

A Technical Review: Design & Fabricated of Air Engine

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Abstract— In the Current energy scenario the fossil fuel sources are fast depleting and their combustion products are causing global environmental problems. So it is inevitable to shift towards the use of renewable energy resources which in turn will reduce pollution and saves fossil fuels. Air Powered Engine is an alternative technology which uses compressed air to run the engine and thus eliminates the use of fossil fuels. Exhaust temperature of it will be slightly less than atmospheric temperature (i.e. 20-25°C) and thus helps in controlling global warming and reducing temperature rise caused due to other means. As we are going to convert the already existing conventional engine into an air powered one, this new technology is easy to adapt. Another benefit is that it uses air as fuel which is available abundantly in atmosphere. Today fossil fuels are widely used as a source of energy in various different fields like power plants, internal & external combustion engines, as heat source in manufacturing industries, etc. But its stock is very limited and due to this tremendous use, fossil fuels are depleting at faster rate. So, in this world of energy crisis, it is inevitable to develop alternative technologies to use renewable energy sources, so that fossil fuels can be conserved. One of the major fields in which fossil fuels are used is Internal Combustion Engine. An alternative of IC Engine is “Air Powered Engine”. It is an engine which will use compressed air to run the engine. It is cheap as it uses air as fuel, which is available abundantly in atmosphere. For this project we required some basic information related to our project for this purpose we make this project report. So we are going to make Air Powered Engine.

Key words: Compressed Air Vehicles (CAV), CI Engine, SI Engine, Biodiesel

I. INTRODUCTION

Transport or transportation is the movement of people, animals and goods from one location to another. Modes of transport include air, rail, road, water, cable, pipeline, and space. Transport is important since it enables trade between people, which in turn establishes civilizations.

Transport infrastructure consists of the fixed installations necessary for transport, including roads, railways, airways, waterways, canals and pipeline and terminals such as airports, railway stations, bus stations, warehouses, trucking terminals, refueling depots (including fueling docks and fuel stations) and seaports. Terminals may be used both for interchange of passengers and cargo and for maintenance. Passenger transport may be public, where operators provide scheduled services, or private. Freight transport has become focused on containerization, although bulk transport is used for large volumes of durable items. Transport plays an important part in economic growth and globalization, but most types cause air pollution and use large amounts of land. While it is heavily subsidized by governments, good planning of transport is essential to make traffic flow and restrain urban sprawl.

II. MODE OF TRANSPORTATION SYSTEM

A mode of transport is a solution that makes use of a particular type of vehicle, infrastructure and operation. The transport of a person or of cargo may involve one mode or several modes, with the latter case being called intermodal or multimodal transport. Each mode has its advantages and disadvantages, and will be chosen for a trip on the basis of cost, capability, route and speed

A. Human-Powered

Human powered transport is the transport of people and/or goods using human muscle-power, in the form of walking, running and swimming. Modern technology has allowed machines to enhance human-power. Human-powered transport remains popular for reasons of cost-saving, leisure, physical exercise and environmentalism. Human-powered transport is sometimes the only type available, especially in underdeveloped or inaccessible regions. It is considered an ideal form of sustainable transportation.

B. Animal-Powered

Animal-powered transport is the use of working animals for the movement of people and goods. Humans may ride some of the animals directly, use them as pack animals for carrying goods, or harness them, alone or in teams, to pull sleds or wheeled vehicles.

C. Air Engine

A fixed-wing aircraft, commonly called airplane, is a heavier-than-air craft where movement of the air in relation to the wings is used to generate lift. The term is used to distinguish from rotary-wing aircraft, where the movement of the lift surfaces relative to the air generates lift. A gyroplane is both fixed-wing and rotary-wing. Fixed-wing aircraft range from small trainers and recreational aircraft to large airliners and military cargo aircraft.

III. REASONS TO MODIFY ENGINES CONVERSION IN TO COMPRESSED AIR ENGINE

- The problem of air pollution around the globe is real and serious, diesel exhaust emissions are a major source of pollution in most urban centers around the world and a major contributor to climate change. Trucks, buses, generators and ships burn millions of gallon of diesel fuel daily. Many countries are to alternative fuels to reduce diesel exhaust emissions, especially in urban centers.
- Furthermore, as the price of crude oil continues to increase, the use of alternative fuel becomes increasingly economical and reduces the import burden of oil country like India.
- Price of diesel is low compare to petrol and has higher efficiency than petrol so people of the urban area are switched over to the diesel engine which make a serious problem in urban are to solve this problem higher

efficient and economical operated Biodiesel fueled diesel engine is required.

- Biodiesel is an alternative source if petroleum source is out of stocks.

IV. MODIFICATION DONE TO CONVERT COMPRESSED AIR ENGINE

- MS framing
- L shape angle
- Ms plain strip
- Bearing
- Tire
- Crank shaft mechanism
- Steering mechanism
- Air pneumatic cylinder
- Air tank
- Rack and pinion mechanism
- Air pipes
- Air flow control valve
- Round steering
- Non return valve
- Ms round plate
- Speed control valve
- Ms round union
- Ms shafting

V. MACHINERY REQUIRED FOR PREPARATION OF PROJECT

For the preparation of our project we need some machinery as listed below.

- Lathe machine,
- Cutter machine,
- Arc Welding machine,
- Drilling machine,
- Speedometer,
- Hand Grinder machine,
- Milling machine,
- Riveting equipment,
- Other fasteners fitting equipment,
- Vernier caliper, micrometer screw gauge, measure tap, and other measuring equipment.

VI. ASSEMBLY DRAWING

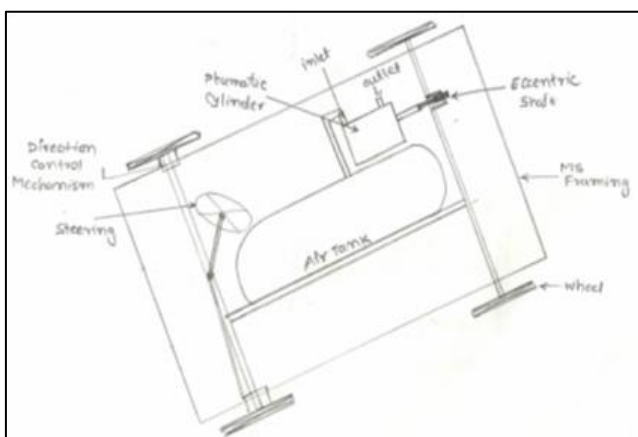


Fig. 1: Line Diagram of Air Engine



Fig. 2: Model of Compressed Air Vehicle

VII. ADVANTAGES

In comparison to petrol or diesel powered vehicles “air powered vehicles” have following advantages:

- Air, on its own, is non-flammable, abundant, economical, transportable, and storable and, most importantly, nonpolluting.
- Compressed air technology reduces the cost of vehicle production by about 20%, because there is no need to build a cooling system, fuel tank, spark plugs or silencers.
- High torque for minimum volume.
- The mechanical design of the engine is simple and robust.
- Low manufacture and maintenance costs as well as easy maintenance.
- Lighter vehicles would mean less abuse on roads, thus, resulting in longer lasting roads.
- The price of fueling air powered vehicles will be significantly cheaper than current fuels.
- When the air is being compressed at reasonable speeds, it heats up. The heat given off during compression could be reclaimed for space heating or water heating, or used in a sterling engine.
- Transportation of the fuel would not be required due to drawing power off the electrical grid. This presents significant cost benefits. Pollution created during fuel transportation would be eliminated. Compressed-air vehicles are comparable in many ways even to electric vehicles and their potential advantages over electric vehicles include:
- Compressed-air vehicles are unconstrained by the degradation problems associated with current battery systems.
- Much like electrical vehicles, air powered vehicles would ultimately be powered through the electrical grid which makes it easier to focus on reducing pollution from one source, as opposed to the millions of vehicles on the road.
- Compressed-air tanks can be disposed of or recycled with less pollution than batteries.
- The tank may be able to be refilled more often and in less time than batteries can be recharged, with refueling rates comparable to liquid fuels.

- The tanks used in a compressed air motor have a longer lifespan in comparison with batteries, which, after a while suffer from a reduction in performance.

VIII. LIMITATION

Disadvantages of compressed-air vehicles are less well known, since the vehicles are currently at the pre-production stage and have not been extensively tested by independent observers. Some bottlenecks of technology may be summarized as:

- Very little is known about air powered vehicles thus far.
- Compressed air vehicles likely will be less robust than typical vehicles of today which causes a danger for users of compressed air vehicles because of the road full with larger, heavier and more rigid vehicles.
- Compressed air has a low energy density comparable to the values of electrochemical lead-acid batteries. While batteries can somewhat maintain their voltage throughout their discharge and chemical fuel tanks provide the same power densities from the first to the last liter, the pressure of compressed air tanks falls as air is drawn off.
- When the air is expanded in the engine, it will cool down via adiabatic cooling and lose pressure thus its ability to do work at colder temperatures. It is difficult to maintain or restore the air temperature by simply using a heat exchanger with ambient heat at the high flow rates used in a vehicle, thus the ideal isothermal energy capacity of the tank will not be realized. Cold temperatures will also encourage the engine to ice up.

IX. APPLICATION

This air engine used many places some of them are as listed below.

- It is used in automobile vehicles.
- Use for short distance traveling purpose.
- To run the vehicle by the compressed air.
- As a secondary drive mechanism in the vehicle so when it out of fuel it can run by this system.
- As a supplementary drive mechanism

X. OBJECTIVE OF PROJECT

In the present energy scenario the fossil fuel sources are fast depleting and their combustion products are causing global environmental problems.

So it is inevitable to shift towards the use of renewable energy resources which in turn will reduce pollution and saves fossil fuels.

Air Powered Engine is an alternative technology which uses compressed air to run the engine and thus eliminates the use of fossil fuels. Exhaust temperature of it will be slightly less than atmospheric temperature (i.e. 20-25°C) and thus helps in controlling global warming and reducing temperature rise caused due to other means. As we are going to convert the already existing conventional engine into an air powered one, this new technology is easy to adapt. Another benefit is that it uses air as fuel which is available abundantly in atmosphere. Apart from above other technical and economic benefits are as follows:

A. Technical Benefits

- The temperature of the engine while working will be slightly less than the ambient temperature.
- Smooth working of the engine due to very less wear and tear of the components.
- There is no possibility of knocking.
- No need of cooling systems and spark plugs or complex fuel injection systems.

B. Economic Benefits

- No use of expensive fossil fuels as the free air is compressed and taken to use.
- For this reason people can easily shift to the new technology.
- Compressors use electricity for generating compressed air which is relatively much cheaper and widespread.
- Smooth working will lead to less wear & tear, so lesser maintenance cost.
- The Air Powered Engine technology is cheaper in cost and maintenance and it doesn't cause any kind of harm to the environment. Thus it is surely a futuristic mode of transport

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