

AIR COMPRESSED HYBRID TRICYCLE

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ABSTRACT

This paper focuses on design, assembly, trial of a vehicle that is mechanized by compressed air to operate. Because we all are aware that conventional fossil fuels obtained from natural oils and gases are decreasing in very short period time, the humankind is desperately in need of a substitute source of energy to move its vehicles. Air is the most luxuriant, convenient and never depleting fountainhead of potency when compressed air engine is an eco-friendly engine which operates through compressed air. The availability of air and never depleting source of energy when compressed. This engine uses the expansion of compressed air to drive the pneumatic pistons. There is no mixing of air and fuels then there is no combustion. The compressed air technology uses for its operation the compressed air mechanism is very simple. Throughout this power can be utilized for advantageous determination.

KEYWORDS: Pneumatic piston, compressed air, compressor, cylinder.

I. INTRODUCTION

The term Pneumatic is derived from Greek word "Pneum" which means air. The pneumatic system resembles the hydraulic system in structure but the applications are limited due to hydraulics, it is a clean and neat system. A Tricycle is a subclass of cycles and are very popular as urban and rural means of transportation for handicapped people. A Tricycle is often abbreviated to Trike is a three wheeled vehicle. A Tricycle includes a main frame, a tread board, wheels, wrench, pressure-regulator, air tank, shaft with chain sprocket mechanism. This tricycle is powered with pneumatic (motor) wrench. As the conventional tricycle requires human strength and effort to be applied on the pedals to propel the vehicle. We intend to develop and fabricate an automated tricycle that uses compressed air pressure as a source to power a pneumatic ratchet, which in return propels the tricycle by means of chain and sprocket transmission. As well as the tricycle can also be operated manually by means of pedal. A Pneumatic tricycle is a compressed air operated vehicle which has a one-person capacity and these kind of vehicles are specially designed for the purpose of low mobility. Tricycles are available in large variety of designs and as those intended for outdoor use. A Pneumatic tricycle is different from a manually operated wheel chair because as the source of power supply in a wheel chair is human effort required for pedaling of the wheel chair whereas in a pneumatic tricycle the pneumatic wrench is used as a power source utilizes the freely available air which is used as the working medium i.e. to transmit power from the source to destination.

II. WORKING OF COMPRESSED AIR VEHICLE

Through literature survey following observations are made:

A. Air Engine

The tricycle mechanized through compressed air of an air engine which is kept in reserve barrel. Substitute of intermixing of air and fuels then combustion into the cylinder to reciprocate the piston. The compressed air impulse may also be integrated in hybrid method that is battery impulse and gas barrel to energize the battery. The variety of method is known as hybrid-pneumatic dynamic impulse. Additionally, regenerative braking can also be used in conjunction with this system.

B. Cylinder

Cylinder are a devices that's generate powered by compressed gas. Pneumatic cylinder convey a force by transfigure the potential energy of compressed gas in to kinetic energy. Engineer sometimes preferred to use pneumatic because they are quieter, cleaner, and do not require large amount of space for fluid storage. Pneumatic cylinder like hydraulic cylinder, something forces a piston to move in the desired direction. In pneumatic cylinder the compressed air enters into the tube at one end of the piston and so convey force on the piston . Accordingly the pistons moves by the compressed air circulate in an attempt to reach atmosphere.

C. Compressor

Compressor are like as pumps: both increase the pressure on a fluid. Compressor can only work at definite speeds. A compressor is also known as mechanical device that enlarge the pressure of a gas by contraction its volume. It is a specific type of gas compressor. Many compressor can be staged, that is, fluid is compressed several times in steps or stages, to decrease discharge pressure. Even the secondary step is physically no taller than the primary step. Each step further compresses the fluid and increase pressure.

WORKING

In this pneumatic cycle initially the person will start the cycle with the slight push and compression lever in pressed position and the ratchet will start. As it starts the compression lever is pressed. It works on the energy conversion principle the air is compressed and stroke in the tank. It contains potential energy and this potential energy of air is converted into kinetic energy and power is developed. Once the power is to be developed the sprocket will start rotating by using chain drive which transmits the power from sprocket to rear axle. Axle rotates the rear wheel and tricycle start running. By using accelerator pedal, we increase and decrease the speed of tricycle.



Fig-1

III. CALCULATION

$$\begin{aligned} \text{Average weight of a Person} &= 90 \text{ Kg} \\ &= 90 \times 9.87 \text{ N} \\ &= 888.3 \text{ N} \end{aligned}$$

$$\begin{aligned} \text{Maximum speed} &= 30 \text{ Km/h} \\ &= 8.33 \text{ m/s} \end{aligned}$$

$$\text{Pressure, } P = 888.3 \times 8.33$$

$$1. \quad P = 7.39 \text{ KW}$$

$$P = 2\pi NT / 60000 \text{ (for } N = 500 \text{ rpm)}$$

$$7.39 = 2 \times 3.14 \times 500 \times T / 60000$$

$$2. \quad T = 141.138 \text{ Nm}$$

$$T = F \cdot r$$

$$141.138 = F \cdot 30/1000$$

$$3. \quad F = 4704.6 \text{ N}$$

$$F = P_r \cdot A$$

$$F = P_r \pi (d_1^2 - d_2^2) / 4$$

where d_1 = full base piston diameter (m)

d_2 = piston rod diameter

$$4704.6 = P_r \cdot (\pi/4 [(100/1000)^2 - (20/1000)^2])$$

$$P_r = 4704.6 / 0.00753 \text{ N/m}^2$$

$$4. \quad P_r = 6.24 \text{ barr}$$

Maximum Pressure = 6.24 barr

IV. METHODOLOGY

1. Analysis
2. Requirement specification
3. Design
4. Implementation
5. Testing and integration
6. Operation and maintenance

V. RESULTS AND CONCLUSION

1. When starts the air compressor fill the air in pipe to the pneumatic cylinder to drive it.
2. Maintain the lubricant in FRL or pressure regulator.
3. If the pneumatic ratchet has abnormal noise, get it check by professional service provider.
4. Front and rear brake adjustment Adjust rear brake using adjusting screw. When the earlier hold the brake, the wheel would stopped and not turned around and when unhold the brake, the brake rubber should be back to its position at once. When the surface of the rubber is twist rarely, change it.
5. Keep the vehicle clean, and to avoid, higher temperature and corrosive air places. Environmental Condition When tricycle is not in use at that time, tricycle should be kept away from rain water, combustible and chemical corrosive products. When there is no use of tricycle for long time hen drain the air tank. When there is no use of tricycle.

VI. CONCLUSION

Even though the vehicle is in its early stage of development, it holds a lot of promise and provides scope for further research. Ample efforts have been rapt on the better understanding of so many types of models enlargement in bicycle. The different empirical methods of transmission of human power on the pedal to the rotation of the wheels are discussed and the major advantages and disadvantages of these transmission methods are listed out. Generally, new mechanisms should be developed such that the design should be eco- friendly and more energy efficient. The project presented has involved the development and implementation of automatic transmissions for bicycles. The aim of this work is to execute this idea in pneumatic featured bicycle with air control from the above line describe that the forces exerted by the cylinders are finest to move the shifting levers (pedals). According to the achieved results, the suggested mechanism is realizable and workable. The mechanism are easier and required hardware to change the old traditional gear shifting mechanism to semi-automatic. In this type of mechanism application uses to make the easier driving process and reduces risk.

VII. REFERENCES

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