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DESIGN AND FABRICATION OF 360 DEGREE ROTATING TROLLEY

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Abstract—This project work "design and The "construction of a three-axis rotating trailer utilising a pneumatic system" was conceived after research into the difficulty of emptying materials. Our investigation of a few car garages revealed the following that generally some troublesome strategies were embraced in emptying the materials from the trailer. The material will only be emptied in one direction by the trailer In small compact highways and small streets, it is difficult to empty the materials. All three sides have been successfully unloaded the trailer in our work. The compressor engine, which stores compressed air when the vehicle is running, is connected to the automobile engine drive. When the valve is activated, the pneumatic cylinder is used to activate the compressed air Spur gear is used to rotate the trailer in three directions, making it simple to dump cargo in narrow streets and roads.

Keywords:-Design, fabrication, vehicle garages, automobile engines, and so on.

INTRODUCTION

Trailer measure has wide applications in areas like farming, development and garbage transportation, etc. Conventional trailer has restriction of instrument which don't permits it to dump the material at rear side only. It is highly inconvenience for vehicles to reposition as shown by dumping side in narrow lanes and limited spaces. This inconvenience is overcomed by different sides trailer system by using single actuator. The material can only exit the trailer in one direction. This difficulty is overcomed by new strategy segment as the multidirectional trailer. This instrument is a way to reduce the actual time to settle the trailer.

The material is unloaded in three ways band accordingly can be firmly communicated as "Three way trailer." The major outcome of three way directional trailer has defeated space necessity which frequently bring about road blocking. As a result, the current mechanism is inverted, allowing for emptying in three directions. This mechanism prevents road blocking, lessen time and increment efficiency at low cost. As considering the mines space accessible is extremely less.

Accordingly it is simple for the driver to dump the trailer and furthermore it decreases time and fuel utilization. For making tipper system with such above conditions pneumatic system can be utilized. Because compressed air enters the pneumatic chamber through the, material is dumped to the left or right side is not possible to expect to take this as an issue, Multisided tipper tilting is he need of time. To beat one side shifting of trolley, multisided shifting mechanism is come into focus. This will help to dump free material one side of tipper. Presently dropping unloader has been brought about by noticing the trouble in emptying the materials. Dropping trailer can dump just in one side by utilizing pneumatic mechanism.

By this project, essentially we focused on above trouble direction control valve and flow control valve. The direction control valve is utilized to control the flow direction of the pneumatic cylinder in both the way and flow control valve is utilized to control the flow of fluids towards chamber

I. LITERATURE SURVEY

A. Ajithkumar, P. Dhivya, D. Surendar, R. Srinivas- describes that their projects works on the Principles of pneumatic mechanism along with micro controllers then efficiency of dumping trailers will increase. The three direction of unloading an material can be done and useful for shipping industry. they have chosen this project for decreasing the man power and time. The combination of pneumatics and microcontrollers can be seen in their project.

Dr.Sushila Rani says that the dumping is a important role of bulky load for carrying construction loads & the materials unloading the particular site of proper direction. Unloading the material is difficult and assigned position in dump of the materials. To address these issues, Some modified designs make it simple to dump items and include a pneumatic cylinder and a chain sprocket system .In this dumper it has been designed by using the finite element based the ANSYS software

II. METHODOLOGY

A simple dump body style cart carried by horses was the very first version of a dump truck used to haul and dump items. It would have been a two-wheeled cart hinged to the axle, with the centre of gravity exactly behind the axle when fully laden. The laden front body was hooked and would dump if unlatched. These carts were pushed by horses along a railway track in open mines. After 1900, a four-wheeled horse-drawn flatbed waggon with a rectangular body hoisted from the front with a hand hoist was used. Excavated materials were removed and conveyed by locomotives and trolleys known as box tip waggons, dump bodies, and scoop tippers before the first dump trucks emerged, according to Heinz- Herbert Cohrs' book 500 Years of Earthmoving.

2.1 Early Truck Mounted Dump Bodies:

For dumping, the first prototypes of truck-mounted dump bodies relied on gravity. The dump body pivots off centre and is secured in place when it is level. When you release the lock, the body will dump to the back. The dump body stayed locked in a non-dumping position when it was empty. The dump body's centre when loaded

The centre of gravity would shift, causing it to dump. When the Mann gravity dump was introduced in 1904, some of the first trucks with dump bodies based on this idea appeared. constructed in England

2.2 Hydraulic Dump Bodies:

Early on, hydraulics were being incorporated into truck-mounted dump bodies. According to records, the Robertson Steam Wagon was one of the first hydraulic dump bodies, having a hydraulic hoist powered by the truck's engine or an independent steam engine. In 1907, Glasgow's Alley &McLellan created another early hydraulic dump body that was powered by steam. Elevating the dump body allowed material to flow freely along chutes and for a distance away from the vehicle. The dump body could be raised by four screws in each corner that were operated by the truck's power take-off. The body would have a gravity pitch, allowing coal to flow from the hopper into the chute. The coal flowed out.

2.3 Crawler Tractor-Trailer:

Crawler tractors towing huge dump trailers on wheels or tracks were becoming increasingly common in the middle of the 1920s. Crawlers would haul two to five trailers on occasion. Wagons that could be mounted to crawler tractors began to be developed. The waggons were originally mounted on tracks, but as speed constraints became an issue, they were remounted on wheels to boost speed. Euclid, James Hagy, LaPlant-Choate, Rex-Watson, Streich and Western were among the manufacturers of such trailers and haulers.

2.4 Euclid Dump Trucks:

Euclid was one of the first to create dump trucks. George Armington Jr., the son of the company's founder, was a hydraulics designer who made two key contributions to the dump truck industry. The wheel tractor bottom dump waggon and the contemporary heavy duty off-highway vehicle were among them. In 1934 the company introduced its 10/11-ton dump truck called the "TrakTruk."

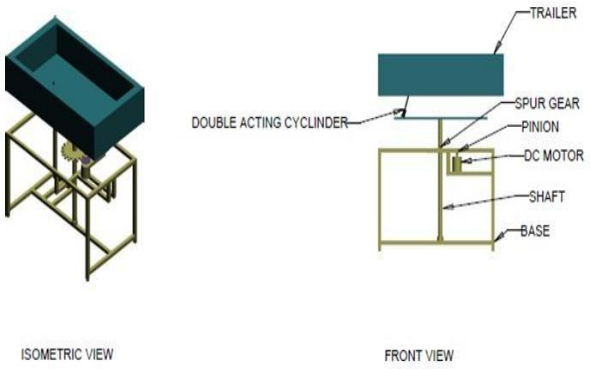
2.5 Dump Trucks in the 1950s:

Dump trucks had achieved the pinnacle of technological progress by the 1940s. Bottom dump trucks dominated earthmoving sites in the United States by the 1950s. As the building industry moved away from relying on rail to transport materials, the demand for domestically built construction site tippers grew. Faun was one of the heavy-duty dump truck manufacturers of the time.

2.6 Saint John First:

In 1920, Robert T. Mawhinney connected a dump box to a flat-bed truck in Saint John, New Brunswick, and the dump truck was born. A winch coupled to a cable fed over a sheave (pulley) situated on a mast behind the cab served as the lifting gear. The cable was connected to the lower front end of the wooden dump box which was attached by a pivot at the back of the truck frame.

III. CAD MODEL



IV.DESIGN CALCULATION

DOUBLE ACTING CYLINDER CALCULATOR FOR OUTPUT STROKE-

The force exerted by a double acting pneumatic cylinder can be expressed as;

F = p/ A

F= p π d2/4 (1)

where, F = force exerted (N)

p = gauge pressure (N/m2, Pa)

A = full bore area (m2)

d = full bore piston diameter (m)

DOUBLE ACTING CYLINDER CALCULATOR FOR INPUT STROKE: The force exerted by double acting pneumatic cylinder on outstroke can be expressed as (1).

The force exerted on in stroke can be expressed as F = p π (d12 - d22) / 4 (2) where d1 = full bore piston diameter (m) d2 = piston rod diameter (m)

FORCE CALCULATIONS:

Pressure of the cylinder = 8kg/cm2 (78.45 × [10]-4 N/m2)

Diameter of the cylinder = 25mm

Diameter of the piston rod = 10mm

CALCULATION FOR DOUBLE ACTING PISTON OUTSTROKE:

A single acting pneumatic cylinder at 1 bar ([10]5 N/m2) and full pressure bore diameter of 10mm (0.01 m) can be calculated as

Area of Cylinder (A) = π/4×(d)2

=3.14/4 ×(0.025)2

= **4.906×[10]-4 m2**

F = p/ A

= 78.45×[10]-4 / 4 .906×[10]-4

F = 15.99 ~ 16 N

CALCULATION - DOUBLE ACTING PISTON IN-STROKE:

The force exerted from a single acting pneumatic cylinder with 8kg/cm2 ~7.84bar full bore diameter of 25 mm (0.025 m) and rod diameter 10 mm (0.01 m) can be calculated as

F = p/ π (d12 - d22) / 4

= (78.45×[10]-4)/ π [(0.025)2 - (0.01)2] / 4

F = 19.02N

Volume of the Cylinder :(V)

Volume of Cylinder (V) =Area of Piston× Stoke Length

=π/4×d2 ×100m

= π/4(0.01)2 × 0.1

V = 7.85×[10]-6 m3

IV. CONCLUSION AND FUTURESCOPE

- The manufacture of a three-axis pneumatic advance trailer is discussed in this work. efficient and user friendly machinery which will lead to more and more use of modern three axis pneumatic trailer. Thus developed an Advance Three Axis Pneumatic Trailer which helps to know how to achieve low cost automationThis system's operation is quite straightforward, and anyone may use it. They can be customised and developed according to the applications by employing various techniques.

- Various tests are conducted to assess efficiency and results, with speed and power being considered. It has been demonstrated that the proposed process is more successful than current unloading mechanisms.

- The lead screw mechanism for rolling shutters has been designed and developed, and it is safe to use in projects for opening and closing shutters. This form of lead screw design is advantageous when the load is acting away from the lead screw's axis. We can deduce from these calculations that if the lead screw is loaded eccentrically, it is possible to design it optimally.

- The chain drive mechanism, MS Sheet, MS Square Pipe, Polished Rod, Double Acting Pneumatic Cylinder, Universal Joint, Pneumatic Pipes, Directional Control Valve, Pneumatic Fluid, Pneumatic Pump, and Reservoir are all used in the construction of this machine. First, MS Square Pipe is used to create a basic frame structure. MS Sheet is used to create the trailer body. The universal joint is secured to the frame using welding.

- On the bottom of the trailer body, another universal joint is attached. A Double Acting Cylinder connects both universal joints. The Double Acting Pneumatic Cylinder is connected to pneumatic pipelines. The Pneumatic pipe is linked to the other side of the Directional Control valve. The Reservoir Tank is filled with pneumatic fluid. The Directional control valve is attached to the other side of the Pneumatic Pump. The pneumatic cylinder that moves the trailer is coupled to this assembly, and the chain drive mechanism has been welded to the dumper's main frame so that it may rotate the entire load carrying structure.

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