COMPRESSED AIR USING PNEUMATIC CYLINDER

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ABSTRACT

The rate depletion of conventional sources of energy are much faster than the new ones are mae, which puts us in place to consider and identify the other sources of energy to drive the needs of the world. Compressed air as the energy source has shown promising results in the field of automobile. Efforts are being made by many organizations to design and develop compressed air-driven vehicle which definitely going to reduce the uses of fossil fuels and its share in the environment. This study presents the methodology towards design and fabrication of a vehicle equipped with pneumatic power generating concept. Most likely, it will be the evolution car that is being built by Zero Pollution Motors. The cars have generated a lot of interest in recent years, and the Mexican government has already signed a deal to buy 40,000 evolutions to replace gasoline- and diesel-powered taxis in the heavily polluted Mexico City.

I . INTRODUCTION

A Pneumatic air engine is a double acting pneumaticcylinder that creates useful work by expanding compressedair.A compressed-airvehicle is powered by an air engine, using compressed air, which is stored in a tank. Instead of mixing fuel with air and burning it in the engine to drive pistons with hot expanding gases, compressed air engine (CAE) uses the expansion of compressed air to drive their pistons. They have existed in many forms over the past two centuries, ranging in size from hand held turbines up to several hundred horsepower.

For example, the first mechanically-powered submarine, the 1863 Plan gear, used a compressed air engine. The laws of physics dictate that uncontained gases will fill any given space. The easiest way to see this in action is to inflate a balloon. The elastic skin of the balloon holds the air tightly inside, but the moment you use a pin to create a hole in the balloon's surface, the air expands outward with so much energy that the balloon explodes. Compressing a gas into a small space is a way to store energy. When the gas expands again, that energy is released to do work. That's the basic principle behind what makes an air car go. Some types rely on pistons and cylinders, others use turbines. Many compressed air engines improve their performance by heating the incoming air, or the engine itself. Some took this a stage further and burned fuel in the cylinder or turbine, forming a type of internal combustion engine. One manufacturer claims to have designed an engine that is 90 percent efficient. Compressed air propulsion may also be incorporated in hybrid systems, e.g., battery electric propulsion and fuel tanks to recharge the batteries.This kind of system iscalled hybrid-pneumaticelectricpropulsion.

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Additionally, regenerative braking can also be used in conjunction with this system.

II. LITERATURE SURVEY

According To Felix Creutzig's journal about"OnEconomic and environmental evaluation of compressed air cars". Res. Lett.40411. Felix Creutizig explained how the compress air cars are useful for the future based on Economic and Environmental factors. Such that climate change and energy security require a reduction in travel demand, a model shift, and technological innovation in the transport sector. Through a series press realises and demonstrations, a car using energy store in a compressed air produced by compressor have been suggested as an environmentally friendly vehicle of the future. We analyse the thermodynamic efficiency of a compressed air car powered by pneumatic energy and the consider the merits of compress air versus chemical storage of potential energy. We have studied various advantages of air pneumatic engine by Prof. KalpeshChavada& Mr. Manish "On study and Development of Compressed Air Engine-Single Cylinder". International journal for scientific Research & Development Vol.2 Issue 05, 2004. Prof. KalpeshChavdaPatel & Mr. Manish details about reports on the review of compressed air engine for the design and development of single cylinder engine which can be run by compressed air. Current four strokes single cylinder engine (bikes\moped) can be run on the objective of the study. Compressed air filled by electricity using a compressor. The electricity requirement for compressing air has to be considered while computing overall efficiency. We learned the Conceptual diagram and fabrication pneumatic air engine by Mr. N. Govind, Mr. S.SanayasiRao& Manish Kumar Behera "On Design and Fabrication of Compressed Air Vehicle". International Journal & Magazine of Engineering, Technology, Management and Research ISSN No: 2348-4845. Mr. N.ZGovind,Mr.S.SanayasiRao& Manish Kumar Behera discussed on Compressed air as a source of energy in different uses in general and as a non-polluting fuel in compressed air vehicles has attracted scientists and engineers for centuries. Efforts are being made by many developers and manufacturers to master the compressed air vehicle technology in all respects for its earliest use by the mankind.The important significance of Pneumatic Air engine according to Mr. KunjanShinde IJRMET Vol. 7, Issue 1, Nov. 2016 – April 2017 Issn: 2249-5762. Issn: 2249-5770 "On Electric Bike". Mr. KunjanShinde's journal on Electric Bike describes the idea of harnessing the various energy and usesit in today's existence of human life. Electric bike which will be driven with the help of battery and thus provide required voltage to the motor. The focus of this report is Design & Fabrication of Pneumatic Air Engine 5 to perform power calculations and system design of this Electric Bike.

III. PROBLEM DEFINITION

 When air expands, as it would in the engine, it cools dramatically (adiabatic cooling; Joule–Thomson effect) and must be heated to ambient temperature using a heat exchanger similar to the Intercooler used for internal combustion engines. The heating is necessary in order to obtain a significant fraction of the theoretical energy output. The heat exchanger can be problematic. While it performs a similar task to the Intercooler, the temperature difference between the incoming air and the working gas is smaller. In heating the stored air, the device gets very cold and may ice up in cool, moist climates. Refueling the compressed-air container using a home or low-end conventional air compressor may take as long as 4 hours, while

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the specialized equipment at service stations may fill the tanks in only 3 minutes.Tanks get very hot when filled rapidly. SCUBA tanks can be immersed in water to cool them when they are being filled. That would not be possible with tanks in a car and thus it would either take a long time to fill the tanks, or they would have to take less than a full charge, since heat drives up the pressure. However, if well insulated, such as Dewar (vacuum) flask design, the heat would not have to be lost but put to use when the car was running.Early tests have demonstrated the limited storage capacity of the tanks; the only published test of a vehicle running oncompressed air alone was limited to a range of 7.22 km (4 mi).

 A 2005 study demonstrated that cars running on lithiumion batteries out-perform both compressed-air and fuel cell vehicles more than threefold at same speeds. MDI has recently claimed that an air car will be able to travel 140 km (87 mi) in urban driving, and have a range of 80 km (50 mi) with a top speed of 110 km/h (68 mph) on highways, when operating on compressed air alone

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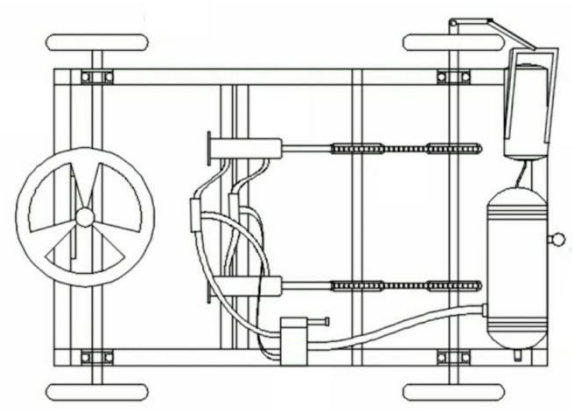
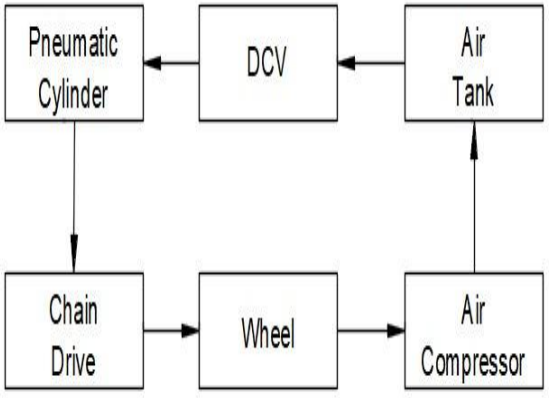
IV.METHODOLOGY

A pneumatic air engine is a type of engine which does mechanical work by expanding compressed air. Pneumatic engine generally converts compressed air energy to mechanical work either into linear motion or rotary motion. Once compressed air is transferred into the onboard storage tank, it is slowly released to power the pistons. The motor then converts the air power into mechanical power. That power is then transferred to the wheels and becomes the source of power for the Engine. Connections are done as per the circuit diagram as shown in figure-1 when the accelerator pedal is pressed, air is passed through the solenoid valve from the reservoir to the cylinder. Now the piston inside the cylinder is pushed forward. When it attains maximum position. The reed switch sensor which is connected along the cylinder changes the direction of flow of air hence, the piston is pushed backward. Thus the forward backward movement of the piston is connected to the crank shaft Hence linear movement of the piston is converted into a rotary motion by mean of chain sprocket, which is connected with the rear axle. Thus the Engine attains its motion.

V.SCHEMATIC DIAGRAM



VI . FLOWCHART



VII.APPLICATIONS

 Air driven engines can be used as drives for different types of conveyors such as Belt conveyors, Chain conveyors, Screw conveyors, etc,. It is normally used for slow speed conveyors. Medium load can only be used. In operations like

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carpentry job clamping generally requires low loading. Air Driven Engine can provide this low load clamping. Air Driven Engine can also be utilized for small displacement pumps of low pressure capacities.The usage of the Air Driven Engine is possible for automobiles as two wheelers and light motor vehicles.

VIII.CONCLUSIONS

Efficiency of the system will higher thanconventional systems. The mechanism designed is pollution free. Compressed air is non-conventional energy and it is abundant in nature Due to global warming it is demand of time to adopt green technology.With some modifications it will give better performance than the conventional engines. This engine having minimum disadvantages. It is cheaper than any other technology. From the observation it will be concluded that compressed air power engine can prove to the future engine which is ecofriendly, pollution free, but also very economical. This redresses both the problems of fuel crises and pollution.

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