Human Powered Flywheel Energy Vehicle – A Review

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Abstract **- The HUMAN Driven VEHICLE association encourages the people to build a vehicle driven by humans. At present, the number of vehicles as well as that of emissions is rising day by day. Since they are running on petrochemical which is becoming an air pollution issue. As everyone knows air pollution also has its bad effect and illness like asthama, etc. There is no question that carbon dioxide emissions from a vehicle exhaust are a problem for the rising rate of global warming, while fuel prices are also growing day by day in India and around the world. As a substitute for such reasons. As everyone knows air pollution also has its bad effect and illness like asthama, etc. There is no question that carbon dioxide emissions from a vehicle exhaust are a problem for the rising rate of global warming, while fuel prices are also growing day by day in India and around the world. As a substitute for such reasons. As everyone knows air pollution also has its bad effect and illness like asthama, etc. There is no question that carbon dioxide emissions from a vehicle exhaust are a problem for the rising rate of global warming, while fuel prices are also growing day by day in India and around the world. As a substitute for such reasons. A Human Powered Flywheel Vehicle runs on human energy by simply piddling. This vehicle having two seater arrangement and there is some special mechanism like some energy is stored in the vehicle as through one of the component and used it via, lever, which gives the thrust to the rider during pickup condition as it reduces man effort. During starting condition when the driver takes pickup to a vehicle. It takes lot of energy to pull the vehicle by piddling. In this HPFV there is such a mechanism when driver prepare for piddling, there is a clutch mounted on the steering and driver will engage the clutch at startup. At this moment after pressing the lever, the linkage connection is followed to the clutch and it gets engaged and driver used to piddle at some desired rpm for store the energy in the flywheel. As this process is completed after disengaging the clutch through by lever all the energy is used to drive the vehicle during startup condition. The main aim of present study is to find different alternatives which replaces the petrochemicals running vehicle and making some more improvement in HUMAN POWERED VEHICLE, applying the things in such a way that people find something attractive in the vehicle which helps implementation easily.**

Index Terms **- Automobile, Human Powered Flywheel Vehicle, Pollution, Piddling, Clutch.**

I.INTRODUCTION

Human powered transport is the transport of persons and goods using human muscle power [1]. Like animal powered transport, human-powered transport has existed since time immemorial in the form of walking, running, and swimming. Human-powered transport is sometimes the only type available, especially in underdeveloped or inaccessible regions [2], [3], [4].
Although motorization has increased speed and load capacity, many forms of human-powered transport remain popular for reasons of lower cost, leisure, physical exercise, and environmentalism. Modern technology has allowed machines to enhance human-power [5], [6], [7]. The fuel consumption associated with transport is a prime issue i.e, consider throughout the world. Mostly transport vehicle is depending on petroleum-based fuel and today there is a need to think about alternative energy source to drive the vehicles [8], [9], [10]. There are various alternatives have been proposed by the society such as biodiesel, electric vehicle, hybrid vehicle [11], [12], [13]. However, one may also utilize the human power as an alternative source to drive vehicles.
The association of HPVA promoting and inviting the concept of HPVA [14], [15], [16]. It also publishes the current research towards HPVA. These vehicles are properly design and experimentations are carried out by the researchers [17], [18], [19]. It is felt that a flywheel is a main source of energy storage. Therefore, if one deploys this flywheel in combination with power transmission element that would be more beneficial to drive HPV at power. Thus, the present work a concept of HPFV (Human Powered Flywheel

Vehicle) is proposed which is to be design and implemented [20].

Following are the components of HPFV [21]

1. Sprocket
2. Freewheel
3. Two stages of spur gear
4. Flywheel
5. clutch

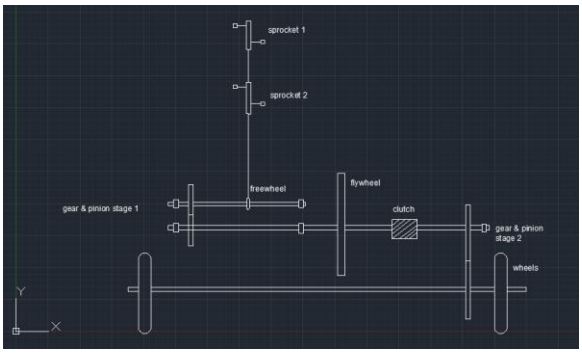

Fig- mechanism of vehicle in AutoCAD

II. RESEARCH OBJECTIVES

1. To provide environmental friendly vehicle for the city and rural people.
2. To come out with medium speed vehicle with less human effort.
3. To reduce the weight of the vehicle.
4. The vehicle should have minimum vibrations while driving.
5. Able to transport a single rider using only manual power.
6. Provide additional health benefits when used at a non-exhaustive amount.

III. LITERATURE REVIEW

Principles of Human-Electric Hybrid Drives for Human Powered Vehicles [22]

In this paper they show the human drive hybrid vehicle, the E-bike parallel hybrid. This vehicle is functioned in such a way that the constant torque should be provided. The concept of the vehicle is that when the vehicle is driving at a flat road or downhill roads with somewhat less energy is required at this stage the battery is get charged. The dynamometer charging the battery at the stage of piddling and no piddle applied to the vehicle. When the uphill road or whenever if you want that battery power to use you can use to run the vehicle through motor mounted at rear wheel. A special function of a parallel hybrid is Michael Kutters drive system where electric and human power are added using a planetary gearset in the rear wheel hub. In this vehicle the human power is converted into electric power through the generator.

Design and analysis of foldable human-powered vehicle [23]

Now a day the human power vehicle which is available is pretty big in size you could not take with you anywhere you are going. The paper shows they made a three-wheel foldable human powered vehicle. There are parts of human powered vehicle which can be foldable to reduce the self-vehicle space. The important body part of the vehicle is folded while the wheels of vehicle and other parts are remained unchanged. The design of the vehicle consists of compact joint, when main body of the vehicle it folded it gives overlap condition. Then, the seat of this HPV also can be folded and adjusted for user comfortable purpose. The drawing of the vehicle is also designed on designing software CATIA & CAD. The concept of design is made to keep in mind of ergonomics, aerodynamic, highly engineered, easily manufactured and keeping the safety. Proper analysis will also be done on this vehicle. This is a really innovative modal. The main advantage of this type of vehicle is that we should carry anywhere with you. This paper shows that carrying problem of the vehicle will also be solved.

Design, Analysis and Fabrication of a Human Powered Vehicle [24]

The paper shows they made a design of both three-wheel bicycle and car combine in one vehicle. Even the design of the vehicle is also undergone by some tests and software this makes the vehicle safe and eco-friendly and precise. This vehicle is also some aerodynamic touch to increase the speed of vehicle. The cost of the vehicle is also low as say in the paper anyone can afford it and drive it with no excuse.

DESIGN OF FAIRING FOR HUMAN POWERED VEHICLES CONSIDERING AERODYNAMICS & AESTHETIC [25]

This project is funded by cal poly hpv. Their goal is to design, test and build a bicycle frame that the HPV club can attach to a fairing of their design. Primary design will be done like speed of vehicle, cost, rider ergonomics, reliability. This vehicle will made to

compete in ASME's Human Powered Vehicle Challenge (HPVC) series of races. The purpose of a human powered ground vehicle is to transport its rider and cargo safely and efficiently. In this the vehicle is available of its simplest form and FEA testing was also performed. This vehicle consists of three wheels, two wheels at rear and one wheel is at front. This vehicle is run by simple piddling and sitting arrangement is ergonomically design with the best and comfortable sitting arrangement. The vehicle is single sitter. This vehicle is more like a car with up shed at its top.

Design and Development of a Hybrid Human Powered Vehicle [26]

In this they design a new version of bicycle with three wheels, two wheels in front and one in back of vehicle. Their main aim is to build such vehicle which is totally based on human power and it will carry or transport in use. The chassis of the vehicle is completely consisting of stainless steel tubes, minimum number of tubes is used to reduce the weight of the vehicle. This makes the vehicle more stronger and more safer. A hub motor is fitted at the rear wheel. The motor turns on when the rider tired of piddling, work till the battery exhausted. The battery is charged when the rider piddles the vehicle. Seating adjustment is also be there to adjust the seating arrangement of the rider from up or down. A CFD analysis is also done on ANSYS to reduce air drag and increase the speed of the vehicle. Fairing material used will be thick transparent plastic with bamboo sticks as it is a skeleton which is overall a new innovation. This vehicle is more practical to use and easy to maintenance.

A Review on Human and Electric Powered Vehicle [27]

The main focus of this project is on transportation and solve the problem of fossil fuel and pollution, using the human powered vehicle to travel at a specific distance while run on human power. This vehicle consists of three-wheel bicycle in which two wheels is in front and one wheel is at rear position, driven by two members with side seating arrangement. The vehicle would be equipped with battery, motor, and transmission belt to transmit the power to the wheels of vehicle. The tadpole type configuration is used for this vehicle in which two wheels are mounted in front side and one wheel in back side of the vehicle. Even disc brakes also mounted at all the three wheels for proper and effective braking. This vehicle is good for short drive at short distance.

Design selection and analysis of human-powered vehicle [28]

This paper shows the design selection, improvement, and analysis of human powered vehicle. The components like chassis, suspension and hub are the components of HPV are designed by using design CATIA software. Whatever problems are facing by vehicle are find out and redesigned the same vehicle by analyzing. Even proper stress distribution of the vehicle is done practically and factor of safety also. In this paper, the methodology of this project will be explained in detail about the research methods performed in order to produce an excellent result.

An Energy-Efficient Human-Powered Hydraulic Bicycle with Flexible Operation and Software Aids [29]

This paper shows an innovative design of a new hybrid human powered vehicle with flexible operation and software aids. In this the bicycle is operate in four modes pedaling, charging, boost this all for riders driving modes. The aluminum chassis also design to function as a system reservoir and customize to optimize the riding comfort, space for components and durability of the vehicle. Because of using aluminum, the body of the vehicle is so free and light weight to drive and also drive with a less power with high speed.

Design of Efficycle-Human Powered Light Weight Hybrid Tricycle with Inbuilt Rear Wheel Steering and Use of Universal Joint in Front Axle [30]

The design of this vehicle is done on the SOLID WORKS and the design analysis is done on ANSYS. In this their main aim is to reduce the vehicle weight. The vehicle has antadpole type design, which is ergonomically engineered and easy to manufacture. The vehicle will provide the easy maintenance, best performance, and safety to the user. In this they provide the UV joint to the front axle so that it is convenient to climb the uphill and also the rear wheel steering is also be provided. UVB joints can be used in tricycle instead of wishbone to minimize their weight and simultaneously provide a base independent suspension. This vehicle is totally dependent on best frame design. It is an ecofriendly drive vehicle with an electric drive system such as light weight tricycle can be used as transport and also be used as disaster management.

HUMAN-POWERED ENERGY-EFFICIENT VEHICLE DESIGN [30]

In this paper, industry sponsored the student project of human powered vehicle. It allows a single rider to move in all types of terrain by transferring power to the drive train through the use of a biodegradable hydraulic fluid. Besides the design criteria specified by the project sponsor, functionality, safety and reliability, manufacturability, and cost effectiveness are focus of this design process. Overall design objective is to minimize the weight and maximize energy efficiency of the low power hydraulic drive train. Among the innovative human powered transportation ideas, an upright carbon fiber configuration is adapted. It optimizes rider comfort, weight and provides support of all hydraulic components and drive train. The pedal power of the rider runs a fixed displacement axial piston pump and transfers the pressurized fluid to a hydraulic motor of similar classification driving the rear wheel. A pressure sensing hydraulic circuit allows storage of the pressurized fluid in a hydraulic accumulator and releases the fluid on demand such as during the uphill motion. A lightweight mechanical drive train provides appropriate torque to drive the pump and driving wheel under all driving conditions.

IV. CONCLUSION

Human power, in the form of direct and electricity generation, is found to be an important source of renewable energy. If it is used in every garden with proper design, it could acquire enough power from it. This may be a big step in saving earth from global warming in the next few decades.

In conclusion, in economic use of human-powered flywheel vehicle system as an alternative energy source, there is vast scope for the generation of renewable energy as well as exercising for good health purpose. When we follow the proper drive method for human energy transfer into mechanical or electrical energy, we can use maximum power.

This way machine lubrication would make the operation of this machine easy. If this makes our computer ergonomically comfortable then this computer will become very popular in the near future. This paper reveals a new form of system that is free of input energy and is totally based on human control. Some human-powered vehicles often have issues with this principle when picking up the car. The gas pump located at long distances in rural areas and even some cities would not have that advantage either. This vehicle is maintenance-free and can be used in rural areas too.

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