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Development of acceleration system in two wheeler

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Abstract - According to the census of 2001, in India the population of physically challenged people was about 21,906,769 which are about 2.1 Percent of the total population out of which 12.6 million are males and 9.3 million are females. In this the people who have disability in movement makes up to 6,105,477 which is about 0.6% of the total population. People with disability in their legs are able to drive a physically challenged vehicle designed with dummy rear axle. It is not possible for a person with disability in their hands to drive such a vehicle as the vehicle's control system is present in the hands. For a hand disabled person driving a vehicle is possible by legs will be possible if the entire vehicle's control is transferred to legs. The leg-operated vehicle is fabricated by using simple mechanisms for steering, acceleration and braking which will enable the person to drive the vehicle.

Keywords:Accelerator,Break,Wire,Pedal,Throttle valve.

I. INTRODUCTION

Internal combustion engines have been now in the stage of making simplest in design aspects like weight reduction, low cost, and increasing the brake power etc. On the other hand research had also been made for introducing the acceleration system in to the automobiles thereby reducing the hand pain lesser as much. For the purpose of improving stability and drivability of vehicles, Foot Operated Accelerator system (FOAS) has been introduced by some manufacturers. In 1993, Toyota developed an FOAS, which has advantages and capabilities of acceleration control for every road surface condition and driving situation. In conventional mechanical throttle control, the pedal actuated by the driver is mechanically linked to the throttle, which regulates the airflow in the intake manifold. FOAS removes the linkage with a by-wire system. Since acceleration process was successfully made with the help of foot pedal in four-wheelers, the same was tried to implement in the two-wheelers.

II. FUNCTIONAL BLOCK DIAGRAM

Fig.1 explains clearly the systematic way of operation of the foot pedal acceleration system. The blocks shown are to be made with minor modifications in the accelerator wire and the pedal. The foot pedal acceleration system consists of two unit namely, foot control unit and the actuator unit.

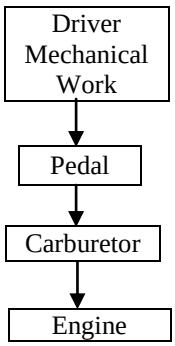

Fig. 1 Block diagram

III. FOOT CONTROL UNIT

The Foot control unit has the pedal rod and a wire as its main parts. So when the motorist gives acceleration, the accelerator was actuated. The driver acts as a power-boosting device such that the signal received from the pedal to the carburetor. In this part, the pedal works under mechanical process by driver.

IV. ACTUATOR UNIT

An actuator is the mechanism by which a control system acts upon an environment. The control system can be simple fixed mechanical system of a human input.

V. PROBLEM IDENTIFICATION

Now days vehicle acceleration system provide at the right hand side in the two wheelers. When gone to long travel the vehicle must be going with maximum speed. When we get maximum speed through by rotating the accelerator in same position to ensure the vehicle speed. Due to that, the wrist pain occurs and not able to operate by physically challenged people.

VI. METHODOLOGY

This project started with discussion with project guide about design. This discussion covering project overview and throw out opinion that related about title and instruct to proposed a certain design and concept before go up to next step. Then start to make and decide the best idea about the title. Before that, literature review and research about title is the important point to get the best idea. Then study and make a lot of investigation about acceleration system. This includes a study about concept of acceleration system, process to fabricate, and material. These tasks have been done through study on the internet, books, and others information.

After gather and collect all related information and obtain new idea and knowledge about the title, the project would continue with the design process. In this stage, the knowledge and idea should throw out in sketching process. After several design sketched, the best design would be choose among previous design so that we could carry on designing process. Then the selected design would be transfer to engineering drawing using CAD software in order to for analysis process. After that material preparation which is has been confirm initially. Purpose of this process is to determine the suitable and follow the product and design requirement. This process covering purchased material, measuring material and cutting off based on requirement. Here, this process is important because the material would determine whether our product in way to failure or otherwise.

After all the drawing and material preparation done the next process is a fabrication process. This process based on dimension has been determined from drawing. During this process, all the manufacturing process which is suitable could be used such as drilling process, thread using lathe machine, welding process and cutting material using disc cutter. Analysis stage has been implemented before fabrication stage. The evaluation is by considering the strength, portable, durability, safety and others. After all process above done on schedule without any problem such as product defect all material for report writing is gathered.

Equipments Selected:

- Lever
- Wire
- Carburetor
- Two wheeler engine

Lever

The Lever is a mechanical element which is used to control the speed and the give the power of the vehicle. Lever can be used to exert a large force over a small distance at one end by expiring only a small force over a greater distance at the other.

Fig. 2 Accelerator lever

Wire

The wire is used to give the acceleration to the vehicle. The wire is made of materials like copper, iron, and many materials. The wire has the outer layer which gives the safety to the wire from corrosion and wire damage.

Fig. 3 Accelerate wire

Carburetor

A **carburetor** (American and Canadian spelling),**carburator**, **carburettor**, or **carburetter**

(Commonwealth spelling) is a device that blends air and fuel for an internal combustion engine. It is sometimes colloquially shortened to carb in North America or carby in Australia. To **carburate** or **carburet** (and thus **carburation** or **carburetion**, respectively) is to blend the air and fuel or to equip (an engine) with a carburetor for that purpose. Carburetors have largely been supplanted in the automotive industry by fuel injection. They are still common on small engines for lawnmowers, rot tillers, and other equipment.

Fig. 4 Carburetor

Principles

The carburetor works on Bernoulli's principle: the faster air moves, the lower its static pressure, and the higher its dynamic pressure. The throttle (accelerator) linkage does not directly control the flow of liquid fuel. Instead, it actuates carburetor mechanisms which meter the flow of air being pulled into the engine. The speed of this flow, and therefore its pressure, determines the amount of fuel drawn into the airstream.

When carburetors are used in aircraft with piston engines, special designs and features are needed to prevent fuel starvation during inverted flight. Later engines used an early form of fuel injection known as a pressure carburetor.

Most production carbureted engines, as opposed to fuel-injected, have a single carburetor and a matching intake manifold that divides and transports the air fuel mixture to the intake valves, though some engines (like motorcycle engines) use multiple carburetors on split heads. Multiple carburetor engines were also common enhancements for modifying engines in the USA from the 1950s to mid-1960s, as well as during the following decade of high-performance muscle cars, fueling different chambers of the engine's intake manifold.

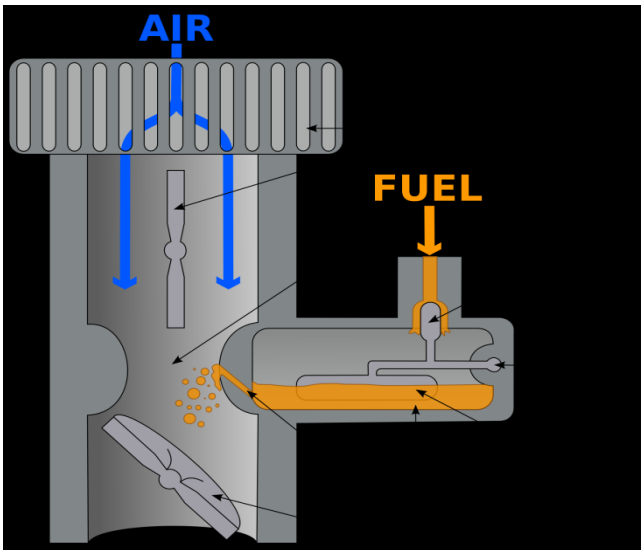

Fig. 5 Carburetor working

Older engines used updraft carburetors, where the air enters from below the carburetor and exits through the top. This had the advantage of never flooding the engine, as any liquid fuel droplets would fall out of the carburetor instead of into the intake manifold; it also lent itself to use of an oil bath air cleaner, where a pool of oil below a mesh element below the carburetor is sucked up into the mesh and the air is drawn through the oil-covered mesh; this was an effective system in a time when paper air filters did not exist.

Beginning in the late 1930s, downdraft carburetors were the most popular type for automotive use in the United States. In Europe, the sidedraft carburetors replaced downdraft as free space in the engine bay decreased and the use of the SU-type carburetor (and similar units from other manufacturers) increased. Some small propeller-driven aircraft engines still use the updraft carburetor design.

Outboard motor carburetors are typically sidedraft, because they must be stacked one on top of the other in order to feed the cylinders in a vertically oriented cylinder block.

The main disadvantage of basing a carburetor's operation on Bernoulli's Principle is that, being a fluid dynamic device, the pressure reduction in a Venturi tends to be proportional to the square of the intake air speed. The fuel jets are much smaller and limited mainly by viscosity, so that the fuel flow tends to be proportional to the pressure difference. So jets sized for full power tend to starve the engine at lower speed and part throttle. Most commonly this has been corrected by using multiple jets. In SU and other movable jet carburetors, it was corrected by varying the jet size. For cold starting, a different

principle was used in multi-jet carburetors. A flow resisting valve called a choke, similar to the throttle valve, was placed upstream of the main jet to reduce the intake pressure and suck additional fuel out of the jets.

Carburetor Adjustment

The fuel and air mixture is too rich when it has an excess of fuel, and too lean when there is not enough. The mixture is adjusted by one or more needle valves on an automotive carburetor, or a pilot-operated lever on piston-engined aircraft (since the mixture changes with air density and therefore altitude). Independent of air density the (stoichiometric) air to gasoline ratio is 14.7:1, meaning that for each mass unit of gasoline, 14.7 mass units of air are required. There are different stoichiometric ratios for other types of fuel.

Ways to check carburetor mixture adjustment include: measuring the carbon monoxide, hydrocarbon, and oxygen content of the exhaust using a gas analyzer, or directly viewing the color of the flame in the combustion chamber through a special glass-bodied spark plug sold under the name "Colortune". The flame color of stoichiometric burning is described as a "Bunsen blue", turning to yellow if the mixture is rich and whitish-blue if too lean. Another method, widely used in aviation, is to measure the exhaust gas temperature, which is close to maximum for an optimally adjusted mixture and drops off steeply when the mixture is either too rich or too lean.

The mixture can also be judged by removing and scrutinizing the spark plugs. Black, dry, sooty plugs indicate a mixture too rich; white or light gray plugs indicate a lean mixture. A proper mixture is indicated by brownish-gray plugs.

On high-performance two-stroke engines, the fuel mixture can also be judged by observing piston wash. Piston wash is the color and amount of carbon buildup on the top (dome) of the piston. Lean engines will have a piston dome covered in black carbon, and rich engines will have a clean piston dome that appears new and free of carbon buildup. This is often the opposite of intuition. Commonly, an ideal mixture will be somewhere in-between the two, with clean dome areas near the transfer ports but some carbon in the center of the dome.

When tuning two-strokes It is important to operate the engine at the rpm and throttle input that it will most often be operated at. This will typically be wide-open or close to wide-open throttle. Lower RPM and idle can operate rich/lean and sway readings, due to the design of carburetors to operate well at high air-speed through the Venturi and sacrifice low air-speed performance.

Where multiple carburetors are used the mechanical linkage of their throttles must be properly synchronized for smooth engine running and consistent fuel/air mixtures to each cylinder.

Fig. 6 Carburetor adjustments

Throttle Valve

A throttle is the mechanism by which fluid flow is managed by constriction or obstruction. An engine's power can be increased or decreased by the restriction of inlet gases (*i.e.*, by the use of a throttle), but usually decreased. The term throttle has come to refer, informally and incorrectly, to any mechanism by which the power or speed of an engine is regulated. What is often termed a throttle (in an aviation context) is more correctly called a thrust lever, particularly for jet engine powered aircraft. For a steam engine, the steam valve that sets the engine speed/power is often known as a regulator.

VII. WORKING PRINCIPLE

The driver is seated in the vehicle with the foot on the foot rest on the either direction. The driver will be able to accelerate the vehicle by his left foot is done by using the accelerator pedal in left side. And the braking is done by using the braking pedal with his left foot.

Decreased downtime and maintenance: Under foot operation lead to costly hours of downtime and maintenance.

Improved safety: Under hand accelerator operation lead to tread separation and accelerator failure, resulting in 25,000 accidents, 13,000 injuries and over 500 deaths per year. Further, operate pedal properly add greater stability, handling and braking

efficiencies and provide greater safety for the driver, the vehicle, the loads and others on the road.

Environmental efficiency: Under foot pedal operation there is an over racing by a youngsters is controlled and also fuel confection is reduced. By this method the exhaust gas is reduced, pollution is decreased.

VIII. RESULT

Our project reduces the wrist pain of the driver and very use full to physically challenged persons for comfort driving.

This modification does no affect the efficiency of the engine.

It is easy to operate without any stress.

It reduces the stress of the driver and only small amount of energy is needed to press the lever.

Its design is easy and maintenance is less.

IX. CONCLUSION

After completing the major project "Development of Acceleration System in Two Wheeler" we are much happy and would like to thank our professor, guides and the lectures of the concerned department who have guided us. While making this project we have been able to learn a lot and understand the various aspects of "Acceleration System" we can use our knowledge, which we get during our knowledge, which we get during our study.

Finally we dedicate our project to the physically challenged people.

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