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(54) Title: AN IMPROVED SOLENOID VALVE FOR REGULATING SPEED OF AN AUTOMOBILE, A METHOD AND AN AUTOMOBILE

(57) Abstract: The present invention relates to a speed regulating device for an automobile, more particularly related to an improved solenoid valve for regulating the speed of an automobile. The speed is regulated by controlling amount of fuel entering inside an engine. The amount of fuel dispensed from the solenoid valve depends on signals provided by electronic circuits to connector.



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**AN IMPROVED SOLENOID VALVE FOR REGULATING SPEED OF AN  
AUTOMOBILE, A METHOD AND AN AUTOMOBILE**

**FIELD OF THE INVENTION**

5 The present invention relates to a speed regulating device for an automobile, more particularly related to an improved solenoid valve for regulating the speed of an automobile. The speed is regulated by controlling amount of fuel entering inside an engine. The amount of fuel dispensed from the solenoid valve depends on signals  
10 provided by electronic circuits to connector.

**BACKGROUND OF THE INVENTION**

The need for the speed control devices are developed based on safety aspect in usage of  
15 an automobile in public environment. There are various ways from which the speed of the automobile is controlled. The solenoid valve based speed control devices are cost effective and proven to be reliable. The speed control systems uses, concept of varying fuel supply to the engine according to the demands made on the engine during the use of the vehicle and based on set speed of the vehicle.

20 In the existing trends for example US 4,177,774 provides a means to control the supply of fuel to the engine to maintain the vehicle running at a constant speed. The vehicle requires speed monitoring system for speed regulation. The fuel demand by the engine is gauged by the degree of vacuum attained in the vehicle inlet manifold and this  
25 vacuum is utilized to control a servo-mechanism operating on the vehicle throttle. The controlling in fuel supply to the engine maintains constant speed.

**OBJECTS OF THE INVENTION**

30 The principal object of the present invention is to develop an improved solenoid valve for regulating speed of an automobile.

Yet another object of the invention is to ensure fuel supply through auxiliary port to engine even though the main port is closed by plunger of the solenoid valve.

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Yet another object of the invention is to provide a method of regulating speed of an automobile.

Yet another object of the invention is to develop an automobile comprising an improved solenoid valve.

### **STATEMENT OF THE INVENTION**

Accordingly the invention provides an improved solenoid valve comprising a connector at solenoid part for supplying input signals to solenoid coil (10) from an Electronic Control Unit (ECU), and a screw holder (5) holding an adjusting screw (4) at bottom of valve part, wherein the valve part is mounted below the solenoid part to regulate speed of an automobile, a method of regulating speed of an automobile comprises acts of; varying auxiliary port (8) opening of solenoid valve using an adjusting screw (4) provided at bottom of the solenoid valve to have predetermined speed of the automobile; varying input frequency of an Electronic Control Unit (ECU) of the solenoid valve for transmitting voltage signals to connectors (11) at solenoid part; and actuating solenoid coil (10) of the solenoid valve by signals of connector for plunger (9) to regulate the speed of the automobile, and an automobile comprising an improved solenoid valve.

### **BRIEF DESCRIPTION OF ACCOMPANYING DRAWINGS**

**Figure 1:** shows the sectional view of the solenoid valve.

**Figure 2 (a):** shows the flow diagram of solenoid valve when the valve is in non-energized condition and the adjusting screw is in closed condition.

**Figure 2 (b):** shows the flow diagram of solenoid valve when and solenoid valve is in non-energized condition and the adjusting screw is in fully opened condition

**Figure 2 (c):** shows the flow diagram of solenoid valve when solenoid energized condition and the adjusting screw is in fully opened condition.

### **DETAIL DESCRIPTION OF THE INVENTION**

The present invention is in relation to an improved solenoid valve comprising a connector at solenoid part for supplying input signals to solenoid coil (10) from an Electronic Control Unit (ECU), and a screw holder (5) holding an adjusting screw (4) at

bottom of valve part, wherein the valve part is mounted below the solenoid part to regulate speed of an automobile:

5 In yet another embodiment of the present invention the solenoid part comprises a plunger (9) at main port (7) of the solenoid valve surrounded by solenoid coil (10) for regulating fuel supply to outlet port (2); and the valve part mounted below the solenoid part comprises a stationary wall (12) adjacent to the main port (7) along with the combination of the plunger (9) and the adjusting screw (4) for regulation of the fuel supply from inlet port (1) to the outlet port (2).

10 In still another embodiment of the present invention the adjusting screw (4) is operated to alter auxiliary port (8) of the solenoid valve.

In still another embodiment of the present invention the auxiliary port (8) regulates the fuel supply to the automobile for predetermined speed.

15 In still another embodiment of the present invention the valve part is made from material selected from a group comprising brass and stainless steel.

20 The present invention is in relation to a method of regulating speed of an automobile comprises acts of; varying auxiliary port (8) opening of solenoid valve using an adjusting screw (4) provided at bottom of the solenoid valve to have predetermined speed of the automobile, varying input frequency of an Electronic Control Unit (ECU) of the solenoid valve for transmitting voltage signals to connectors (11) at solenoid part; and actuating solenoid coil (10) of the solenoid valve by signals of connector for plunger (9) to regulate the speed of the automobile.

25 In still another embodiment of the present invention the variation in auxiliary port (8) opening is manually operated.

30 In still another embodiment of the present invention the plunger (9) regulates the fuel supply to the automobile for speed control through main port (7) of the solenoid valve.

In still another embodiment of the present invention the plunger (9) moves in upward and downward directions for opening and closing of the main port (7) respectively.

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In still another embodiment of the present invention the main port (7) is opened and closed by the plunger (9) when the solenoid coil (10) is in an energized state and in non- energized state respectively.

5 The present invention is in relation to an automobile comprising an improved solenoid valve comprising a connector at solenoid part for supplying input signals to solenoid coil (10) from an Electronic Control Unit (ECU), and a screw holder (5) holding an adjusting screw (4) at bottom of valve part, wherein the valve part is mounted below the solenoid part to regulate speed of an automobile.

10 Solenoid valve comprises of valve part and solenoid part, the solenoid valve has an inlet port (1) and an outlet port (2) at fuel supply line. An adjusting screw (4) is mounted inside a screw holder (5) at the bottom of solenoid valve (referring to figure 1).

15 Leakages of fuel in-between the adjusting screw (4) at valve body (3) and the screw holder (5) is arrested by usage of o-ring (6). The solenoid valve is connected to power supply ranging 12 volts to 24 volts, wherein solenoid coil (10) of the valve gets actuated and an emf is produced, this produced emf is used for the making the plunger  
20 (9) present in valve to move in the upward direction, whereas in the absence of the power supply the plunger (9) will regains its original position in downward direction by the spring force [figure 2 (b)]. Figure 2 (a) illustrates a state of valve wherein the main port (7) and the auxiliary port (8) is completely closed. This closed condition of both ports does not provide fuel supply to engine.

25 Figure 2 illustrates during the open condition of the valve, the fuel will flow through the inlet port (1), and reach the outlet port (2) via the main port (7) and auxiliary port (8). The auxiliary port (8) opening is varied using the adjusting screw (4) to set the predetermined speed of the automobile [figure 2 (b)]. The main port (7) is made close  
30 and open using the plunger (9) which depends on the speed of automobile [figure 2 (c)]. The required quantity of fuel for the automobile is made available at this condition is attained by varying the frequency to Electronic Control Unit (ECU) for transmitting voltage signals to connectors (11) and then to actuate the solenoid coil (10).

In case of fully closed state of main port (7) by the plunger (9) the minimum flow of fuel to engine is ensured via setting of auxiliary port (8) opening. Hence, the engine is ensured with the minimum amount of fuel for functioning. The solenoid coil (10) is controlled through an external circuit to perform as proportional flow control valve.

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The solenoid valve is provided with a special connector (11) through which is input for the solenoid coil (10) is provided. The connector (11) is an environmentally sealed type. The wiring harness used withstands high temperature. The connector (11) ensures the solenoid coil (10) input considering usage of the automobile in all the possible environment conditions.

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The valve portion is made of the brass material and stainless steel material, which are more reliable for automotive fuel application.

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**We claim:**

1. An improved solenoid valve comprising a connector at solenoid part for supplying input signals to solenoid coil (10) from an Electronic Control Unit (ECU), and a screw holder (5) holding an adjusting screw (4) at bottom of valve part, wherein the valve part is mounted below the solenoid part to regulate speed of an automobile.
2. The improved solenoid valve as claimed in claim 1, wherein the solenoid part comprises a plunger (9) at main port (7) of the solenoid valve surrounded by solenoid coil (10) for regulating fuel supply to outlet port (2); and the valve part mounted below the solenoid part comprises a stationary wall (12) adjacent to the main port (7) along with the combination of the plunger (9) and the adjusting screw (4) for regulation of the fuel supply from inlet port (1) to the outlet port (2).
3. The improved solenoid valve as claimed in claim 1, wherein the adjusting screw (4) is operated to alter auxiliary port (8) of the solenoid valve.
4. The improved solenoid valve as claimed in claim 3, wherein the auxiliary port (8) regulates the fuel supply to the automobile for predetermined speed.
5. The improved solenoid valve as claimed in claim 1, wherein the valve part is made from material selected from a group comprising brass and stainless steel.
6. A method of regulating speed of an automobile comprises acts of;
  - a. varying auxiliary port (8) opening of solenoid valve using an adjusting screw (4) provided at bottom of the solenoid valve to have predetermined speed of the automobile,
  - b. varying input frequency of an Electronic Control Unit (ECU) of the solenoid valve for transmitting voltage signals to connectors (11) at solenoid part; and
  - c. actuating solenoid coil (10) of the solenoid valve by signals of connector for plunger (9) to regulate the speed of the automobile.
7. The method as claimed in claim 6, wherein the variation in auxiliary port (8) opening is manually operated.

8. The method as claimed in claim 6, wherein the plunger (9) regulates the fuel supply to the automobile for speed control through main port (7) of the solenoid valve.
9. The method as claimed in claim 6, wherein the plunger (9) moves in upward and  
5 downward directions for opening and closing of the main port (7) respectively.
10. The method as claimed in claims 6 and 9, wherein the main port (7) is opened and closed by the plunger (9) when the solenoid coil (10) is in an energized state and in non- energized state respectively.
- 10 11. An automobile comprising an improved solenoid valve of claim 1.

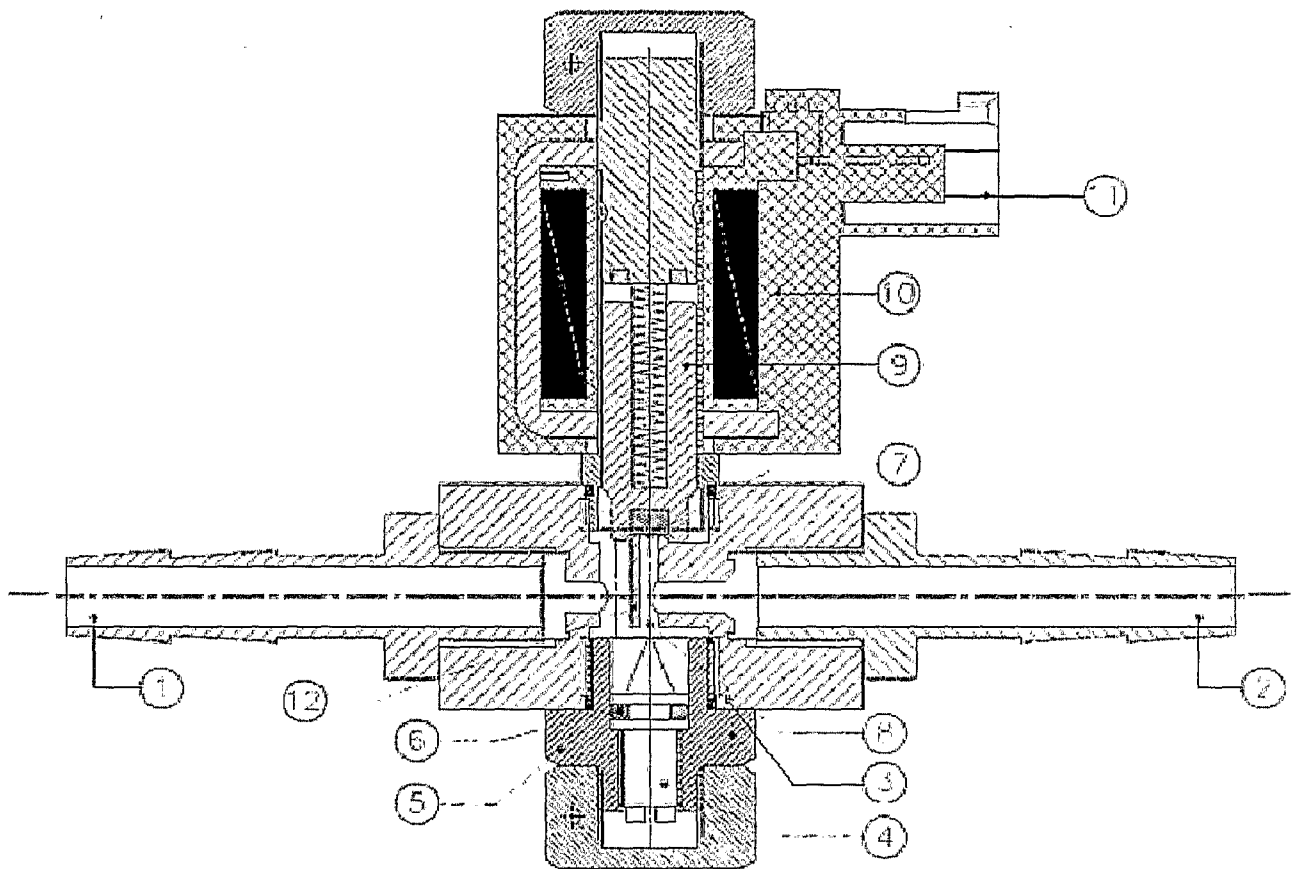
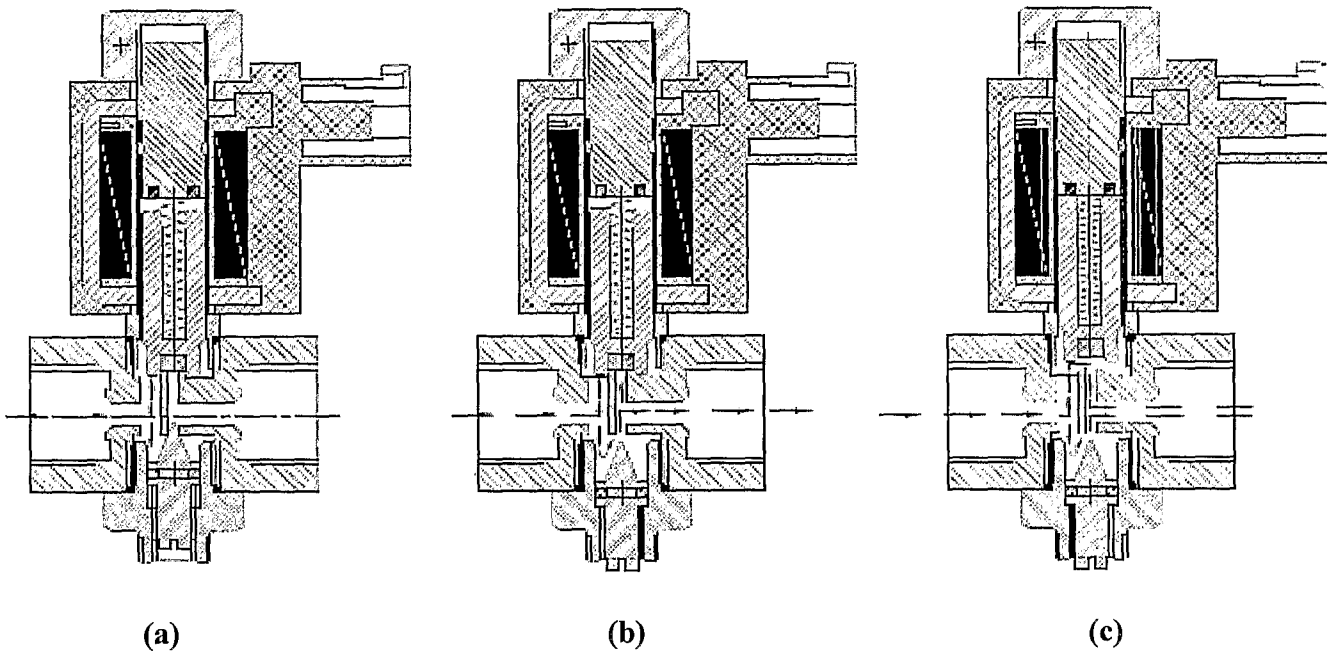


Figure 1

**Figure 2**