Fabrication of Air Hybrid Tricycle
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Abstract:
Advancement of a traditional tricycle into a hybrid cycle with options of pedalling as well as pneumatic aid which significantly reduces the muscle power taken by driver also sustain the momentum for longer time. Sustainability of momentum is the prime focus which is consequence of low muscle plus pneumatic power resulting less frequently pedalling by driver. The hybrid tricycle can either be pedalled manually or be run on compressed air. Tricycle is a relatively cheap and environmentally friendly mode of transportation. This project is a step that would make transportation environment friendly.

Keywords: Compressed air, Clean and highly efficient, Cylinders, Non-polluting, Chain and sprocket.

I. INTRODUCTION
In present scenario, with increase in number of automobiles the need for petroleum products is reaching the peak point. These petroleum products are non-renewable sources, and it has danger of exhaustion in future, so it is better to move an alternate energy sources. The price of crude oil is increased significantly over the past few years and there seems to be no turning back. The environment has also been more of a focus throughout the world in past few years and it seems that cleaner alternatives have been steadily on the rise with no end in sight. Fossil fuels (i.e., petroleum, diesel, natural gas and coal) which meet most of the world's energy demand today are being depleted rapidly. Also, their combustion products are causing global problems, such as the greenhouse effect, ozone layer depletion acid rains and pollution which are posing great danger for environment and eventually for the total life on planet . These factors are leading automobile manufactures to develop cars fuelled by alternatives energies. Hybrid cars, Fuel cell powered cars, Hydrogen fuelled cars will be soon in the market as a result of it. One possible alternative is the air powered vehicle. Air, which is abundantly available and is free from pollution, can be compressed to higher pressure at a very low cost, is one of the prime options since atmospheric pollution can be permanently eradicated. It is hard to believe that compressed air can be used to drive vehicles and that is true and air tri cycle as it popularly knows has caught the attention of research worldwide. It has zero emission and is ideal cycle on temperature for city driving condition. The Hybrid Tricycle can either be pedalled manually or run on compressed air. Compressed air is used to turn the rear wheel through a slider crank mechanism via a chain and sprocket. The actuation of the pneumatic piston used in the slider crank mechanism is controlled by a 5/2 pneumatic directional control valve which in turn is actuated by a push button through cam and follower arrangement connected to the crankshaft. This arrangement ensures that the pneumatic piston expands for half the revolution and contracts for the other half. A push button valve actuates this mechanism and a flow control valve is used for speed control.

II. OBJECTIVE
The main objective is to build a Tricycle which can be run by the compressed air and can also be pedalled manually. To make it success there are several things that we need to know such as what will be the prime movers, how to store it and advantages of this new vehicle. To reduce air pollution which is subjected to global warming. By developing a tricycle which is completely runs on renewable source of energy and compressed air and is totally eco-friendly. This Tricycle does not use any fuels for its working.

III. EXPERIMENTAL DETAILS
A tricycle is an air operated one-person capacity vehicle that is specially designed for low mobility. It is generally used by those who have difficulty walking or moving frequently from one place to another. Tricycles are available in variety of design, those intended for outdoor use. A tricycle is different from a manually operated wheel chair as source of supply is air motor which utilize freely available air as the working medium that is to transmit power from the source to destination.

IV. MODELING
The modelling consists of various parts and their assembling.

The main parts are:
1. PNEUMATIC DOUBLE ACTING CYLINDER
Pneumatic cylinders are sometimes known as air cylinders are mechanical devices which use the power of compressed gas to produce a force in a reciprocating linear motion. A double acting cylinder is employed in control systems with the full pneumatic cushioning and it is essential when the cylinder itself is required to retard heavy masses. This can only be done at the end positions of the piston stock. In all intermediate position a separate externally mounted cushioning derive must be provided with the damping feature. The normal escape of air is out off by a cushioning piston before the end of the stock is required. As a
result the sit in the cushioning chamber is again compressed since it cannot escape but slowly according to the setting made on reverses.

2. CAM PLATE
The most commonly used cam is cam plate. It is also known as cam or radial cam which is cut out of flat plate or metal. The cam supports plate in a twin cam engine not only supports the cams, it provides the manifold system used to distribute oil flow to all the critical areas of engines. It also contains oil pressure bypass valve, which is designed to redirect excess oil pressure from the manifold back into pump.

3. SAFETY VALVE
A safety valve is a type of valve that automatically actuates when the pressure of inlet side of the valve increases to a predetermined pressure, to open the valve disc and discharge the fluid (steam or gas). The primary purpose of safety valve is protection of environment. A safety valve is designed to open and relieve excess pressure from vessel or equipment.

4. GATE VALVE
Gate valve is used to shut off the flow of air rather than flow regulation. A gate valve also known as sluice valve, it is a valve that opens by lifting a barrier out of the path of fluid.

5. 5/2 SOLENOID VALVE
The directional valve is one of the important parts of a pneumatic system. Commonly known as DCV, this valve is used to control the direction of air flow in the pneumatic system. The directional valve does this by changing the position of its internal movable parts. This valve was selected for speedy operation and to reduce the manual effort and also for the modification of the machine into automatic machine by means of using a solenoid valve. A solenoid is an electrical device that converts electrical energy into straight line motion and force. These are also used to operate a mechanical operation which in turn operates the valve mechanism. Solenoids may be push type or pull type. The push type solenoid is one in which the plunger is pushed when the solenoid is energized electrically. The pull type solenoid is one in which the plunger is pulled when the solenoid is energized.
6. AIR TANK
Air tank is a closed container designed to hold fluids at pressure other than atmospheric pressure. Air receiver is used to provide compressed air to tank. They are dangerous to handle hence regulated time to time. The system will have the cylinder made up of mild steel and it will have two holes which may be used to pass input and output air.

7. P.U PIPE
Polyurethane pipe are the most flexible materials available. Polyurethane pipe is very durable with outstanding memory, making it a good choice for coiled, portable, or self-storing pneumatic hose application.

8. P.U CONNECTORS
PU connectors are also called PU fittings. PU fittings are the parts used to connects sections of pipe, tube, and hose in pneumatic (pressurized gas) systems.

V. WORKING CONCEPT
The Hybrid Tricycle can either be pedalled manually or be run on compressed air. This project consists of pneumatic cylinder, solenoid valve, pu pipe, pu connectors, cam plate. This is fixed at bottom of the main frame. A bicycle is rear wheel drive get the power from pneumatic cylinder creates pressure to push the piston which is connected to the cam plate at the rear wheel. This bicycle provides all the controls for driving to the driver. The air storage tank is mounted at the frame of chassis. The shaft or axles are fixed on the chassis with the help of pedestal, which consist of bearing enclosed in the casing. The chain drives are used to transmit the power. 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 the ratchet 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 cycle start running.

VI. ADVANTAGES
- It is flexible and easy to drive and control due to its simple construction as that of a bicycle and light weight.
• It is automatic as well as manual in operation.
• Refueling can occur at home using an air compressor or at local service stations.
• No pollutants are emitted.

VII. DISADVANTAGES

• Initial purchase price is high.
• Compressor air usage is more than the production.
• Changes of pneumatic leakage.
• It require additional space to place cylinder and tanks.

VIII. FUTURE SCOPE

• In future we can use flexible seating arrangement.
• Bicycle can be used for long distance.
• This bicycle is very flexible and can be modified according to one’s interest.
• In future this bicycle can used for normal people and daily routine.
• A particularly well suited application for vehicle operating on compressed air is material handling and for visitors in industry.

IX. CONCLUSION

Based on the work that has been done on this project. We can say our project can be a success considering that will be effective in providing mobility for persons who have disabilities. One of the major lessons we have learned is that designing an appropriate technology is a huge challenge.

X. REFERENCES


