. This mechanism is applicable for various manufacturing and agriculture sector. The operating procedure of this system is very simple, so any person can operate and make it user friendly.

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