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A PATH FOR HORIZING YOUR INNOVATIVE WORK

EMISSION REDUCER WITH FUEL ECONOMIZER

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Abstract: 'Fuel Economizer' is a device introduced in two wheelers. The leading problem seen in bikes nowadays is less mileage and high exhaust emissions. This problem can be overcome by the implementation of 'Fuel Economizer' in bikes. The main problem of the carburetor is, it supplies more fuel at the high speed, which is not required. The next problem is that the carburetor contains a venturi, which is provided to increase the velocity of the air-fuel mixture, but this ultimately leads to decrease the pressure of the mixture and moreover also decreases the density of the air-fuel mixture. Because of the reduction in the density, the fuel in the combustion chamber does not burn properly and leads to reduce the average of the vehicle and also in addition increases the emission to great extent. These two disadvantages lead to reduce the efficiency and increase the emissions.

Keywords: Emission, Reducer, Fuel Economizer

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INTRODUCTION

One of the reasons for high exhaust emission and poor mileage in the vehicles is insufficient air in the mixture. Mostly simple carburetors are used in two wheelers where in a rich mixture is attained during high throttle opening. This problem is effectively solved in four wheelers by sophisticated techniques. However, these devices cannot be implemented in the two wheelers for want of space and are also uneconomical.

This project aims to solve the inherent drawbacks of simple carburetor by increasing the amount of air supplied to the A/F mixture. The device called economizer is designed for Pulsar-150 vehicle, introduced in the carburetor. This admits air long with the mixture in the carburetor and its quantity increases with the increase in the speed of the vehicle. This particular action reduces the strength of the mixture and brings it to the normal value and counteracts the action of simple carburetor.

1.1. Objectives

a) To achieve proper combustion of A/F mixture in combustion chamber.

b) To increase the mileage of vehicle.

c) To reduce emissions.

1.2. Carburetor

The carburetor works on the “Venturi Principle”, which states that at the throat section the velocity charge increases at the reduction in the pressure and also cause to reduce the density of the charge. The reduction in density directly affects the combustion of charge. But it is necessary so as to obtain proper homogeneous A/F mixture. Thus, venturi cannot be eliminated from the carburetor. Figure. 1 shows the Venturi Principle.

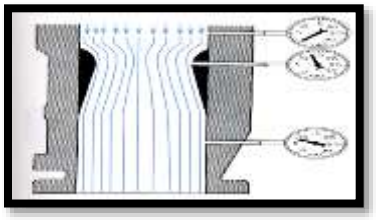


Figure 1: Venturi Principle

1.3. Working of Carburetor

In carburetor slider and throttle is provided. At the lower part of the slider a pin is connected which controls the supply of fuel. The pressure of the suction stroke of the piston is acted over the carburetor. This pressure is used to suck the charge. When throttle opens this pressure acts over the slider leads to lift the slider, thus A/F mixture is supplied to engine according to throttle opening and lifting of slider. Figure. 2 show the working of carburetor.

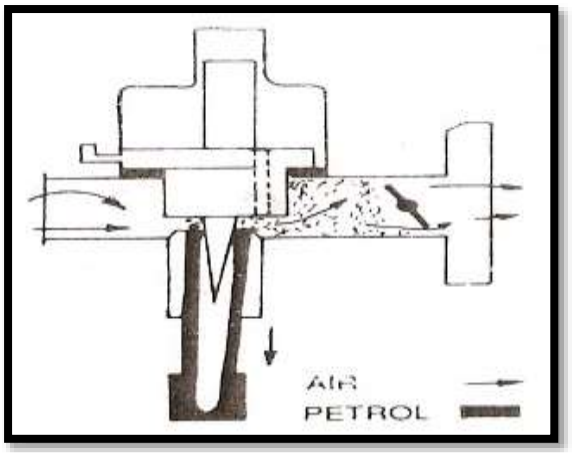


Figure 2: Working of Carburetor

1.4. Disadvantages of Carburetor

1. When air-fuel mixture passes through a venturi, velocity of the mixture increases ultimately leads to reduce pressure and density of the mixture.
2. This causes improper combustion of the mixture.
3. Less efficiency.
4. High emissions.

2. LITERATURE REVIEW

On page no. 368 of Kirpal Singh's "Automobile Engineering" Volume 2, working of carburetor i.e. all the operations in the carburetor are explained.

On Dec11, 1979 Thomas.H.W.W.P.Ogle has invented a fuel economy system for an internal combustion engine which, when installed in a motor vehicle, obviates the need for a conventional carburetor, fuel pump and gasoline tank. The system operates by using the engine

vacuum to draw fuel vapors from a vapor tank through a vapor conduit to a vapor equalizer which is positioned directly over the intake manifold of the engine. The vapour tank is constructed of heavy duty steel or the like to withstand the large vacuum pressure and includes an air inlet valve coupled for control to the accelerator pedal. The vapor equalizer ensures distribution of the correct mixture of air and vapor to the cylinders of the engine for combustion, and also includes its own air inlet valve coupled for control to the accelerator pedal. The system utilizes vapor-retarding filters in the vapor conduit, vapor tank and vapor equalizer to deliver the correct vapor/air mixture for proper operation.

On May 2, 1961 Robert S Shelton has carried out tests which relates to improvement in vapor fuel systems that are to be used in internal combustion engines. This invention provides a great saving in gasoline fuel and approximately can give the mileage about eight times the current internal combustion engine gives. Another object of the invention is to provide a vapor fuel system that is provide to the reservoir which contain liquid gasoline which is heated to provide vapors which the internal combustion engine will operate.

While basic carburetors have only one venturi, many carburetors have more than one venturi, or "barrel". Two barrel and four barrel configurations are commonly used to accommodate the higher air flow rate with large engine displacement. Multi-barrel carburetors can have non-identical primary and secondary barrel(s) of different sizes and calibrated to deliver different air/fuel mixtures; they can be actuated by the linkage or by engine vacuum in "progressive" fashion, so that the secondary barrels do not begin to open until the primaries are almost completely open. This is a desirable characteristic which maximizes airflow through the primary barrel(s) at most engine speeds, thereby maximizing the pressure "signal" from the venturis, but reduces the restriction in airflow at high speeds by adding cross-sectional area for greater airflow.

The main disadvantage of this carburetor is high emissions and more consumption of fuel due to multiple venturies causing improper combustion of charge.

Figure 3: Multi Barrel Carburetor

1.0 System Modeling

The problem of low density of charge entering into the engine can be solved by supplying pressurized air to the flowing charge. This can be done by providing an air vent to the carburetor.

According to the requirement and space availability a hole of 4 mm diameter is drilled which lies between the throttle and the slider of carburetor as shown in Figure 4. The flow of pressurized air in the carburetor is supplied via U-tube assembly as shown in Figure 5. The purpose of U-tube is to convert the velocity head of air entering into U-tube into pressure head. Thus, the reduced density of charge is increased and proper combustion of charge is achieved. The dimensions of U-tube and funnel are according to the space availability.

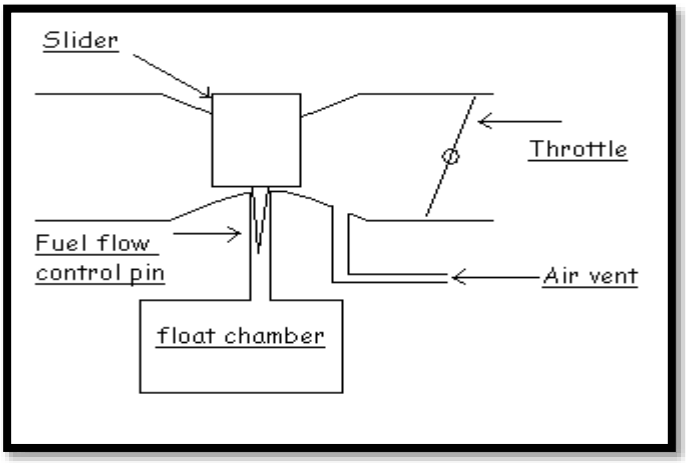


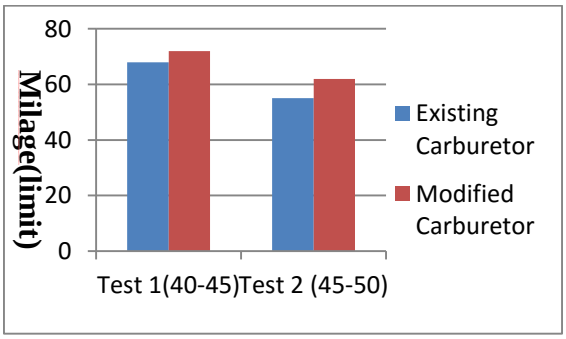
Figure 4: Position of Air Vent

Figure 5: U-tube Unit with Carburetor

4.0 PERFORMANCE OF MODEL

4.1 Fuel Economy Tests:

Average tester machine is used to calculate the mileage of vehicle in a stationary condition. It is an automatic computerized system to calculate mileage of vehicle. It consists of two rollers which rotate in opposite direction which are parallel to each other. It has a display that shows the readings which are related to the average of vehicle like speed, fuel consumption, mileage, max. & min. speed. This machine calculates the distance travelled by vehicle for 20ml of petrol and is automatically converted in km/lit.



Graph 1: Mileage readings on Average Tester Machine

Graph 1: The mileage of vehicle is increased by 8.94%.

4.2 Field Tests:

Bottle test procedure:

1) Take bottle of 100ml with petrol.

2) Disconnect the carburetor inlet fuel line from fuel tank.

3) Then this line is connected to the bottle containing 100ml of petrol.

4) Before starting the vehicle confirm that carburetor does not contain fuel in float chamber.

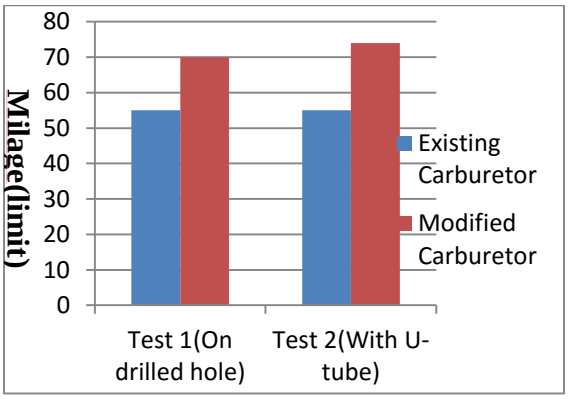
5) Note down the reading on speedometer before starting the vehicle

6) Now the vehicle is driven until all the fuel from the bottle is vanished.

7) At this point note down the reading on the speedometer.

8) Calculate the speedometer reading difference.

Mileage = Speedometer reading difference x 10 (km/lit)



Graph 2: Field Test readings

Graph 2: The average of vehicle is increased up to 30.94%

4.3 Emission Test:

To measure the emission reduced PUC test are conducted. This machine provides information about carbon monoxide, hydrocarbons content in the exhaust of the emission. The reduction in the carbon monoxide is due to increase in the oxygen particles and hydrocarbons are reduced due to proper combustion of charge.

Table 1: Emission Test Readings

Sr. No.	Content in Exhaust	Reading on old Carburetor	Reading on modified Carburetor
1.	Carbon Monoxide	1.4	0.671
2.	Hydro-carbons	1134	543

Table 1: Emission is reduced up to 50%.

4.4 Advantages:

1) Increase average of vehicle near about 30 to 35%.

2) Reducing emissions about 45 to 55%.

3) Manufacturing cost is low.

4) No variation in pick-up.

5) It needs no modifications in operating parameters and setting of the engine.

6) It can be easily incorporated in the vehicle.

7) Most economical than other sophisticated devices.

5.0 CONCLUSION:

The average of vehicle is increased near about 30-35 % and emissions are reduced up to 50%. While implementation of this project engine variations are not concerned. This implementation is beneficial and economical in future.

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