May 8, 1951 L. J. SPRANGER 2,552,465

CONSTANT AIR VELOCITY CARBURETOR

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Fig. 1.

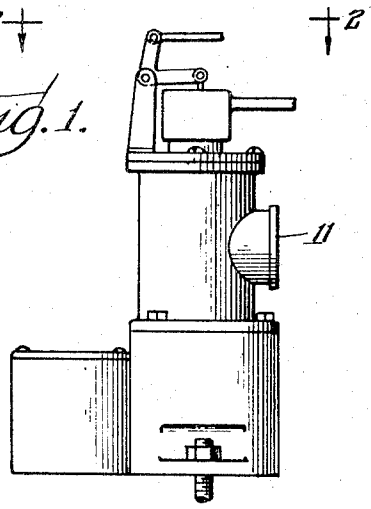


Fig. 2.

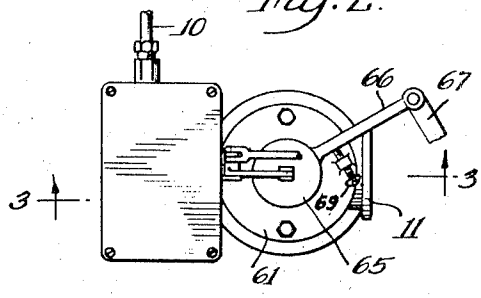
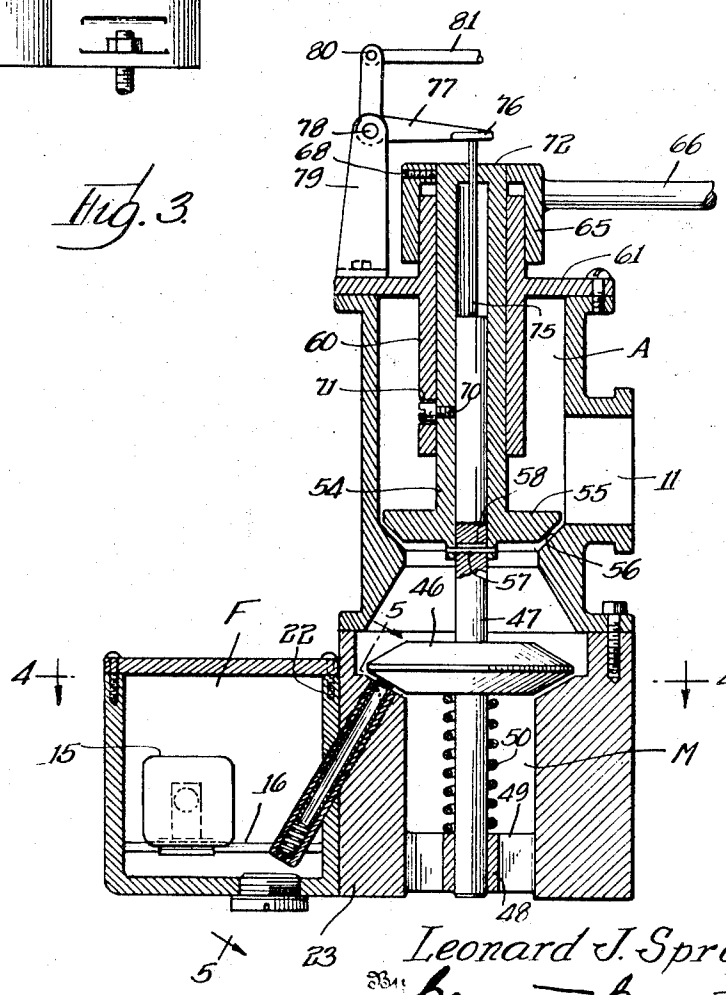


Fig. 3.



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Fig. 4.

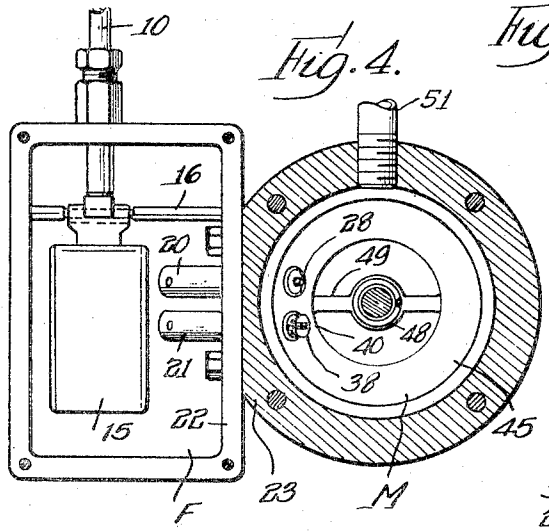


Fig. 5.

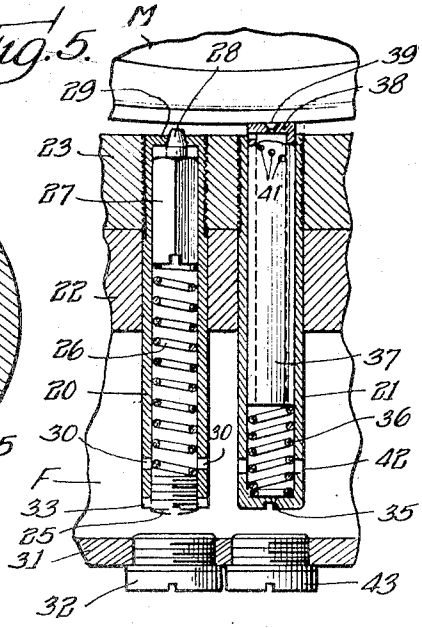


Fig. 6.

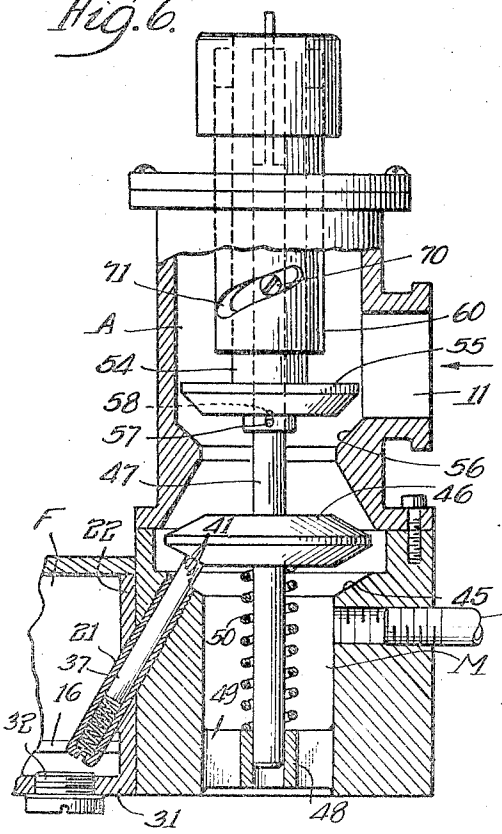


Fig. 7.

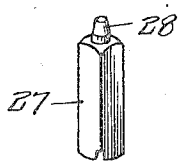
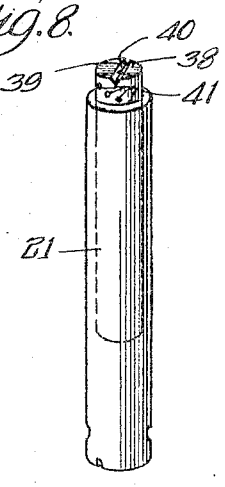


Fig. 8.



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CONSTANT AIR VELOCITY CARBURETOR

Leonard J. Spranger, Oak Park, Ill.

Application July 9, 1949, Serial No. 103,797

3 Claims. (Cl. 261—52)

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My invention relates to a carburetor embodying certain novel features by which to produce an effective mixture of fuel and air for operation of an internal combustion engine. The present application is a continuation-in-part of my application filed October 12, 1946, Serial No. 702,972, now Patent No. 2,521,421, issued September 5, 1950.

The present carburetor includes in its construction means for increasing the ratio of air to fuel with increase in the amount of the gaseous mixture, thereby conducing to increased economy in consumption. This is accomplished by a mechanism which is simple and dependable in its operation. This objective of my invention, as well as others which will hereinafter appear, may be attained by a construction of which a suggestive form is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of the carburetor;

Fig. 2 is a top plan view thereof;

Fig. 3 is a vertical section, taken on line 3—3 of Fig. 2;

Fig. 4 is a horizontal section, taken on line 4—4 of Fig. 3;

Fig. 5 is a detail in section, enlarged, taken on line 5—5 of Fig. 3;

Fig. 6 is a view similar to Fig. 3 in which the parts are shown as having been operated to another position;

Fig. 7 is a view in perspective of the choke plunger; and

Fig. 8 is a perspective view of the feed tube leading from the fuel chamber.

The body of the present carburetor is formed to provide an air chamber A in line with a mixing chamber M to one side of which is a fuel chamber F. The walls defining these three chambers are suitably joined to provide a unitary structure. Leading into the fuel chamber is a fuel pipe 10, and opening into the air chamber is an air inlet 11. The bottom of the mixing chamber is open for operative connection with the intake manifold (not shown) of an internal combustion engine.

The flow of liquid fuel into the fuel chamber is controlled by a valve in the pipe 10, operated by a float 15 which is pivotally supported upon a bar 16 to swing up or down in response to fluctuations in the level of the fuel within the chamber. By such a conventional means it is possible to keep a substantially constant level of fuel within the fuel chamber at all times.

A pair of tubes 20 and 21 are extended obliquely downwardly into the fuel chamber from

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its wall 22 which is proximate to the mixing chamber. Each of these tubes may be secured by a screw threaded connection within cylindrical passages which extend through the wall 22 and the adjacent wall 23 of the mixing chamber into communication with the latter (see Fig. 5).

The tube 20 is closed at the bottom by a plug 25 against which is thrust the lower end of a coiled spring 26 whose upper end resiliently supports a plunger 27 having at its top a head in the form of a truncated cone 28 seating within an axial opening which extends through an end wall 29 at the top end of the tube. The top end of the truncated cone head projects slightly into the mixing chamber when the plunger is in its uppermost position, the opening around the cone then being closed. This plunger, together with its cooperating seat, forms a choke valve which will be further explained hereinafter. As shown, the plunger body is polygonal in cross section so that spaces along its sides will remain to provide a passageway between the plunger and its surrounding tube. Ports 30 extend through the tube wall near its lower end to permit fuel to enter therethrough into the tube. At a point opposite the lower end of the tube, the bottom wall 31 of the fuel chamber is apertured to receive a closure plug 32 which is maintained in place by a screw threaded connection. When this plug is removed, the tube 20 may be passed endwise therethrough. End slots 33 in the tube permit application of a screw driver whereby to rotate the tube either way for purposes of assembly or disassembly with the mixing chamber wall 23.

The second tube 21 is also closed at the bottom by an end wall 35 adapted to receive the thrust of a coiled spring 36 which extends within an inner tube 37, open at the bottom, but closed at the top by an end wall 38 through which is a small axial opening 39 lying within a cross groove 40. This inner tube is provided with a plurality of small ports 41 in stepped formation, close to its upper end, and in response to tension of the spring 36 the inner tube is urged upwardly to project into the mixing chamber, thereby to expose more or less of its side wall ports 41 according to the distance to which the tube is projected axially of itself. Near the bottom of the outer tube 21, I provide side wall ports 42 through which liquid fuel may enter to rise therewithin. To facilitate assembly of the tube 21 into operative position, a second closure plug 43, the same as the plug 32, may be removably fitted in the fuel chamber bottom wall 31. The wall passages

wherein the tubes 20 and 21 are mounted open out upon a beveled seat 45 which is extended circularly within the mixing chamber M. A valve member in the form of a beveled disk 46 is adapted to be moved toward and from this seat and in all of its positions to be engaged by the upper end 38 of the inner tube 37. In the lower part of its movement range this disk will also remain in engagement with the end of the cone 28 that is projected from the plunger 27. This valve disk is carried by a stem 47 whose lower end is slidably supported in a tubular guide 48 which by a pair of webs 49 is maintained fixedly in a center position near the bottom end of the mixing chamber. A spring 50 which is coiled around the stem exerts opposing thrusts upon the guide and disk whereby to normally hold the valve in an up position off of its seat 45 (see Fig. 6). If desired, a valved connection 51 may be entered into the mixing chamber to supply water thereto in a controlled amount.

The upper end of the stem is slidingly confined within a tube 54 whose bottom end is laterally flanged to provide a second valve disk 55. This disk 55 which occupies an upper position relative to the first valve disk 46 is beveled on its under face for cooperation with a beveled seat 56 which is extended circularly inwardly from the surrounding walls to provide a partial separation and line of constriction between the mixing chamber M below and the air chamber A above. A limited slip connection between the upper valve disk and the stem is also provided, this taking the form of a cross pin 57 which is carried by one for engagement within a vertically disposed slot 58 in the other.

The tube 54 extends from the upper valve disk upwardly within a cylindrical guide wall 60 that depends into the air chamber A from a top wall 61. This guide wall also rises above the top wall to furnish a swiveled mounting for the cupped end 65 of a lever 66 which is adapted to be operated by a link connection 67 from a suitable control (not shown). As by a set screw 68 entered through the cup wall 65 to bear with pressure against the tube 54 I provide for transmitting rotary motion thereto whenever the lever 66 is operated. A screw 70 which is secured to the tube 54 extends laterally thereof to present its head within a spiral cam slot 71 that is formed in the guide wall 60 (see Fig. 6), so as to cause the tube 54 to be raised or lowered with each operation of the lever 66. By some such means as this, the upper valve disk 55 is moved toward and from its seat 56, the lower valve disk 46 being also moved in unison therewith. The point of minimum clearance between the valve disk 55 and its seat 56 may be determined by a stop 69 that is adjustably mounted on the top wall 61 to engage the lever 66 when operated to its limit in a clockwise direction as viewed in Fig. 2.

To operate the lower valve disk 46 there is slidably positioned through the upper end 72 of the tube 54 and axially thereof a pin 75 whose lower end is rested upon the top end of the stem 47. At its top end this pin is engaged at 76 by one arm of a bell crank lever 77 which is pivoted at 78 to the upper end of a bracket 79 that upstands from the top wall 61 of the air chamber. To the other arm of the bell crank is pivoted at 80 an operating rod 81 leading to a suitable control (not shown). By the means just described, I provide for operation of the choke valve through movement imparted to the stem 47 which, when downwardly moved, will advance the lower valve

disk 46 against the seat, the slip movement at the pin and slot connection 57 and 58 permitting this disk to reach this position even when the upper valve disk 55 is slightly separated from its seat.

In operation, when the lever 66 is moved, the stem 47 will be lifted to raise the valve disk 46 off of its seat. In this movement the plunger head 28 is permitted to advance outwardly whereby to close the opening through the port 29. Concurrently the inner tube 37 advances outwardly to expose additional ports 41 through which liquid fuel is drawn into the mixing chamber. Air entering through the opening 11 descends into the mixing chamber since the valve disk 55 is moved further away from its seat when the lever 66 is operated. Under these conditions, a gaseous mixture is produced which, when admitted into an associated internal combustion engine, will effectively support continued operation thereof.

Manifestly when the valve disk 46 is moved away from or toward its seat, the amount of fuel admitted into the mixing chamber is increased or decreased, respectively; at the same time the area of the opening around this valve into the passageway leading to the internal combustion engine is varied, being either increased or decreased as this valve moves away from or toward its seat. In these operations there is a constant inflow of air through the port 11, passing around the valve disk 55, to enter into the mixing chamber. This inflow varies with the amount of fuel admitted into the mixing chamber since the two valve disks 55 and 46 operate in unison in their movements toward and from their respective seats. There is accordingly maintained through the carbureter an air movement of constant velocity.

For cold starting, when priming is needed, operation of the control rod 81 will produce a down movement on the stem 47. This will advance both valve disks toward their seats, with a slight overmovement of the valve disk 46 whereby to assure that the plunger head 28 is depressed below its normal up position. By this operation, fuel passing around the plunger is admitted through the port 29 into the mixing chamber while inflow of air is greatly reduced through maintaining the valve disk 55 in a nearly closed position. A very rich mixture, such as is required under cold starting conditions, may accordingly be produced by the manipulation just described.

I claim:

1. A carburetor in which is combined a fuel chamber and a mixing chamber, the latter having a seat with a valve movable toward and from the same, an air chamber in communication with the mixing chamber and partially separated therefrom by an annular seat, a valve in the air chamber movable toward and from its seat, a stem slidably supported for movement longitudinally and which carries the valve in the mixing chamber, a spring biasing the valve in the mixing chamber away from its seat, a tube slidably supported on said stem and to the lower end of which the valve in the air chamber is secured, a limited slip connection between the stem and the valve in the air chamber providing for movement of the valve in the mixing chamber a slight distance independently of the movement of the valve in the air chamber, means for moving said stem to concurrently operate said valves, and separate means for moving the valve in the mix-

ing chamber a slight distance toward its seat independently of movement of the valve in the air chamber.

2. A carburetor in which is combined a fuel chamber and a mixing chamber, the latter having a seat with a valve movable toward and from the same, an air chamber in communication with the mixing chamber and partially separated therefrom by an annular seat, a valve in the air chamber movable toward and from its seat, a stem slidably supported for movement longitudinally and which carries the valve in the mixing chamber, a spring biasing the valve in the mixing chamber away from its seat, a tube slidably supported on said stem and on the lower end of which is secured the valve in the air chamber, a limited slip connection between the stem and the valve in the air chamber providing for movement of the valve in the mixing chamber a slight distance independently of the movement of the valve in the air chamber, means for moving said stem to concurrently operate said valves, and separate means for moving the valve in the mixing chamber a slight distance toward its seat independently of movement of the valve in the air chamber, said last mentioned means including a rod slidably mounted on said tube to extend longitudinally within the same from one end thereof to engage the outer end of said stem.

3. A carburetor in which is combined a fuel chamber and a mixing chamber, the latter having a seat with a valve movable toward and from the same, an air chamber in communication with the mixing chamber and partially separated therefrom by an annular seat, a valve in the air chamber movable toward and from its seat, a

longitudinally movable stem which carries the valve in the mixing chamber, a spring biasing the valve in the mixing chamber away from its seat, a tube slidably supported on said stem and on the lower end of which is secured the valve in the air chamber, a limited slip connection between the stem and the valve in the air chamber providing for movement of the valve in the mixing chamber a slight distance independently of movement of the valve in the air chamber, a stationary sleeve member in which said tube is slidably confined, means for moving said stem to concurrently operate said valves including a cam slot in said stationary sleeve member, a pin projecting laterally from said tube engaging said cam slot, and means for imparting rotary movement to said tube, and separate means for moving the valve in the mixing chamber a slight distance toward its seat independently of movement of the valve in the air chamber, said last mentioned means including a rod slidably mounted on said tube to extend longitudinally within the same from one end thereof to engage the outer end of said stem.

LEONARD J. SPRANGER.

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