DESIGN AND DEVELOPMENT OF INTEGRATED PNEUMATIC CAR JACK

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ABSTRACT

Pneumatic jacks are used to move large trucks, doors, and other objects. Hydraulic jacks will be phased out in favour of pneumatic jacks as the main lifting method for large things. This jack runs on compressed air. We produce lifting technology that does away with the necessity for human labour. The driver may raise or lower it as needed because it's incorporated inside the vehicle.

Keywords: Air Compressor, DC Valve, FRL Unit, Integrated Pneumatic Jack, Power Screw

INTRODUCTION

Punctured tyres must be replaced by raising the vehicle to a specific height. It's now possible to accomplish this swiftly and effectively using a variety of technologies available today. Screw jacks or hydraulic jacks are commonly used in this process. It is necessary to remove the automobile from the vehicle and then place it underneath the axle in order to lift it. After that, the screw may only be rotated by hand, and only with great force. Many individuals and a significant amount of time are needed in this case. It's now possible to use pneumatic jacks to make your life easier. No fuel is required, yet it's capable of lifting substantial loads with nothing but air pressure.

- It reduces the need for human labour;
- It takes less time and effort to do tasks on it.

Both the cost of production and the cost of maintaining this jack are lower than those of other jacks.

- It is extremely light and portable.

NEED OF INVENTION

A jack, like many other devices on the planet, is a need because of how laborious it is to use manually. Alexendria was the first to publish works on the subject of air and wind power. It was further enhanced

by Otto von Guericke, a German scientist (1602 to 1686). Over the course of several decades, pneumatics has progressed. Normal jacks, which will be the norm for the next few decades, will take a long time and require a large amount of labour to change a car's tyres.

It's tough to move standard jacks because they're enormous and heavy. For the sake of time and labour efficiency, pneumatic jacks have been developed that require less manpower and can be moved more easily between locations. Because air is utilised as a fuel in these jacks, there is no need for fuel, which is good for the environment. As a result of its affordability, they're a must-have item in today's houses.

The ultimate purpose of this project is to make operating the jack easier. Men and women of various ages, even teenagers can benefit from it.

Literature Review

An introduction to vehicle lift systems can be found in Thomas J. Prather (2009)[1]. Mechanically, the piston was attached to the drive assembly. To begin with, the piston's top surface was elevated by means of the drive assembly. Second movement of the drive assembly was necessary when the piston's upper end was lowered. Removable power supply ports were used when the drive assembly required power supply.

A Farhad Razzaghi (2007)[2] photo depicts the usage of an electric jack to raise and lower an automobile from the ground. In addition to the mechanism, it may be used with a typical portable auto jack, which comes with a power drill, a rod, and several jack adapters.

In this essay, Manoj Patil[3] proposes the development of a screw jack that can outperform human labour. Daily duties will be especially difficult for pregnant women and the elderly. It takes a long time to replace a tyre. The use of additional force during surgery is specifically prohibited for women. With an electric automobile jack, you can accomplish the task at hand.

See Lokhande Tarachand for more information (2012). According to this article, a mechanical screw jack's efficiency can be improved by increasing the helix angle..

Pneumatic Jack

A pneumatic jack is a device that uses compressed air to lift heavy things, such as cars, heavy doors, and other components. Based on the principle of actuated air, the Pneumatic Jack uses piston cylinders to move.

In order for pneumatic jacks to operate correctly, it is necessary to provide ample and adequate pressures of compressed air. Compressed air supply, on the other hand, needs to be handled when first constructing the pneumatic system. A compressed air supply facility would be incomplete without the

use of a reciprocating compressor. In order to distribute the air at a higher pressure, the air must first be compressed. A normal ambient temperature and atmospheric pressure are used to express the volume of air that can be taken in. The compressor has a capacity of this..

Working Principle

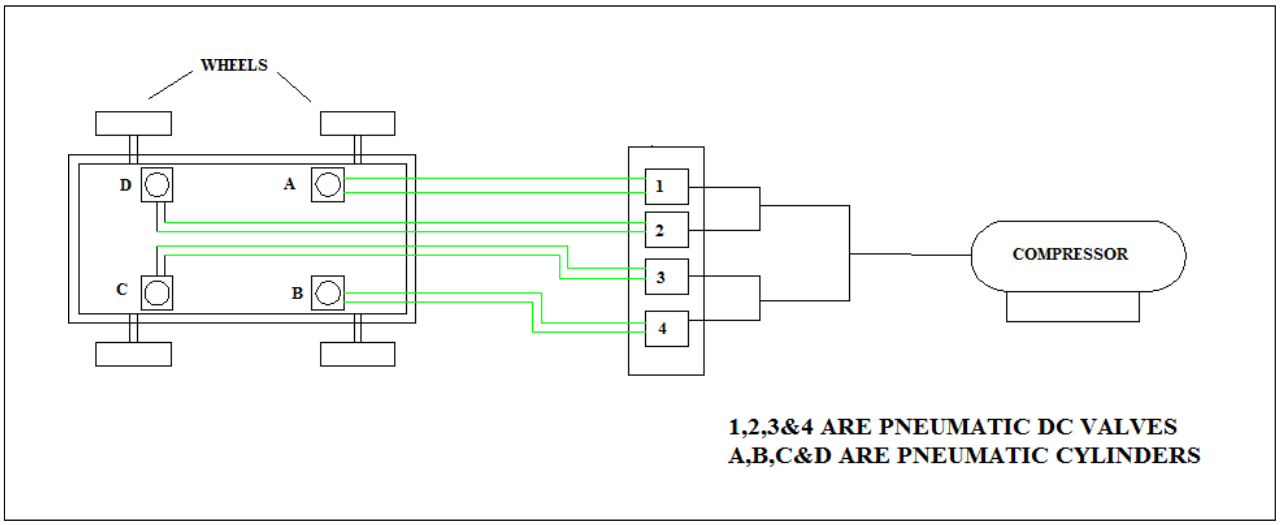

Fig. No.3.1. Layout Of Model

1. Firstly we connect hoses as shown in figure.
2. When we give supply to the compressor then compressor begans to run.
3. At normal condition compressed air is supply at bottom side.
4. The flow control valve is connected to cylinder for the controlling of the flow.
5. The circular disc is connected to the end of piston.
6. So piston will goes downward and the rear wheel goes upward
7. In that way we can lift the wheel as per requirement.

DESIGN CALCULATIONS

Consider the total weight of vehicle is 60 kg
The weight lifting by one pneumatic cylinder near wheel is consider-
15 Find out the force applied on trailer in N

F= 15 x 9.81
= 147.15 N

We know the formula F = P X A Where,

F= Applied Force (N)

P = pressure used (N/mm^2) A

=area of cylinder (mm^2)

We consider the normal pressure is 5 bar =0.5 N/mm^2

F= P X A

147.15 = 0.5 X A A

=374.71

Now we find out the required diameter of cylinder

We know that

$A = \frac{\pi}{4} X d^2$

Where,

A= area of cylinder (mm^2)

d = diameter of cylinder (mm) A = $\frac{\pi}{4} X d^2$

374.71 = $\frac{\pi}{4}$ X d^2 d =

19.35≈20mm

The standard cylinder available in market is 20 mm, 25mm, 32mm We select 20mm

20mm > 19.35mm

So we select the diameter of cylinder is 20 mm which is safe.

For pneumatic cylinder ø20 x 75

CONCLUSION

When it comes to automobiles that can be operated by compressed air, this pneumatic car jack is a must-have accessory. Pregnant women and the elderly will greatly benefit from it. To create a system that is simple to use. To create a high-quality but low-cost product. to make life easier on ourselves To make use of in a commercial setting. To create a product that requires less upkeep

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