

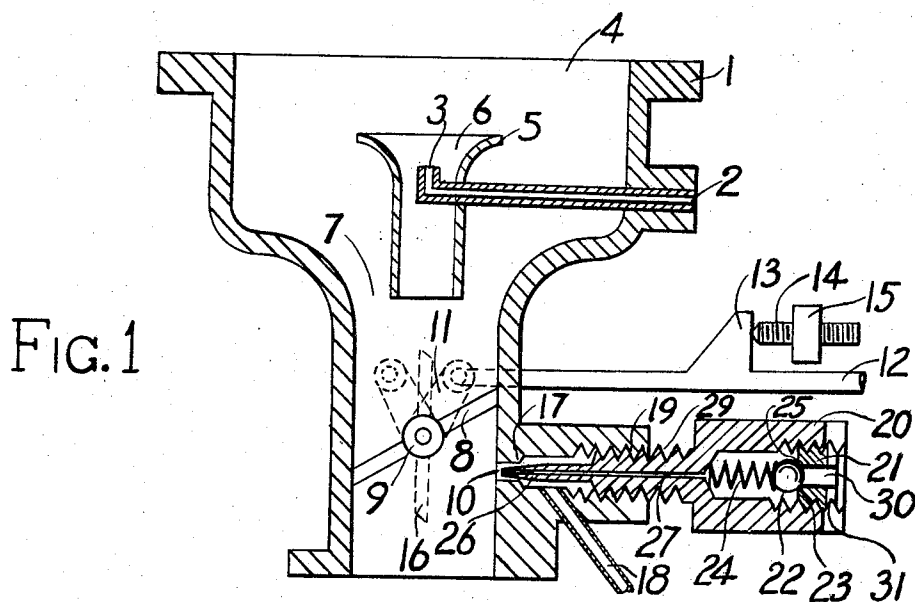
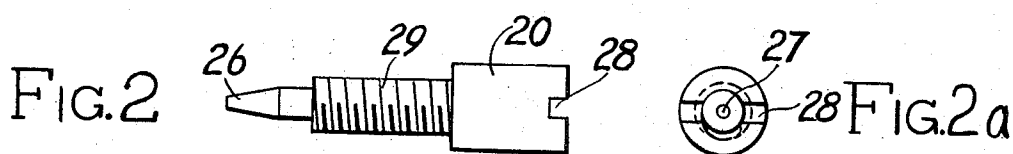
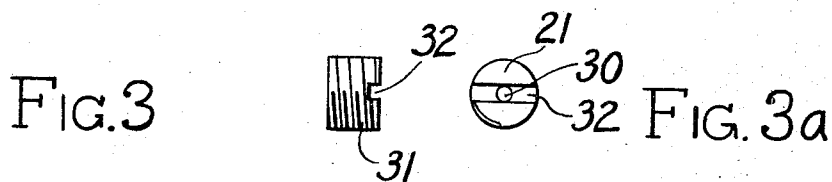
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MOTOR IDLING SPEED CONTROL PROPORTIONING VALVE

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MOTOR IDLING SPEED CONTROL PROPORTIONING VALVE

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2 Claims. (Cl. 261-41)

This invention relates to a plurality of coaxial fluid flow proportioning valves for controlling the fluid flow rates of two or more fluids and urging said fluids to combine to form a fluid mixture, particularly for internal combustion engines. At present, to control the motor idling speed of a typical internal combustion engine, an adjustable solid needle valve is used in a carburetor to supply a preset flow rate of fuel by means of a bypass channel in the carburetor to the engine. This small flow of fuel through said bypass controls the speed of the engine when the main throttling valve is usually considered closed. This revolutionary engine speed is generally known as the motor idling speed. The present solid needle valve is adjusted axially by means of its associated screw thread towards or away from the needle valve valve seat. To complement this said small flow of fuel through the said carburetor bypass to the engine, the main throttling valve which controls the power speeds of the engine is usually equipped with a stop to prevent the throttle valve from completely closing so that an adequate supply of air can be maintained to assist the combustion of the fuel mixture. However, when the main butterfly throttle valve is prevented from complete closure by the stop, the partial vacuum produced by the pistons in the engine also, at the same time, draws in a small flow of fuel as well as air through the small opening in the throttle valve structure. Because of the relatively large valve periphery providing the stop opening, a critical adjustment is required to maintain the proper fuel and air proportions in the fuel mixture. This type of control is critical and usually results in the use of an over-rich fuel mixture at motor idling speeds.

The primary object of this invention, therefore, is to provide a new and more economical means of fuel mixture control at motor idling speeds, which will eliminate the need for supplying the necessary air through the main throttling valve.

A further object of this invention is to provide a new, simple and improved fuel flow control means to supply a flow of fuel and air through a bypass in the carburetor to the engine with the main throttle valve completely closed.

A further object of this invention is to provide for the supplementary passage of fuel and air to the engine at high engine speeds.

It is another object of this invention to provide a set of coaxial proportioning valves with independent means for presetting the fluid flow rate of each of the two fluids to provide the proper proportions of fuel and air to the engine at motor idling speeds.

A further object of this invention is to provide a less critical means of controlling and mixing a supply of fuel and air through a bypass in the carburetor supplying a fuel mixture to an internal combustion engine.

Other novel and unique features of this invention will become apparent upon consideration of the following detailed description taken in conjunction with the accompanying drawing.

FIGURE 1: Represents a cross-sectional view of a typical internal combustion engine carburetor showing the new coaxial proportioning valves, butterfly valve, venturi, and valve actuating mechanism.

FIGURE 2: Represents an external view of a proportioning valve and a typical adjusting slot which is an important part of this invention.

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FIGURE 2a: Represents an end view of FIGURE 2.

FIGURE 3: Represents an external view of the inner coaxial adjustable fluid flow rate proportioning valve, which is an important part of this invention.

FIGURE 3a: Represents an end view of FIGURE 3.

In FIGURE 1 the numeral 1 represents the carburetor body, 2 is the main fuel supply channel to nozzle 3, 4 is the customary air intake from the air filter, 5 is a venturi tube, 6 is the venturi tube air intake, 7 is the large venturi throat opening, 8 is a butterfly throttle valve located in a single tubular structure commonly known in carburetor language as a carburetor barrel. Any number of such barrels may be used, depending on the size and type of internal combustion engine. 9 is the main operating shaft for butterfly valve 8; 10 is the coaxial valve opening for discharging a fluid fuel mixture at a preset flow rate to control the idling speed of the internal combustion engine; 11 is a lever for actuating valve shaft 9 and butterfly valve 8; 12 is the connecting rod which actuates lever 11; 13 is the customary stop to arrest the movement of valve 8 in closure; 14 is an adjustable stop which customarily controls the minimum valve opening of valve 8 when solid needle idling screw valves are used to control idling speed; 15 is a fixed stop member holding stop screw 14; 16 shows the position of the butterfly valve 8 when fully open; 17 is a valve seat for valve 26; 18 is a fuel supply channel to the coaxial valve chamber; 19 is the internally threaded valve chamber; 20 is the outer externally and internally screw threaded coaxial valve body; 21 is the inner externally screw threaded coaxial valve member; 22 is a ball valve engaging valve seat 23 in coaxial valve member 21; 24 is a spring urging said ball valve to close on valve seat 25 on inner coaxial valve member 21; 26 is the nozzle valve seat of the outer coaxial valve member 20; 27 is the coaxial air channel.

FIGURE 2 represents an external view of outer coaxial valve member 20, showing adjusting slot 28 and adjusting screw thread 29, and nozzle valve seat 26.

In FIGURE 3, numeral 21 represents an external view of inner coaxial valve body with adjusting screw thread means 31, 32 is the slot for adjusting the tension of spring 24 by means of external thread 31, 30 is the air entrance channel.

At present, in the operation of the internal combustion engine at motor idling speed when the throttling control rod 12 is moved to actuate valve 8 towards the closure position, the preset needle valve, which is similar to outer coaxial member 20 in FIGURE 1, with the exception that it is a solid structure, allows a small quantity of fuel to flow through opening 10 and on to the piston chamber. To supply the proper proportion of air, screw threaded stop 14 is adjusted to prevent the throttle valve 8 from completely closing. This permits a small quantity of air to pass through opening 4 and to pass by valve 8, and on to the piston chamber. However, a portion of the air which enters through opening 4 passes through venturi opening 6 and draws in a small amount of fuel from nozzle 3, and carries it along with the air through a manifold to the piston chamber. This adjustment and control is critical in obtaining the proper fuel and air flow rate, and it is difficult to maintain the adjustment over extended operation of the vehicle. It also results in the constant use of an inefficient mixture of fuel and air at idling speeds. This inefficient consumption of fuel usually develops a substantial cumulative expense over an extended period of time, especially in cities, where an engine is idling and running at slow speeds a greater portion of the time.

When the new and improved coaxial proportioning valves shown in FIGURE 1 are substituted for the customary solid needle valve, a better control of the fuel and

air mixture is obtained at engine idling speeds. With the use of the coaxial proportioning valves, valve 8 can be completely closed. With valve 8, FIGURE 1, closed, coaxial valve comprising valve member 20 is adjusted to permit the most satisfactory minimum amount of fuel to pass between valve seats 17 and 26, FIGURE 1. With this adjustment fixed and with the engine idling at a satisfactory speed, a vacuum will be produced in channel 27 and air will then enter through orifices 30 and 27. Orifice 27 is of sufficient size to provide the proper capacity for the required air flow. With the inner coaxial member 21 adjusted to provide the required spring (27) pressure on ball valve 22, the proper amount of air will pass through channel 30 and 27, and will mix with the fuel flowing from between valve seats 26 and 17. The proper proportional flow rate of fuel to air is obtained by rotating valve body 20 to decrease or to increase the flow rate of the fuel. The proper flow rate of air is adjusted by rotating the inner coaxial valve member 21 which increases or decreases the tension on spring 24, depending on which direction the coaxial valve member 21 is turned. The fuel enters through channel 18 which maintains the fuel supply. When throttle valve 8 is initially opened, a relatively small amount of fuel is drawn in to increase the power developed in the engine. The degree of vacuum lessens in channel 10 and the pressure differential on ball valve 22 decreases. Spring 24 then urges ball valve 22 to close the valve opening. With the new coaxial proportioning valves, shown in FIGURE 1, a more precise control of fuel and air rates of flow can be readily obtained and maintained. When engine speed is substantially increased to cause a high degree of vacuum in channel 10 and a wide pressure differential on ball valve 22, equal to or greater than the spring (24) pressure, the ball valve will open and a supplemental quantity of gas and air will flow through the bypass and on to the engine, and will induce extra power for acceleration. It supplements air and gas flowing through the main throttle valve.

One or more of these coaxial proportioning valves can be used in a carburetor, depending upon the type, size and number of barrels used in the carburetor. Numerous other arrangements may be readily devised by those skilled in the art, which will embody the principles of the invention and fall within the scope thereof.

What I claim is:

1. A carburetor for an internal combustion engine, said carburetor having a carburetor barrel and a main throttle valve, a first valve chamber leading to a first valve seat forming a first valve opening into said carburetor barrel downstream of said main throttle valve, and a fuel supply outlet into said chamber adjacent said valve seat, comprising:

- a body with a second valve chamber and a nozzle member attached to said body adapted to fit within and coaxially with said first valve chamber, the unattached end of said nozzle member forming a first valve with said first valve seat and adapted to be adjustably spaced from said first valve seat;
- a coaxial air passage through the entire length of said nozzle member communicating said second valve chamber with said carburetor barrel;
- an end member coaxial with said second valve chamber providing a second valve seat and an air inlet passage into said second valve chamber;
- a closure member biased within said second valve chamber against said second valve seat forming a

second valve responsive to the vacuum in said carburetor barrel of said combustion engine to open said second valve;

first adjustment means adapted to adjust said first valve thereby adjusting the flow of fuel from said fuel supply outlet through said first valve opening into said carburetor barrel; and

second adjustment means independent of said first adjustment means adapted to adjust the biasing force on said closure member thereby adjusting the flow of air from said air inlet passage through said coaxial air passage through said nozzle member and into said carburetor barrel.

2. A carburetor for an internal combustion engine, said carburetor having a carburetor barrel and a main fuel control valve in said carburetor barrel adapted to be fully closed on deceleration and idling of said engine, a first valve chamber leading to a first valve seat forming a first valve opening into said carburetor barrel below said main fuel control valve, and a fuel supply outlet into said chamber adjacent said valve seat whereby the fuel flow is responsive to the vacuum in said carburetor barrel adjacent said first valve seat, comprising:

- a body with a second valve chamber and a nozzle member attached to said body adapted to fit within and coaxially with said first valve chamber, the unattached end of said nozzle member forming a first valve with said first valve seat and adapted to be adjustably spaced from said first valve seat;
- a coaxial air passage through the entire length of said nozzle member communicating said second valve chamber with said carburetor barrel;
- an end member coaxial with said second valve chamber providing a second valve seat and an air inlet passage into said second valve member;
- a closure member biased within said second valve chamber against said second valve seat forming a second valve responsive to the vacuum in said carburetor barrel adjacent said first valve seat to open said second valve;
- first adjustment means adapted to adjust said first valve thereby adjusting the flow of fuel from said fuel supply outlet through said first valve opening into said carburetor barrel;
- second adjustment means independent of said first adjustment means adapted to adjust the biasing force on said closure member thereby adjusting the flow of air from said air inlet passage through said coaxial air passage through said nozzle member and into said carburetor barrel; and
- said fuel flow and said air flow being entirely independent of each other prior to entering said carburetor barrel.

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