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Compressed Air Production Using Vehicle Suspension

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Abstract: In this project we are collecting air cylinder and store this energy to the compressor tank as non-conventional method by simply driving the vehicle. Non-conventional energy system is very essential at this time to our nation. Compressed air production using vehicle suspensor needs no fuel input power to produce the output of the air. For this project the conversion of the force energy in to air. The control mechanism carries the air cylinder (vehicle suspensor), quick exhaust valve, Non-return valve and spring arrangement. We have discussed the various applications and further extension also. The initial cost of this arrangement is high.

I. INTRODUCTION

Man has needed and used energy at an increasing rate for his sustenance and well being ever since he came on the earth a few million years ago. Primitive man required energy primarily in the form of food. He derived this by eating plants or animals, which he hunted. Subsequently he discovered fire and his energy needs increased as he started. To make use of wood and other bio mass to supply the energy needs for cooking as well as for keeping himself warm. With the passage of time, man started to cultivate land for agriculture. With further demand for energy, man began to use the wind for sailing ships and for driving windmills, and the force of falling water to turn water wheels.

Till this time, it would not be wrong to say that the sun was supplying all the energy needs of man either directly or indirectly and that man was using only renewable sources of energy.

II. DESCRIPTIONOF EQUIPMENTS

A. Foot Pump: A bicycle pump is a type of positive-displacement pump specifically designed for inflating bicycle tires. It has a connection or adapter for use with one or both of the two most common types of valves used on bicycles, Schrader or Presta. A third type of valve called the Woods valve exists, but tubes with these valves can be filled using a Presta pump.

Several basic types are available:

- Floor models or track pumps
- Frame mounted

Compact or mini

- Foot operated
- Double action

In its most basic form, a bicycle pump functions via a hand-operated piston. During the up-stroke, this piston draws air through a one-way valve into the pump from the outside. During the down-stroke, the piston then displaces the air from the pump into the bicycle tire. Most floor pumps, also commonly called track pumps, have a built in pressure gauge to indicate tire pressure.

Caution must be used when using a gas station air pump. Some are designed to cut off before the high pressures used in many bicycle tires are reached. Other operate at such a high pressure that the tire can be burst. There is also a slight difference between the modern standard for Schrader valves on an automobile and that on a bicycle which makes some more recent valves on gas station pumps a poor fit.

These pumps are often not specifically designed for bicycle use. They do not generate very high pressures so don't work well for narrow road-bike tires, but are fine for large low-pressure tires as found on mountain bikes.

Because they are designed for cars they fit schrader valves. If the bicycle has presta valves a small brass reducer is required in order to use the pump.

B. Air tank:

A pressure vessel or storage tank is a closed container designed to hold gases or liquids at a pressure different from the ambient pressure.

The pressure differential is potentially dangerous and many fatal accidents have occurred in the history of their development and operation. Consequently, their design, manufacture, and operation are regulated by engineering authorities backed up by laws. For these reasons, the definition of a pressure vessel varies from country to country, but involves parameters such as maximum safe operating pressure and temperature.

C. Hoses & Connectors

Hoses used in this pneumatic system are made up of polyurethane. These hose can with stand at a maximum pressure level of 10 $x10^5 N/m^{2.}$

In our system there are two type of connectors used. One is the Hose connector and the other is the reducer. Hose connectors normally comprise an adopt hose nipple and cap nut. These types of connectors are made up of brass (or) aluminum (or) hardened pneumatic steel.

D. Pressure Gauge

Pressure gauges are usually fitted with the regulators. So the air Pressure adjusted in the regulator is indicated in the pressure Gauge, is the line pressure of the air taken to the cylinder.

E. Spring

The automobile chassis is mounted on the axles not direct but through some form of springs. This is done to isolate the vehicle body from the road shocks which may be in the form of bounce, pitch, roll or sway. These tendencies give rise to an uncomfortable ride and also cause additional stress in the automobile frame and body. All the parts which perform the function of isolating the automobile from the road shocks are collectively. A Springing device must be a compromise between flexibility and stiffness. If it is more rigid, it will not absorb road shocks efficiently and if it is more flexible it will continue to vibrate even after the bump has passed so we must have sufficient damping of the spring to prevent excessive flexing.

F. Return Spring

A spring is a flexible elastic object used to store mechanical energy. Springs are usually made out of hardened steel. Small springs can be wound from pre-hardened stock, while larger ones. A spring is a mechanical device, which is typically used to store energy and subsequently release it, to absorb shock, or to maintain a force between contacting surfaces. They are made of an elastic material formed into the shape of a helix which returns to its natural length when unloaded this is called return spring. Springs are placed between the road wheels and the vehicle body. When the wheel comes across a bump on the road, it rises and deflects the spring, thereby storing energy therein. On releasing, due to the elasticity of the spring, material, it rebounds thereby expending the stored energy. In this way the spring starts vibrating, with amplitude decreasing gradually on internal friction of the spring material and friction of the suspension joints till vibrations die down.

G. Non-Return Valve

A check valve, clack valve, non-return valve or one-way valve is a mechanical device, a valve, which normally allows fluid (liquid or gas) to flow through it in only one direction.

Check valves are two-port valves, meaning they have two openings in the body, one for fluid to enter and the other for fluid to leave. There are various types of check valves used in a wide variety of applications. Check valves are often part of common household items. Although they are available in a wide range of sizes and costs, check valves generally are very small, simple, and/or cheap. Check valves work automatically and most are not controlled by a person or any external control; accordingly, most do not have any valve handle or stem. The bodies (external shells) of most check valves are made of plastic or metal. An important concept in check valves is the cracking pressure which is the minimum upstream pressure at which the valve will operate. Typically the check valve is designed for and can therefore be specified for a specific cracking pressure.

H. Whee:

A wheel is a circular device that is capable of rotating on its axis, facilitating movement or transportation or performing labour in machines. A wheel together with an axle overcomes friction by facilitating motion by rolling. In order for wheels to rotate a moment needs to be applied to the wheel about its axis, either by way of gravity or by application of another external force. Common examples are found in transport applications. More generally the term is also used for other circular objects that rotate or turn, such as a Ship's wheel and flywheel. The wheel most likely originated in ancient

The wheel is a device that enables efficient movement of an object across a surface where there is a force pressing the object to the surface. Common examples are a cart drawn by a horse, and the rollers on an aircraft flap mechanism.

The wheel is not a machine, and should not be confused with the wheel and axle, one of the simple machines.

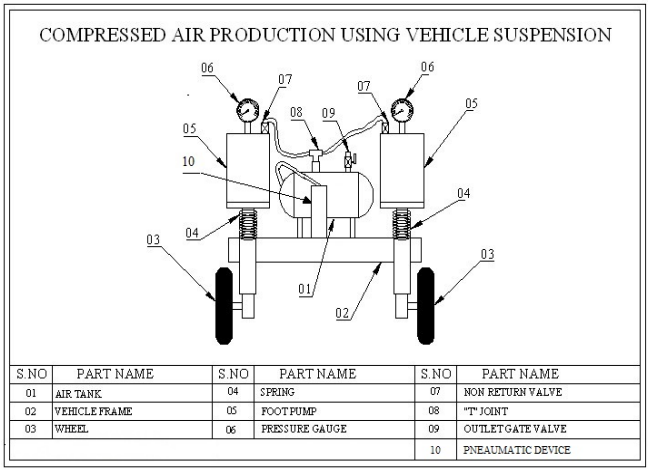
A driven wheel is a special case that is a wheel and axle. Wheels are used in conjunction with axles, either the wheel turns on the axle or the axle turns in the object body. The mechanics are the same in either case. The normal force at the sliding interface is the same. The sliding distance is reduced for a given distance of travel. The coefficient of friction at the interface is usually lower.

I. Pneaumatic Device

Pneumatics is a section of technology that deals with the study and application of pressurized gas to produce mechanical motion. Pneumatic systems are used extensively in industry, and factories are commonly plumbed with compressed air or compressed inert gases. Pneumatic systems, that are used extensively in industry, and factories, are commonly plumbed with compressed air or compressed inert gases. This is because a centrally located and electrically powered compressor, that powers cylinders and other pneumatic devices through solenoid valves, can often provide motive power in a cheaper, safer, more flexible, and more reliable way than a large number of electric motors and actuators. Pneumatics also has applications in dentistry, construction, mining, and other areas

III. DESIGN AND DRAWING

A. Drawing For Compressed Air Production System



S.NO	PART NAME	S.NO	PART NAME	S.NO	PART NAME
01	AIR TANK	04	SPRING	07	NON RETURN VALVE
02	VEHICLE FRAME	05	FOOT PUMP	08	"T" JOINT
03	WHEEL	06	PRESSURE GAUGE	09	OUTLET GATE VALVE
				10	PNEAUMATIC DEVICE

B. Working Principle

When the vehicle runs on the irregular roads then the wheel goes to up and down motion. The cylinder arrangement is attached on the wheel axle. This motion is used to suck the air from the atmosphere. Thus the piston inside the cylinder creates the internal pressure which results in storage of air to the tank at certain pressure. This pressurized air is saved inside the tank. The outlet of tank consists of four valves which are used to supply the air to other pneumatic applications. Here the non return valve is used to avoid the reversing of air flow to the atmosphere.

IV. ADVANTAGE AND DISADVANTAGES

A. Advantages

- Air production is simply running the vehicle

- No need fuel input and electrical power input
- This is a non-conventional system
- Easy to work and reduces the manual stress

B. Disadvantages

- Mechanical moving parts is high
- Initial cost of this arrangement is high

C. Applications

- All highways
- All road ways speed brake
- Petrol bunk
- All vehicles
- Future scope
- This arrangement is slightly modified to construct in speed breaker and foot step and this arrangement can be fixed in Schools.

V. LIST OF MATERIALS

A. Factors Determining The Choice Of Materials

The various factors which determine the choice of material are discussed below.

B. Properties

The material selected must possess the necessary properties for the proposed application. The various requirements to be satisfied Can be weight, surface finish, rigidity, ability to withstand environmental attack from chemicals, service life, reliability etc.
The following four types of principle properties of materials decisively affect their selection

- Physical
- Mechanical
- From manufacturing point of view
- Chemical

The various physical properties concerned are melting point, thermal Conductivity, specific heat, coefficient of thermal expansion, specific gravity, electrical conductivity, magnetic purposes etc.
The various Mechanical properties Concerned are strength in tensile,
Compressive shear, bending, torsion and buckling load, fatigue resistance, impact resistance, elastic limit, endurance limit, and modulus of elasticity, hardness, wear resistance and sliding properties.
The various properties concerned from the manufacturing point of view are,

- Cast ability
- Weld ability
- Surface properties
- Shrinkage
- Deep drawing etc.

C. Manufacturing Case

Sometimes the demand for lowest possible manufacturing cost or surface qualities obtainable by the application of suitable coating substances may demand the use of special materials.

D. Quality Required

This generally affects the manufacturing process and ultimately the material. For example, it would never be desirable to go casting of a less number of components which can be fabricated much more economically by welding or hand forging the steel.

E. Availability of material

Some materials may be scarce or in short supply, it then becomes obligatory for the designer to use some other material which though may not be a perfect substitute for the material designed. The delivery of materials and the delivery date of product should also be kept in mind.

F. Space consideration

Sometimes high strength materials have to be selected because the forces involved are high and space limitations are there.

G. Cost

As in any other problem, in selection of material the cost of material plays an important part and should not be ignored.
Sometimes factors like scrap utilization, appearance, and non-maintenance of the designed part are involved in the selection of proper materials.
Photo view:

VI. COST ESTIMATION

A. Material cost

B. Labour cost

Lathe, drilling, welding, drilling, power hacksaw, gas cutting cost

C. *Overghead Charges*

The overhead charges are arrived by" manufacturing cost"

Manufacturing Cost = Material Cost + Labor Cost
= 3500+1500
= 5000

Overhead Charges = 20%of the manufacturing cost
= 1000

D. Total cost

Total cost = Material Cost + Labor Cost + Overhead Charges
= 3500+1500+1000

Total cost of project = 6000

VII. CONCLUSION

This project is made with pre planning, that it provides flexibility in operation.

This innovation has made the more desirable and economical. This project "COMPRESSED AIR PRODUCTION USING VEHICLE SUSPENSON" is designed with the hope that it is very much economical and help full to all vehicles to produce the compressed air.

This project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.

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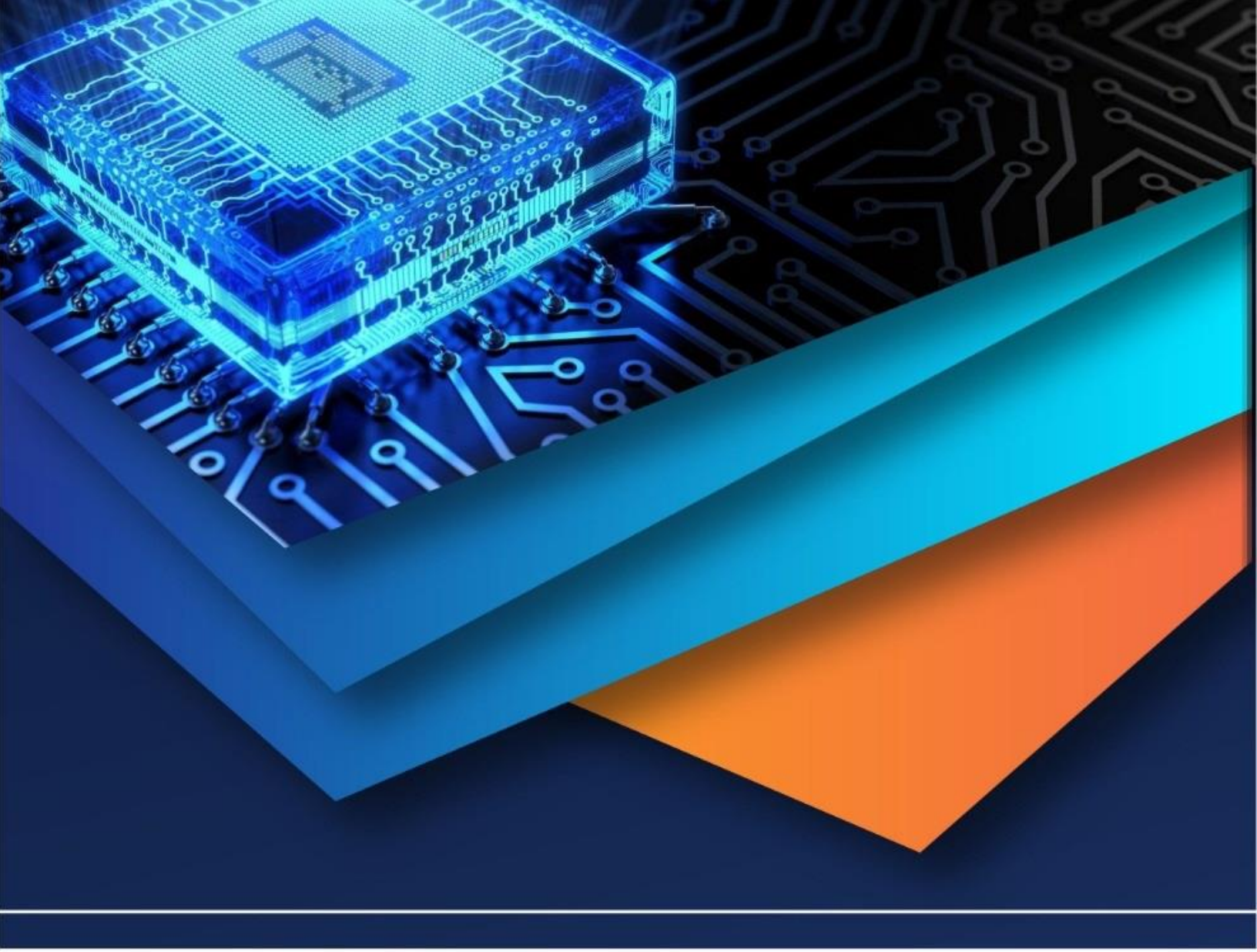

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