

Design and Fabrication of Multi-Side Pneumatic Modern Trailer

Dinesh Kumar S¹, Senthil Vinayagam M²

¹Assistant Professor, East Point College of Engineering and Technology, Bengaluru, Karnataka, India

²Student, East Point College of Engineering and Technology, Bengaluru, Karnataka, India

ABSTRACT

This project work has been conceived having studied the difficulty in unloading the materials. Our survey in the regard in several automobile garages, revealed the facts that mostly some difficult methods were adopted in unloading the materials from the trailer.

Now the project has mainly concentrated on this difficulty, and hence a suitable arrangement has been designed. Such that the vehicles can be unloaded from the trailer in three axes without application of any impact force. By pressing the Direction control valve activated. The compressed air is goes to the pneumatic cylinder through valve. The ram of the pneumatic cylinder acts as a lifting the trailer cabin. The automobile engine drive is coupled to the compressor engine, so that it stores the compressed air when the vehicle running. This compressed air is used to activate the pneumatic cylinder, when the valve is activated.

I. INTRODUCTION

Automation can be achieved through computers, hydraulics, robotics, etc., of these sources, hydraulics form an attractive medium. Automation plays an important role in automobile. Nowadays almost all the automobile vehicle is being atomized in order to product the human being. The automobile vehicle is being atomized for the following reasons.

1. To achieve high safety
2. To reduce man power
3. To increase the efficiency of the vehicle
4. To reduce the work load
5. To reduce the fatigue of workers
6. To high responsibility
7. Less Maintenance cost

II. PNEUMATICS

The word 'pneumatic' comes from Greek and means breather wind. The word pneumatics is the study of air movement and its phenomena is derived from the word pneumatic. Today pneumatics is mainly understood to means the application of air as a working medium in industry especially the driving and controlling of machines and equipment Pneumatics has for some considerable time between used for carrying out the simplest mechanical tasks in more recent times has played a more important role in the development of pneumatic technology for automation. Pneumatic systems operate on a supply of compressed air which must be made available in sufficient quantity and at a pressure to suit the capacity of the system. When the pneumatic system is being adopted for the first time, however it will indeed the necessary to deal with the question of

compressed air supply. The key part of any facility for supply of compressed air is by means using reciprocating compressor. A compressor is a machine that takes in air, gas at a certain pressure and delivered the air at a high pressure.

III. SELECTION OF PNEUMATICS

Mechanization is broadly defined as the replacement of manual effort by mechanical power. Pneumatic is an attractive medium for low cost mechanization particularly for sequential (or) repetitive operations. Many factories and plants already have a compressed air system, which is capable of providing the power (or) energy requirements and the control system (although equally pneumatic control systems may be economic and can be advantageously applied to other forms of power).

The main advantage of an all pneumatic system are usually economic and simplicity the latter reducing maintenance to a low level. It can also have outstanding advantages in terms of safety.

Production of Compressed Air

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IV. LITERATURE REVIEW

The trailer is thought to have been first conceived in the farms of late 19th century Western Europe. As early as 1905, the first motorized dumping vehicles

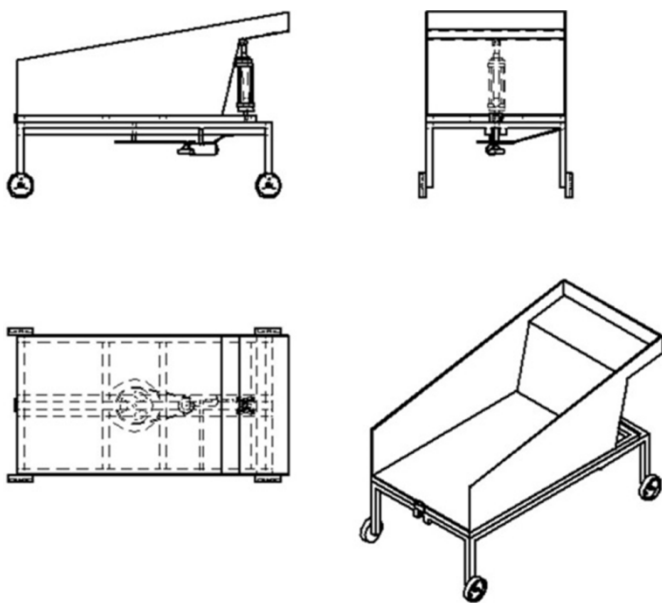
were developed. The first motorized dump trucks in the United States were developed by small equipment companies such as Galion Buggy Co. Among many others around 1910. Such companies flourished during World War I due to massive wartime demand. Companies like Galion Buggy Co. continued to grow after the war by manufacturing a number of express bodies and some smaller dump bodies that could be easily installed on either stock or converted (heavy-duty suspension & drive train) Model T chassis prior to 1920. Galion and Wood Mfg., Co. built all of the dump bodies offered by Ford on their heavy-duty AA and BB chassis during the 1930s. Galion (now Galion Godwin Truck Body Co.) is the oldest known truck body manufacturer still in operation today.

The first known Canadian dump truck was developed in Saint John, New Brunswick when attached a dump box to a flatbed truck in 1920. The lifting device was attached to a cable that fed over sheave (pulley) mounted on a mast behind the cab. 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. The operator turned a crank to raise and lower the box. The first dump bed apparatus on a wheeled vehicle patented in Canada The present invention relates to trailer hitches, and, in particular, to a three-axis trailer hitch having an improved rotatable coupling about a longitudinal axis extending between the towing vehicle and the trailer. Trailer hitches providing mechanical coupling about three independent axes between a towing vehicle and a trailer are known in the art. One representative example is disclosed in U.S. Pat. No. 2,133,065. The trailer hitch disclosed in this patent employs a universal joint or coupling providing limited angular movement about a first or transverse axis and about a second or vertical axis. Rotatable coupling about a third or longitudinal axis is achieved by a longitudinally extending, internally tapered socket member attached to the universal joint. The internally tapered socket member receives the

forward end of an externally tapered pintle, the rear end portion of the pintle being securely connected to the trailer. The tapered forward end of the pintle is rotatable secured within the internally tapered socket member by locking pin or bolt. The trailer is disconnected from the universal joint by manually releasing the sliding lock pin and withdrawing the tapered pin from its mating socket. It is a principal object of the present invention to provide a strong, safe, and simple trailer hitch having improved rotational coupling about the longitudinal axis extending between the towing vehicle and the trailer.

It is another object to provide a trailer hitch having a tightly coupled rotatable joint of low friction. An additional object is to provide a trailer hitch requiring a relatively simple adjustment to compensate for any wear of the abutting parts of the rotatable joint. The above objects of and the brief introduction to the present invention will be more fully understood, and further objects and advantages will become apparent, from a study of the following detailed description in connection with the drawings.

Orthogonal Views of multi-side pneumatic trailer

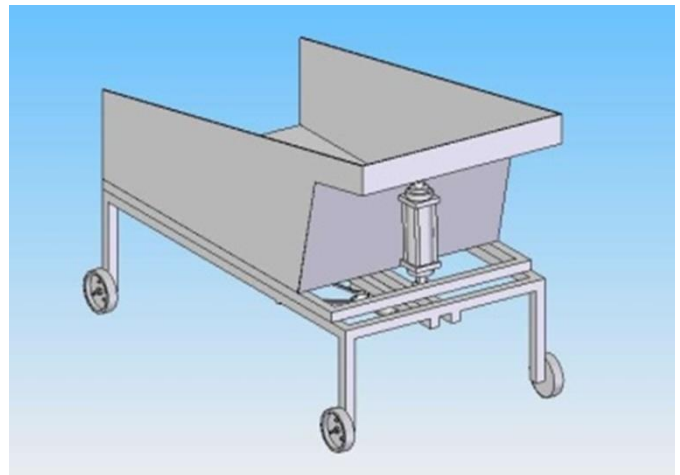


Orthogonal views of Tipper

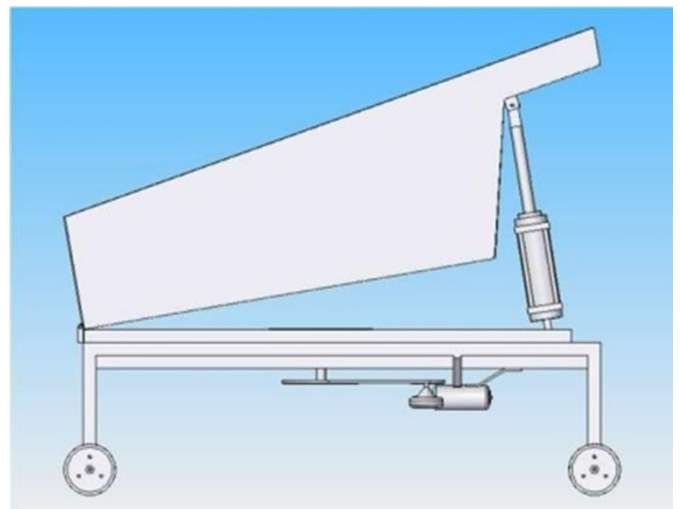
CAD Model



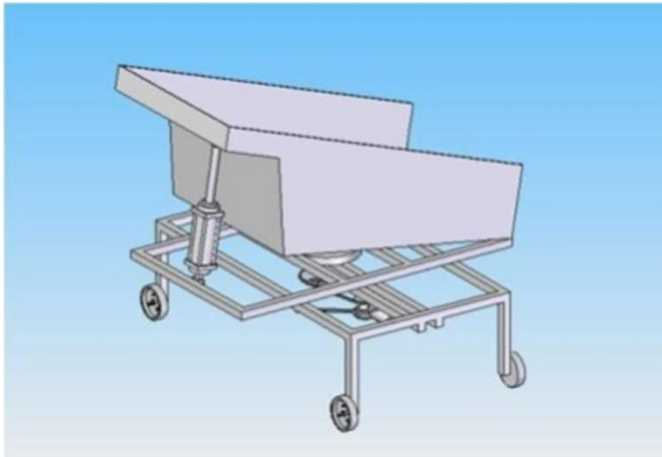
Assembled view of the trailer



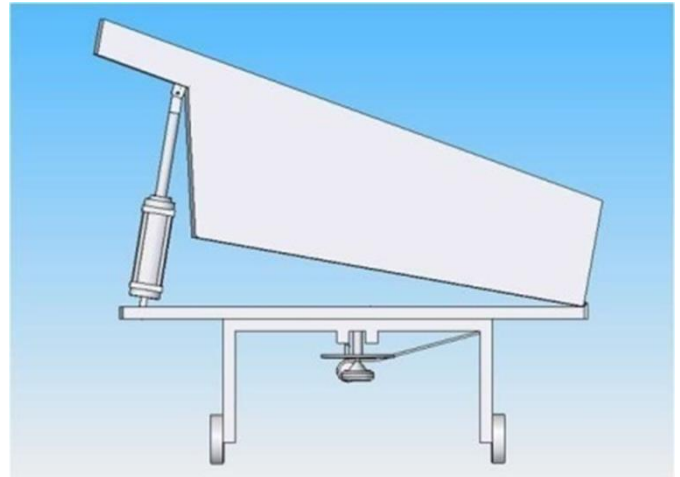
Tipping of trailer to the rear



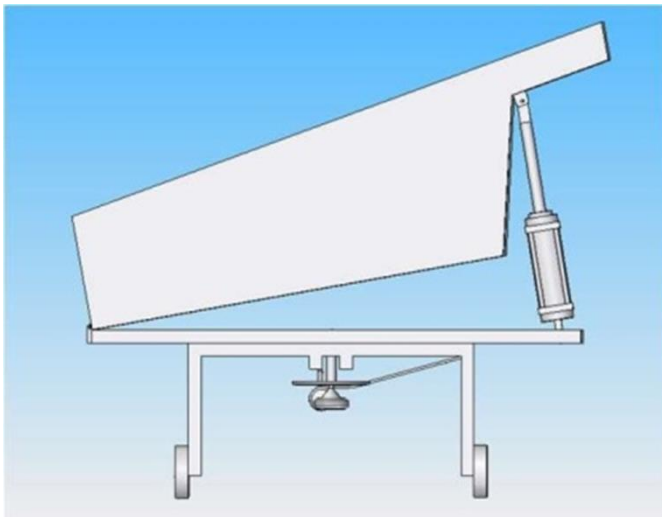
Left view of tipping the trailer to the rear



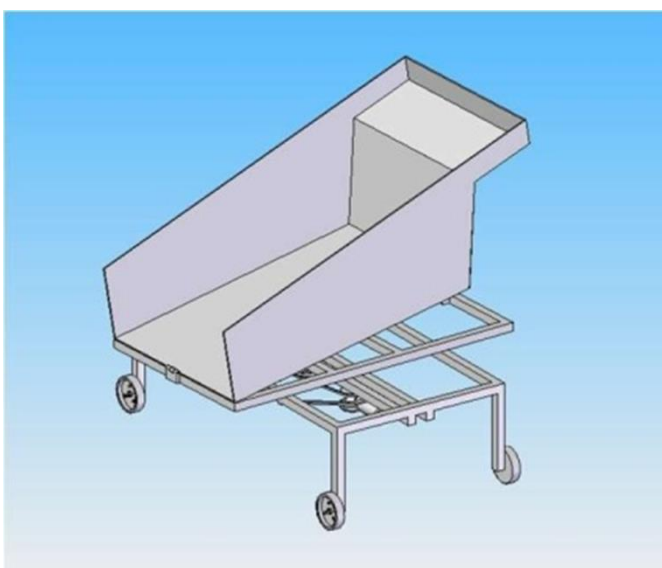
Tipping of trailer to the left of the truck



Rear view of tipping the trailer to the right



Rear view of tipping the trailer to the left



Tipping of trailer to the right of the truck

V. WORKING PRINCIPLE

- Since pneumatic circuit plays a vital role in this device, it is very necessary to explain the working of this circuit.
- Initially starting with air compresses, its function is to compress air from a low inlet pressure (usually atmospheric) to a higher pressure level. This is accomplished by reducing the volume of the air.
- Air compressors are generally positive displacement units and are either of the reciprocating piston type or the rotary screw or rotary vane types. The air compressor used here is a typically small sized, two-stage compressor unit. It also consists of a compressed air tank, electric rotor and pulley drive, pressure controls and instruments for quick hook up and use. The compressor is driven by a 1 HP motor and designed to operate in 10 – 100 PSI range. If the pressure exceeds the designed pressure of the receiver a release valve provided releases the excess air and thus stays a head of any hazards to take place.
- Then having a pressure regulator where the desired pressure to be operated is set. Here a variable pressure regulator is adopted. Through a variety of direction control valves available, a hand operated spool valve with detent is applied.

- The spool valve used here is 5 ports, 3 positions. There are two exhaust ports, two outlet ports and one inlet port. In two extreme positions only the directions can be changed while the Centro ore is a neutral position and no physical changes are incurred. The 2 outlet ports are connected to an actuator (Cylinder). The pneumatic activates is a double acting, single rod cylinder. The cylinder output is coupled to further purpose. The piston end has an air horn effect to prevent sudden thrust at extreme ends.
- The compressed air from the compressor reaches the direction control valve. The direction control valve changes the direction of flow according to the valve position handle.
- The compressed air pass through the direction control valve and it is admitted into the front end of the cylinder block. The air pushes the piston for the lifting stroke. At the end of the lifting stroke air from the valve reaches the rear end of the cylinder block. The pressure remains the same but the area is less due to the presence of piston rod. This exerts greater pressure on the piston, pushing it at a faster rate thus enabling faster return stroke.
- The stroke length of the piston can be changed by making suitable adjustment in the hand lever valve operating position.

Advantages:

- It requires simple maintenance cares
- Checking and cleaning are easy, because of the main parts are screwed.
- Handling is easy.
- Manual power not required
- Repairing is easy.
- Replacement of parts is easy.

Disadvantages:

- Initial cost is high.
- Separate air tank or compressor is required

Application:

All hydraulic and pneumatic dipper applications

VI. CONCLUSION

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We feel that the project work is a good solution to bridge the gates between institution and industries.

The “MULTI-SIDE PNEUMATIC MODERN TRAILER” is working with satisfactory conditions. As for this trailer is concerned in India, single piston arrangement is the most commonly used. Instead, with the same Piston arrangement available, repositioning the system with the help of the spur gears meshed normal to each other, the trailer can be lifted in the other two sides just by changing the position with the help of a motor connected with the battery.

Thus we have developed a “MULTI-SIDE PNEUMATIC MODERN TRAILER” which helps to know how to achieve low cost automation. The operating procedure of this system is very simple. By using innovative techniques, this system can be modified and developed based on the human need in our day to day life.

VII. REFERENCES

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