Dec. 3, 1935. C. DROUIN 2,022,957

CARBURETOR

Filed Jan. 30, 1935

Fig.1

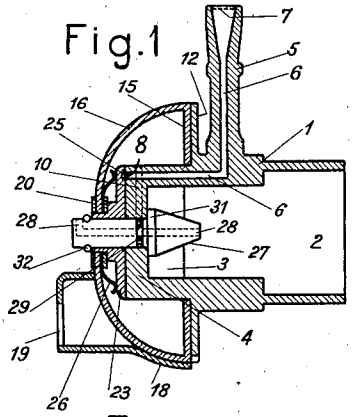


Fig.1a

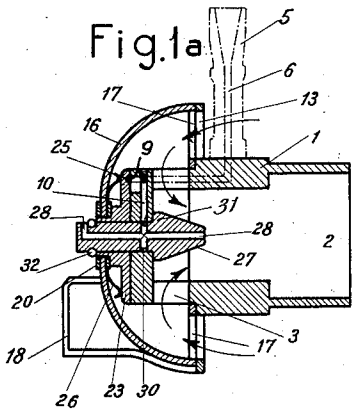


Fig.2

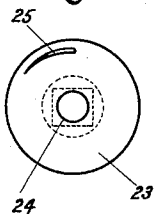


Fig.3

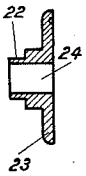


Fig.4

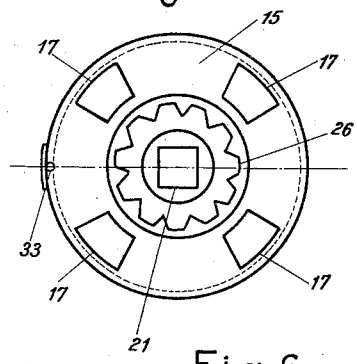


Fig.5

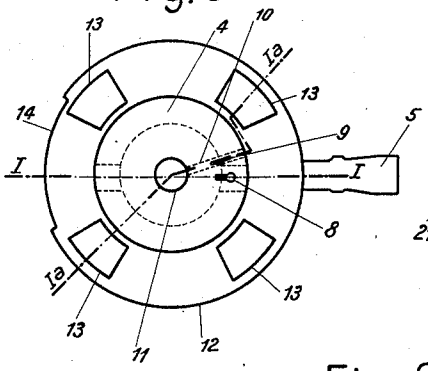


Fig.7

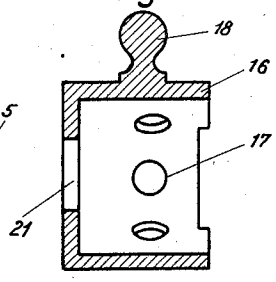


Fig.6

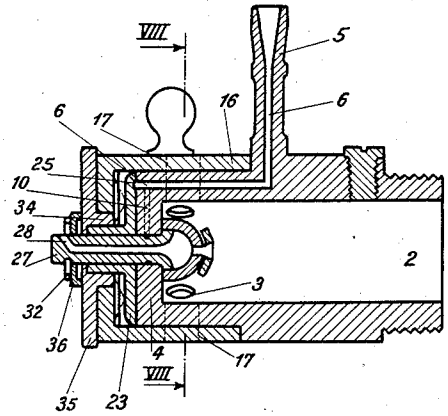


Fig.8

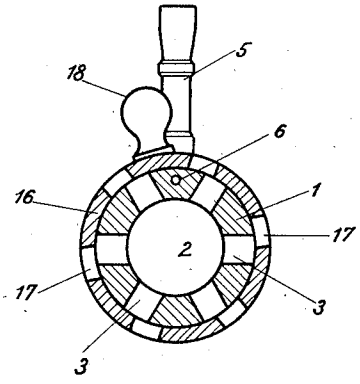


Fig.9

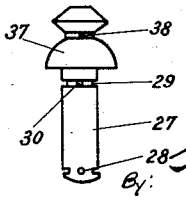
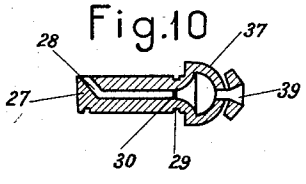


Fig.10



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CARBURETOR

Charles Drouin, Paris, France

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In France February 1, 1934

5 Claims. (Cl. 261—50)

The present invention has reference to carburetors for internal combustion engines and has for its primary object to provide a carburetor of improved construction capable of furnishing gaseous mixtures of variable richness to suit the different operative conditions of the aforesaid engines, for instance for starting under low temperature conditions as well as for normal operation.

A further object of the invention is to provide a carburetor of reduced overall dimensions and simplified construction comprising no fuel bowl and no float as the common types of carburetors manufactured heretofore, said carburetor being however devoid of any fuel leakage regardless of the relative positions occupied by its constitutive parts during operation, either when starting the engine or when running it at low, medium or high speed, this result being due to the fact that the ingress of fuel to the atomizing means is automatically controlled responsive to the position of the actuating means operated from the accelerator pedal or like lever.

A still further object of the invention is to provide a carburetor wherein the atomizing means are of much larger cross section than in known carburetors so that there is less risk of said means becoming clogged by dirt, frost or other choking media, the fuel consumption being however kept within limits not higher than in known carburetors due to an automatic throttling of the fuel ingress in conjunction with the regulation of the air supply.

Still another object of the invention is to provide a carburetor wherein the shape or outline of the fuel ducts is such that back firing from the engine does not risk propagation of fire to the mass of fuel, the more so as the carburetor comprises, as above stated, no bowl but is connected to the fuel tank which may be remotely located by a pipe of suitable length.

With these and such other objects in view as will incidentally appear hereafter, the invention comprises the novel construction and combination of parts that will now be fully described with reference to the accompanying diagrammatic drawing exemplifying the same and forming a part of the present disclosure.

In the drawing:

Figure 1 is a sectional view on the straight line I—I of Figure 5 of a constructional form of the carburetor.

Figure 1ª is a sectional view similar to Figure 1 on the irregular line Iª—Iª of Figure 5.

Figure 2 is a plan view of the valve showing its tapering groove.

Figure 3 is a sectional view of the valve showing its boss.

Figure 4 is a plan view of the dome-shaped air intake member comprised in the carburetor shown in Figure 1, showing the air intake ports and the star-shaped spring adapted to hold the valve in contact with the adjacent wall of the body.

Figure 5 is a plan view of the body of the carburetor shown in Figure 1, showing the air vents and the narrow slots adapted to co-operate with the groove of the valve.

Figure 6 is a sectional view of another constructional form of the carburetor.

Figure 7 is a sectional view of the air intake member comprised in the carburetor shown in Figure 6.

Figure 8 is a sectional view on the line VIII—VIII of Figure 6, assuming the nozzle to have been omitted for the sake of clearness.

Figure 9 is an elevational view of the nozzle comprised in the carburetor shown in Figure 6.

Figure 10 is an axial sectional view of the nozzle shown in Figure 9.

Like reference numerals designate like parts throughout the several views.

Reference being first had to Figures 1 to 5, the carburetor comprises a hollow body 1 of cylindroid shape delineating an inner capacity or mixing chamber 2. The body 1 has air ports 3 and is open at its right end and closed at its left end by a wall 4 forming the bottom of the cylindroid capacity 2.

A slender chimney-like projection 5 formed integral with the body 1 is bored to provide a duct 6 for the incoming fuel. The inlet of the duct 6 may be provided with a strainer 7 capable of arresting dirt contained in fuel. The duct 6 has a cranked outline and terminates in a narrow or constricted slot 8 formed in the smooth outer face of the bottom wall 4. Adjacent the slot 8 is another narrow or constricted slot 9 which forms the one end of a duct 10 the opposite end of which is situated in the periphery of a central perforation 11 of the wall 4 of the body 1.

The body 1 has an integral flange 12 formed with a plurality of air vents 13 of suitable shape and size. An elongated notch 14 is formed in the periphery of the flange 12 for a purpose that will be hereafter described.

Against the body flange 12 bears the wall 15 of a dome-shaped air intake member 16, said wall 15 being formed with ports 17 corresponding in size and shape to the air vents 13 and capable

of registering with them when the member 16 rotates relative to the body 1. The air intake member 16 is provided with a bracket 18 slotted at 19 for connection with the actuating means (not shown) which may be for instance a lever or rod operated as usual from the usual accelerator pedal if the carburetor is mounted on an automobile engine.

The air intake member 16 has a central boss 20 formed with a square hole 21 in which is fitted a corresponding square boss 22 integral with a disc-shaped valve or distributor 23, said boss 22 being bored at 24. The valve 23 has a smooth bearing face capable of tightly contacting with the smooth outer surface of the bottom wall 4 of the body 1. In the smooth face of the disc valve 23 is formed an arcuate groove or cut 25 conveniently of tapering outline, as shown in Figure 2. By "tapering outline" is meant that the groove or cut 25 gradually becomes narrower towards one of its ends to form a sharpened termination while the portion of the groove or cut adjacent its opposite end may have divergent sides, as shown, or parallel sides.

The disc valve 23 is held in contact with the wall 4 of the body 1 by a star-shaped spring 26 held by the central boss 20 of the air intake member or dome 16.

The groove or cut 25 in the disc valve 23 extends transversely to the radial slots 8 and 9 and is so located as to bridge said slots when the valve occupies a suitable angular position.

In the central perforations 11, 24 is fitted a nozzle 27 bored throughout its length to provide a channel 28 which establishes a permanent communication between the atmospheric air and the mixing chamber 2 of the hollow body 1. The inner end of the channel 28 may be made of any suitable shape to properly perform its fuel atomizing function. A ring-shaped groove 29 is formed in the nozzle 27 and small holes 30 coinciding with said groove connect the air-suction channel 28 to the duct 10 through which the fuel is fed. Registration of the groove 29 and duct 10 is ensured by the fact that the nozzle 27 is held in the required position by a shoulder 31 abutting the inner surface of the wall 4 and a locking ring 32 encompassing the external end of said nozzle.

The air intake member 16 and the valve 23 are bound to rotate together about the stationary nozzle 27 due to the mutual engagement of their square bosses 20 and 22. The rotation of the air intake member 16 relative to the body 1 is limited to the required angular extent by a pin 33 secured to the periphery of the wall 15 and capable of moving along the notch 14 formed in the flange 12 of the body 1.

The adjustment of the body 1, air intake member 16 and valve 23 is such that the degree of registration of the slots 8, 9 and groove 25 and of the air ports 13, 17 may be regulated simultaneously by a mere rotation of the air intake member 16 to suit the varying conditions arising in the consumption of gaseous mixture by the engine to the manifold (not shown) to which the carburetor is connected as usual.

The operation is as follows:—In the inoperative position, the angular position of the air intake member 16 and valve 23 is such that the groove 25 does not register with the slots 8, 9 so that the access of fuel is cut off to the nozzle 27. As the contiguous smooth faces of the valve 23 and body wall 4 tightly contact against each other, no fuel can then leak out so that the carburetor is fuel-tight. For starting the engine, the air-intake member 16 is slightly moved angularly. This causes the air vents 13, 17 to overlap slightly so that a limited quantity of air is drawn into the carburetor. At the same time, the wider end of the valve groove 25 bridges the slots 8, 9 so that the total fuel feed coming in through the duct 6 can flow on through the duct 10 to the nozzle 27. A very rich gaseous mixture is thus furnished to the engine. This renders starting very easy without requiring the use of any of the so-called "starters" of known construction. When the engine begins to speed up, the air intake member 16 may be further rotated in the same direction to bring the air vents 13, 17 to full coincidence. This permits a full access of air into the carburetor as shown by the arrows in Figure 1a. At the same time, the wide part of the valve groove 25 still bridges the slots 8, 9 so that the full quantity of fuel is still fed to the nozzle 27. This corresponds to the top speed of the engine. On further rotating the air intake member 16, the narrower portion of the valve groove 25 can be brought into spanning coincidence with the slots 8, 9. This throttles the fuel feed while also throttling to a gradual extent the air suction through the air vents 13, 17. When the pin 33 reaches the end of its stroke in the notch 14, the fuel and air feeds are completely cut off.

The actuating means may be so provided as to permit the feed of air and fuel either for starting the engine or for running it at low, medium or high speed to be conveniently regulated by means of an accelerator pedal or similar control member of known construction.

Reference being now had to Figures 6 to 10 in which is shown a constructional modification of the carburetor, it will be seen that the body 1 is substantially similar in structure to the one described with reference to Figures 1 to 5, like parts being designated by like numerals for the sake of clearness.

The disc valve 23 is similarly formed with a tapering groove 25 adapted to register with the radial spaced slots in which the fuel inlet duct 6 and fuel outlet duct 10 formed in the body 1 terminate at their adjacent ends on the smooth face of the bottom wall 4 of said body.

The only constructional differences between the carburetor shown in Figures 1 to 5 and the carburetor shown in Figures 6 to 10 reside in the shape of the air intake member 16, nozzle 27 and means for connecting said member 16 to the valve 23 for causing them to rotate together. The functions of these several elements is similar to the ones of the elements described in the first embodiment.

The air intake member 16 is thimble-shaped and has peripheral air ports 17 which can be brought into partial or full coincidence with the air ports 3 of the body 1 or may be offset from them to establish a variable degree of communication between the atmospheric air and the mixing chamber 2 or to cut off said communication.

The bracket 18 connecting the air-intake member 16 to the actuating means (not shown) is in the form of a knob. Such a form is quite arbitrary and may be widely modified. A square central perforation 21 is formed in the bottom wall of the thimble-shaped air intake member 16 (see Fig. 7). The perforation 21 receives a boss 34 formed on a washer 35 formed in turn with a central square perforation in which the square boss 22 of the disc valve 23 is received. The boss 22 is perforated to receive the nozzle 27 about

which it is rotatably mounted. Owing to this arrangement, the air intake member **16** and the valve **23** are bound to rotate together for the purpose above described. A locking washer **36** fills the gap between the washer **35** and the locking ring **32**.

The nozzle **27** has a through extending channel **28** (see Fig. 10) but is of a construction slightly different from the one shown in Figures 1 and 1a. The nozzle **27** has a bowl **37** forming an enlargement of the channel **28**. Beyond the bowl **37** the channel communicates by side or radial holes **38** with the body capacity **2** and it terminates in a flaring mouth **39** forming a spraying hole for the fuel while the side holes **38** constitute air suction holes.

The fuel flowing through the inlet and outlet ducts **6** and **10** formed in the body **1** to the ring-shaped groove **29** formed in the nozzle **27** proceeds through the holes **30** to its channel **28** in which it is drawn by the current of air sucked through said channel into the capacity **2** of the carburetor. The fuel is driven by the air drawn through the channel **28**, whirls in the bowl **37**, is further driven by the additional air drawn through the holes **38** and is sprayed or atomized through the central hole **39** whence it becomes mixed with the air drawn through the air ports **3** under the suction exerted by the engine, in the usual way. The fact that the fuel is already mixed with a certain quantity of air while it still flows through the nozzle channel **28** improves the spraying action through the nozzle mouth **39** and furnishes a more homogenous gaseous mixture to the engine.

The general operation of the carburetor in the two constructional embodiments disclosed by way of non-limitative examples is identical.

The constructional details such for instance as the size of the slots **8**, **9** and valve groove or cut **25** might vary of course, for example to suit different engine powers, without departing from the scope of the subjoined claims.

What is claimed is:

1. A carburetor comprising a hollow body providing a mixing chamber and having air vents and fuel inlet and outlet ducts terminating at one end in spaced slots in a flat centrally perforated surface of the body, a spring-urged rotatable centrally perforated disc valve co-axial to said body, said valve being tightly applied against said surface and having a tapering groove capable of bridging said slots, the rotation of said valve relative to the body making, breaking and controlling a communication between the slots, an air intake member co-axial to said body and rotatable to control the size of the air vents, and a central nozzle inter-connecting the atmospheric air and mixing chamber, the said nozzle being engaged through the central perforations of the body and valve, the channel of the nozzle being connected intermediate its ends to the fuel outlet duct of the body and provided with an atomizer projecting inside the mixing chamber, the valve and air intake member being so connected together by mutually interengaging portions that movement of said member relative to the body shifts the groove of the valve relative to the slots.

2. A carburetor comprising a cylindrical body open at one end and closed at the other end by a centrally perforated bottom wall providing a mixing chamber, said body having a fuel inlet duct extending from its outer face and a fuel outlet duct extending from its inner face, both ducts having adjacent ends in the form of narrow spaced slots formed in the bottom wall air vents in said body, a disc valve co-axial to said body and rotatable to make, break and control a communication between said slots, an air intake member co-axial to said body and rotatable to control the size of the air vents, and a central nozzle inter-connecting the atmospheric air and mixing chamber, said nozzle being held in the central perforation of the body, the channel of said nozzle being connected intermediate its ends to the fuel outlet duct and having an atomizer inside the mixing chamber, the valve and air intake member being so connected by mutually fitting portions that movement of said member relative to the body shifts the valve relative to the slots.

3. A carburetor comprising a hollow body providing a mixing chamber and having air vents and fuel inlet and outlet ducts terminating at one end in spaced slots in a flat end surface of said body, a rotatable disc valve co-axial to said body, said valve tightly contacting with said surface and having a groove capable of bridging said slots, the rotations of the valve relative to the body making, breaking and controlling a communication between the slots, an air intake member co-axial to said body and rotatable to control the size of the air vents, and a central nozzle inter-connecting the atmospheric air and mixing chamber, said nozzle being connected intermediate its ends to the fuel outlet duct of the body and having an atomizer projecting into the mixing chamber, said atomizer having a central fuel spraying hole and a plurality of peripheral air suction holes, the valve and air intake member being so connected by mutually fitting portions that movement of said member relative to the body shifts the groove of the valve relative to the slots and simultaneously controls the flow of air and the flow of fuel.

4. A carburetor comprising a hollow body providing a mixing chamber and having air vents and fuel inlet and outlet ducts terminating at one end in slightly spaced slots in a flat and smooth surface of said body, a spring-urged movable disc valve tightly applied against said surface and having an arcuate tapering groove capable of bridging said slots, the rotation of the valve relative to the body making, breaking and controlling a communication between the slots, an air intake member movable to control the size of the air vents, and a nozzle inter-connecting the atmospheric air and mixing chamber, said nozzle being connected intermediate its ends to the fuel outlet duct of the body and having a bowl-shaped atomizer projecting into the mixing chamber, said atomizer having a central fuel spraying hole of flaring shape and a plurality of peripheral air suction holes, the valve and air intake member having mutually fitting male and female portions which connect them rigidly so that movement of said member relative to the body shifts the groove of the valve relative to the slots and simultaneously controls the flow of air and the flow of fuel.

5. A carburetor comprising a hollow cylindrical body providing a mixing chamber and open at one end and closed at the other end by a centrally perforated smooth bottom wall, said body having a fuel inlet duct extending from its outer cylindrical wall and a fuel outlet duct extending from the face of its perforation, both ducts terminating in narrow spaced adjacent slots in the bottom wall of the body, air vents in the cylindrical wall of the body, a rotatable centrally perforated disc valve having a smooth face and a tapering groove

capable of bridging said slots, a spring holding the smooth grooved surface of the valve in tight contact with the smooth slotted surface of the body, the rotation of said valve relative to the body making, breaking and controlling a communication between the slots, an air intake thimble-shaped member rotatable to control the size of the air vents, and a nozzle interconnecting the atmospheric air and mixing chamber, said nozzle being engaged through the central perforations of the body and valve, the channel of the nozzle being connected to the fuel outlet duct of the body and provided with an atomizer projecting inside the mixing chamber beyond its air vents, the valve and air intake member being so connected together that movement of said member relative to the body shifts the groove of the valve relative to the slots and simultaneously controls the flow of fuel and the flow of air.

CHARLES DROUIN.