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Design and Fabrication of Power Hand Truck

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ABSTRACT

Over the time certain principles have been found to be applicable in the analysis, design. And operation of material handling systems. All material handling should be the result of a deliberate plan where the needs, performance objectives, and functional specification of the proposed methods are completely defined at the outset. The principles of material handling' are listed and explained. Implementing these principles will result in safer operating conditions, Iowa costs, and better utilization and performance of material handling systems, commercial organization, where the goods are prepared they need to transport their goods from one place or one station to another. For this purpose, they use hand trolley or also known as hand truck on which the load is handled manually from one place to another. Sometimes, it is difficult with this equipment to transport or carry the load manually.

1. INTRODUCTION

This device the Automatic car lifting by hydraulic pressure for automobile garages has been developed to later the needs of small and medium automobile garages, who are normally man powered with very minimum of skilled labors. In most of the garages the vehicles are lifted by using screw lifter. This needs high man power and skilled labors. In order to avoid all such disadvantages. This, automatic car lifting arrangement has been designed in such a way that it can be used to lift the vehicle very smoothly without any impact force. The operation is made be simple that even an unskilled labor can handled, by just demonstrating the working of the motorized hydraulic car lifter once.

The d.c motor is coupled with the hydraulic cylinder by cam mechanism. The cam shaft moves up and down depends upon the rotation of D.C motor rotary motion with gear arrangement is to cam mechanism. This is a simple type of automation project.

This is an era of automation where it is broadly defined as replacement of manual effort by mechanical power in all degrees of automation. The operation remains an essential part of the system although with changing demands on physical input as the degree of mechanization is increased.

2. HISTORY

Once the new technology hit Europe, they took it and developed the first above-ground rotary lifts. The European lifts fit the smaller, narrower European cars, so when they made their way to America there were some issues. Mechanics had a difficult time getting in and out of a vehicle without scratching the side of the vehicle. This meant that after using the lift, mechanics would have to do some bodywork to repair the minor damage. Although it was easier to see what was happening and maneuver under the vehicle, the time to complete work on each vehicle was taking longer with the repairs needed to fix the dings.

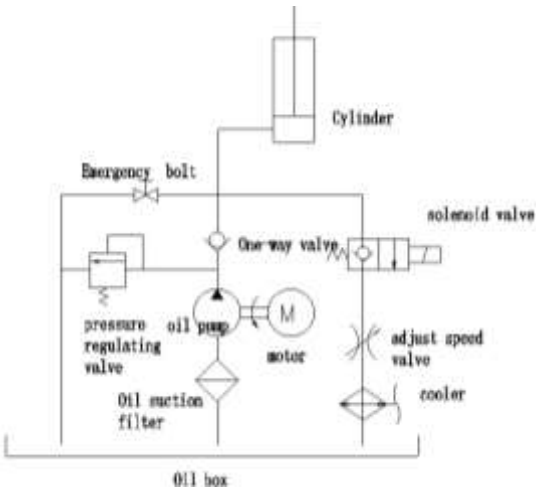

Fig: Principle of Operation

For many centuries, man has utilized hydraulic principles to satisfy common, everyday needs, Opening a faucet to fill a sink with water a practical application of hydraulics. Water moves through a dam in accordance with well-known principles of fluid motion. There are hydraulic principles that explain the action of fluids in motion and others for fluids at rest.

We are chiefly concerned, however; with that branch of hydromechanics which is called simply Hydraulics and is defined in engineering textbooks as the engineering application of fluid mechanics. It includes the study of the behavior of enclosed liquids under pressure, and the harnessing of the forces existing in fluids to do some practical task such as steering a submarine or opening the outer door of a torpedo tube.

Examples of hydraulically operated equipment are familiar to all. Barber or dentist chairs are raised and lowered hydraulically; so is an automobile when placed on a hydraulic rack for a grease job. Stepping on the brake pedal in an automobile creates the hydraulic power which stops the rotation of the four wheels and brings the car to a halt.

For an understanding of how a hydraulic system works, we must know the basic principles, or laws, of hydraulics, that is, of confined liquids under pressure.

3. HYDRAULIC CYLINDER

Hydraulic cylinder consist of piston and piston rod with plate. The pressurized oil is going to the hydraulic lifter, the piston moves forward. The plate is fixed at the end of the piston rod, which is used to lift the vehicle from the ground level.

Ram: The ram is the lifting parts of this project. It is fixed to the L-angle flat form.

Oil Tank: The oil tank is provided in the hydraulic lifter inside. The hydraulic system requires the oil to work the system. So we have to provide the oil tank.

Hydraulic Fluids: Almost any free-flowing liquid is suitable as a hydraulic fluid, as long as it will not chemically injure the hydraulic equipment. For example, an acid, although free-flowing, would obviously be unsuitable because it would corrode the metallic parts of the system.

Water, except for its universal availability, suffers from a number of serious defects as a possible hydraulic fluid. One such defect is that it freezes at a relatively high temperature, and, in freezing, expands with tremendous force, destroying pipes and other equipment. Also, it rusts steel parts; and it is rather heavy, creating considerable amount of inertia in a system of any size.

The hydraulic fluid used in submarine hydraulic systems is light, fast-flowing lubricating oil, which does not freeze or even lose its fluidity to any marked degree even at low temperatures, and which possesses the additional advantage of lubricating the internal moving parts of the hydraulic units through which it circulates. Since this oil, a petroleum derivative, causes rapid deterioration of natural rubber, synthetic rubber is specified for use in these systems as packing and oil seals.

Plunger Pump: This is known as the input component of this project i.e. from the power is transmitted to the right of the cylinder, the oil is draw from the reservoir through pumping the handle provide at the right side of the pump plunger.

The pump is welded on the right side of the cylinder. The length of stroke of the pump handle is depends upon the length of the plunger used. For this a flexible pivoting arrangement is provided behind the pump. The material used for pump block is mild steel.

O-Ring: The “O” rings are fitted into the grooves of plunger pump to maintain perfect seal between the plunger and the outer wall. They are mostly made up of neoprene rubber.

Release Valve Lever: It is made up of mild steel. This is used to release the hydraulic pressure, so that the ram downwards to its original position.

Handle: This is also made upof mild steel. This handle is used to lifting the ram from downwards position to upward position. This handle is used to pull the plunger pump.

D.C Motor: An electric motor is a machine which converts electrical energy to mechanical energy. Its action is based on the principle that when a current-carrying conductor is placed in a magnetic field, it experiences a magnetic force whose direction is given by Fleming’s left hand rule.

When a motor is in operation, it develops torque. This torque can produce mechanical rotation. DC motors are also like generators classified into shunt wound or series wound or compound wound motors.

Lead-Acid Wet Cell: Where high values of load current are necessary, the lead-acid cell is the type most commonly used.

The electrolyte is a dilute solution of sulfuric acid (H_2SO_4). In the application of battery power to start the engine in an auto mobile, for example, the load current to the starter motor is typically 200 to 400A. One cell has a nominal output of 2.1V, but lead-acid cells are often used in a series combination of three for a 6-V battery and six for a 12-V battery.

3. WORKING PROCEDURE:

The block diagram of car lifting by hydraulic pressure arrangement is shown in fig. The lead-acid battery depends upon the length of the plunger used. For this a flexible pivoting arrangement is provided behind the pump. The material used for pump block is mild steel.

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4. ADVANTAGES

1. The moving parts of this system are cooled by the oil itself used. Thus this project does not require any cooling arrangements.
2. The loaded light vehicles can be easily.
3. Checking and cleaning are easy, because of the main parts are screwed.
4. Handling is easy
5. No Manual power
6. Easy to Repair.
7. Replacement of parts are easy

5. DISADVANTAGES

1. Cost of the equipment is high when compared to ordinary hand lifter.
2. This system requires high maintenances care when compared to ordinary hand lifter.
3. Care must be taken for the handling the equipment such as proper wiring connection, oil level checkup, etc.

Fig. Design & fabrication of power hand truck

6. APPLICATIONS

1. It is very much useful in auto-garage. This motorized hydraulic lifter is used for lifting the vehicles.
2. Thus it can be useful for the following types of vehicles;
   a. Maruti,
   b. Ambassador,
   c. Fiat,
   d. Mahindra

7. FUTURE SCOPE

Our organization future industries Pvt. Ltd 's established in the year 2009 is one of the eminent organizations indulged in manufacturing and supplying, exporting, retailing and wholesaling a wide assortment of Hydraulic Lifting Stacker and Wheels and Casters. We offer Hydraulic Lifting Stacker, Hydraulic Lifting Equipments, Stacker, Hydraulic Electric Stacker, Wheels and Casters, Wheel Barrow, Single Wheel Barrow, Pressed Steel Casters and many more. The entire range of products are manufactured using high technology and latest machines for providing a flawless array to the industry with optimum standards of quality. Our major Markets are Europe, America, Australia, UAE and Indian Subcontinent.

8. CONCLUSION

The fabrication of Quick lifting lifter with gear arrangement was successfully completed as per the designed specification. The trial performance of this device provides to be successful, with case of operation and safety, hence the results has given a clear indication of its commercial viability. The cost analysis has shown its economic feasibility and we are under the impression that it can be further reduced, when produced on a mass scale

9. REFERENCES

[1] Automobile Engineering - Dr. Kripal Singh
[2] Fluid Mechanics and machines.
[3] Strength of materials -I.B. PRASAD
[4] E. E. Blanco. Stair-climbing wheelchair: A case study in creative design. Depart-ment of M'echanicl Engineering, Massachusetts Institute of Technology.
[5] J. Choi. A re-redesigned frictional ratchet for wheelchair propulsion. Department of Mechanicl Engineering, Massachusetts Institute of Technology, June 1995
[6]. F. W. Crimson.U.S. Military Wheeled Vehicles. Crestline Publishing Co. Inc.,1983.
[7]. A. F. Hoermann. Feasibility analysis of a design for a stair-climbing wheelchair. Department of Mechanicl Engineering, Massachusetts Institute of Technology, June 1997.