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TITLE: STUDY ON DEVELOPMENT OF COMPRESSED AIR DRIVEN PISTON ENGINE

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Abstract

Transportation is the most vital part in our day to day life. Transportation consist of cars, trucks, train, etc. Which Requires Petrol And Diesel as fuel to run. The fuel and diesel is very expensive and also formed pollution in large amount. So for reducing the pollution and cost of that vehicles we introduce some new ideas. In this paper we discus about the air power cars. In this cars we use air as fuel instead of using gasoline. Gasoline is the main sources of pollution so if you are using air as fuel which help to reduce the pollution. For air compressed cars we don not any fuel like diesel and petrol, we directly use air as fuel. TATA MOTORS make an agreement with motor development international MDI of france to develop a car that runs on compressed air .also it will be more economical and pollution free. The cost of air refilling is very less as compared to diesel and petrol.

Keywords: Air filter, compressed air tank, compressed air, carbon fibre tank, etc.

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1. INTRODUCTION

In the past few decades, energy conservation and carbon reduction have become very crucial issue worldwide . scientist have been searching for solution to reduce the extensive use of conventional internal combustion engine and reduced their carbon dioxide emission. Compressed air as a source of energy in different uses in general and as a non polluting fuel in compressed vehicles has attracted scientist and engineers for centuries.

The present paper gives a brief introduction to lastest development of a compressed air. Vehicles along with an introduction to various problem associated with technology and their solution. While developing of compressed air vehicles we get the control on the air pollution. Because compressed air vehicle is very advantageous as compared to cars which runs on petrol and diesel.

2. BASIC PRINCIPLE

The engine of compressed air cars has four stage piston ,that are eight compression or expansion chambered.

They have two function first to compressed ambient or atmospheric air , and second one is to make successive expansion thereby approaching isothermic expansion.

3. HOW COMPRESSED AIR CAN FUEL A CAR

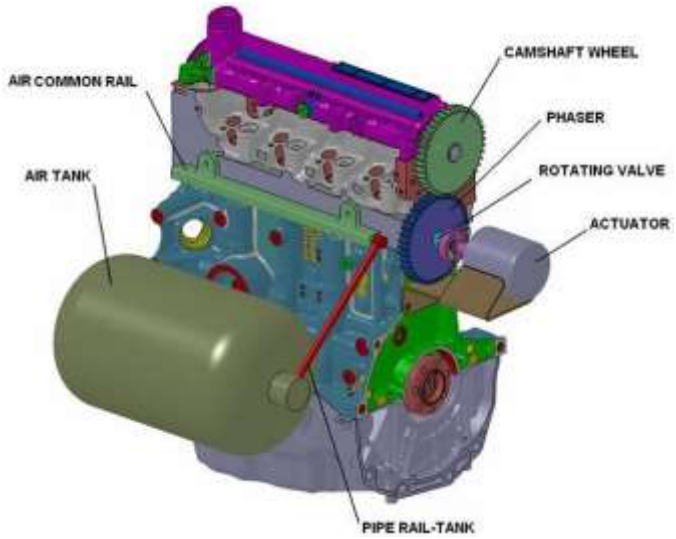
In practical terms compressed air can stored at 300 bars in carbon fibre tank. A. Air is release through the main line firstly to an alternator .B. where the first stage of decomposition is take place. The new cold air passes through heat exchanger. C. which adds the heat energy to the air and provides a convenient opportunity for air conditioning. D. The warm compressed air now passes to the motor .E. where the two more stages of decomposition and reheating take place. The motor drives the real axel G through the transmission .F. control of engine speed is through conventional accelerator pedal .H. controlling a value within the motor .

4. COMPRESSED AIR TANK

In compressed air cars the air tank is the most important part . which consist of carbon –fibre, hence called carbon- fibre tank. The holding capacity of this tank is 90 cubic meter of air. This tank can be ruptured, but can't be explode. Metal tanks can withstand a large number of pressure cycles, but must be checked for corrosion periodically.

This tank design in this way to carry the explosive product like methane gas. The tank consist of the

composite material that are carbon and fibre . This material are more expensive and lighter in weight. This tank similar to tanks which is used to carry the liquid gases used for public transport. The coiled carbon fibre technology used in the construction of the tanks is complex and requires a substantial quality control process, which the multinational company home of the air bus, aircraft, will provides for our vehicles.



5. HOW DOES AIR ENGINE WORK

Compressed air car contained fibre tank which stored approximately 90 cubic meter of compressed air. The engine power by compressed air, stored in a carbon-fibre tank at 30 Mpa. In order to reduce weight of tank. It consist of carbon fibre. The engine has injection similar to normal engine, but uses special crankshafts and piston.

Which remain at the top dead centre for about to degree of the crankshaft's cycle. This allows more power to be developed in the engine.

Also for increasing speed we use turbocharger. Expanded air exerts a force on piston due to that piston get displace. And creates movement. The atmospheric temp is used to reheat the engine and increase the road coverage. The air conditioning system makes of use of expelled cold air.

6. Air Filter

Air filter are used for filter air which is use for compression. The engine work with both air 1. Which is taken from the atmosphere 2. Air pre compressed in tanks .air is compressed by high pressure compressor before compression the air must be filtered to get impurities which damage the engine.

Carbon filters are used to eliminate dirt, dust, humidity, and other particles which are found in our cities. Ex-carbondioxide .It is the first time that a car has produced less pollution. It eliminates and reduces exciting pollution rather than emitting dirt and harmful gases. The exhaust pipe on the car produced clean air which is cold on exist and is harmless to human life. With this system the air comes out of car is cleaner than air that went in.

7. How To Air Cars Helps To Reduce Pollution

We know gasoline is the main sources of pollution if we can use compressed air instead of gasoline, help to reduced pollution. Because of the pressure and temperature inside a cylinder the nitrogen and oxygen in the air get combine and there is formation of nitrogen oxide. There is so little time available during the combustion phase due to that all hydrocarbons do not take part in the reaction ,hence the unburned hydrocarbons is produced. Carbon monoxide is formed due to the incomplete combustion. Not enough oxygen is available fast to react with all carbon which are present there.

As we know that nitrogen is main constituents of environment In case of air cars we extract nitrogen from environment liquefy it and used as fuel in cars then there will be nitrogen exhaust gas which is not harmful to human beings and environment. By using liquid nitrogen in air car, we can reduce pollution up to 70 to 80 %.

8. How Air Engine Works

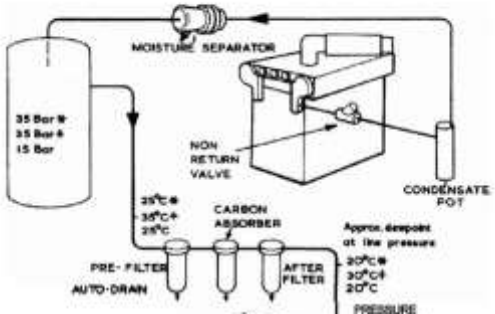
First piston takes in atmosphere air compresses it to approximately 300 psi and at 93.3 c in the compression chamber during first cycle of the engine. When the piston pause a small amount compressed air leaves a tank and entre into the expansion chamber to create a low pressured, low temp volume of about 140 psi. Before the value open to the exhaust cylinder a high speed shutter connects to the compression and expansion chamber the sudden different temperature and pressure between low chamber creates pressure in expansion chamber, and hence work is produce in the exhaust chamber, which helps to drive the piston to power the engine. The car engine runs or compressed air and incorporates the three law of thermodynamics. The first law state that energy can neither be destroyed nor be wasted. Second law describes the disorders within substances.

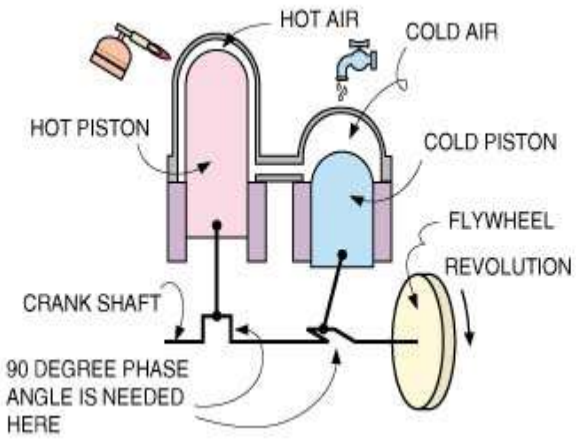
9. Cars that run on the air in India soon

TATA MOTORS signed agreement with motor development internal of france to develops car that runs on compressed air. Cost around 350,000 in India and refuels have range around 300 km between refuels. The cost of a refill would be about rs.90.

10. Technology Description

The following id the technology description of the actual Fuctionality of motor.





11. Advantages Of Compressed Air Cars

1. The air power cars produced minus pollution as compare to fuel or diesel cars .
2. In this cars no need to build a cooling system, spark plugs, starter motor or muffler. Due that reason it help to reduced cost of vehicle production by about 20%.
3. Lighter vehicle result less wear on roads.
4. One major advantages is that in compressed air car we used compressed air instead of using, so this car do not produced pollution at the tailpipe.
5. Another advantages of air cars is that the fuel should be remarkable cheap, an important consideration in price of volatile gas.
6. Low maintenance cost.
7. Reduction or elimination of hazardous chemicals such as gasoline or battery acids metal.

12. Disadvantages Of Compressed Air Cars

1. Limited storage capacities of the compressed air tank.
2. A tank containing 30 mpa compressed air is risky and dangerous.
3. Low boot space, as compressed air cars, will be having a compressed air tank.
4. Running the vehicles on compressed air will be requiring the provision for filing the compressed air in the tank.

13. Conclusion

Air power cars is the realization of latest technology in automobile field. It eliminates the use of non-renewable fuels like gasoline, diesel, petrol etc., and thereby preventing pollution caused by millions of automobiles all over the world. This could be further of automobiles and step to a healthier environment.

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