July 24, 1956 C. R. B. SMITH ET AL 2,756,033

CARBURETTORS FOR INTERNAL COMBUSTION ENGINES

Filed Nov. 8, 1954 4 Sheets-Sheet 1

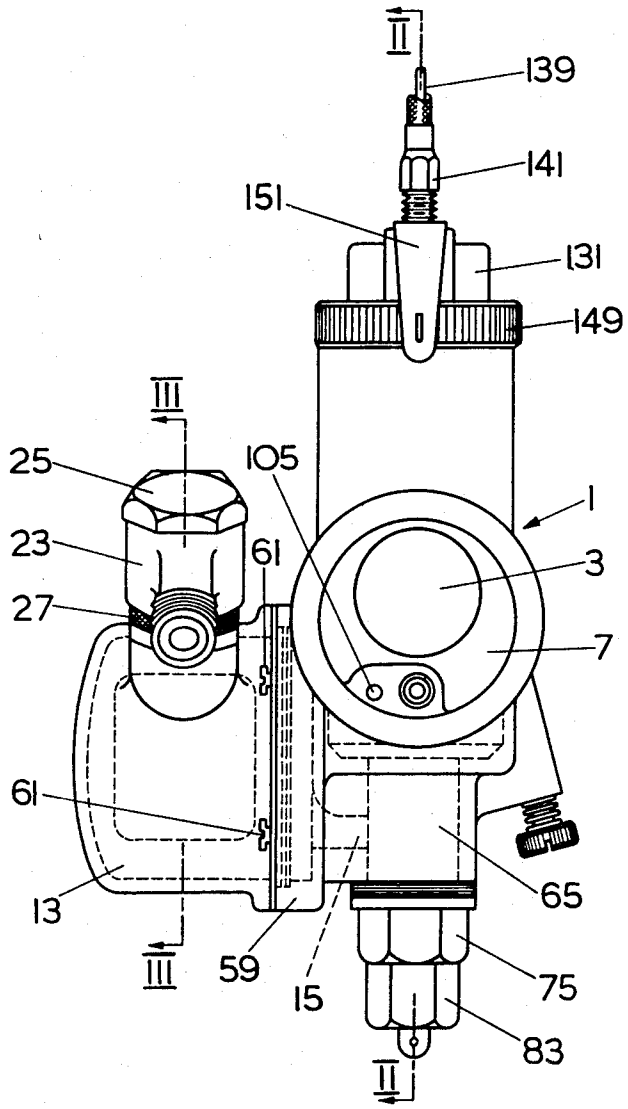


FIG. 1

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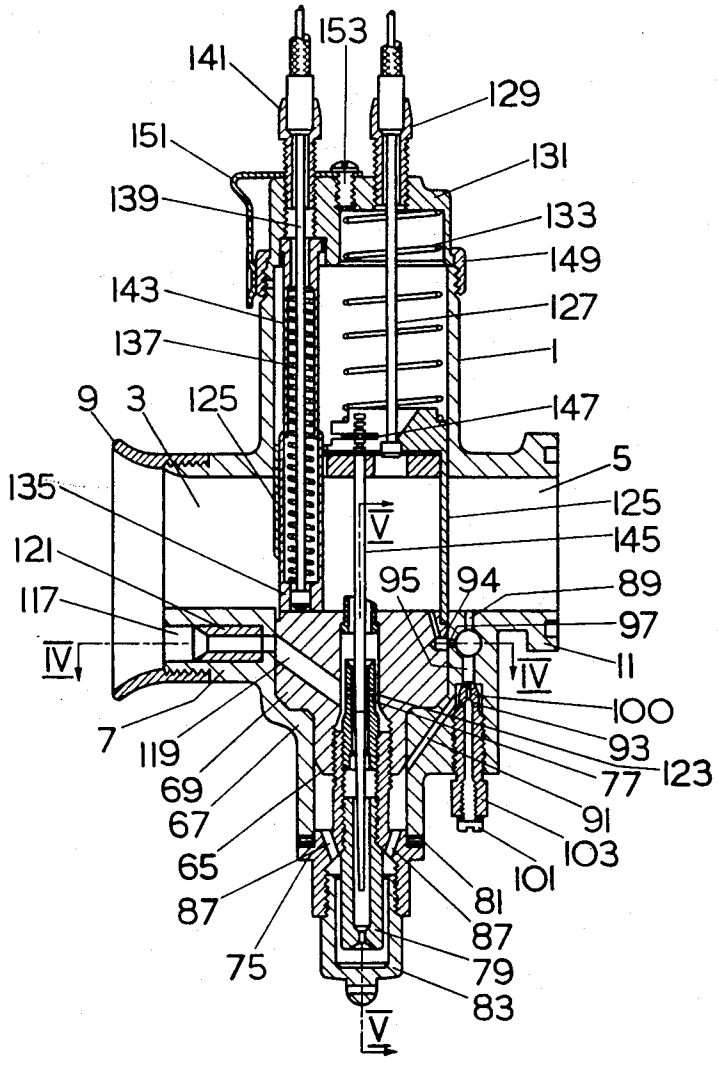


FIG. 2

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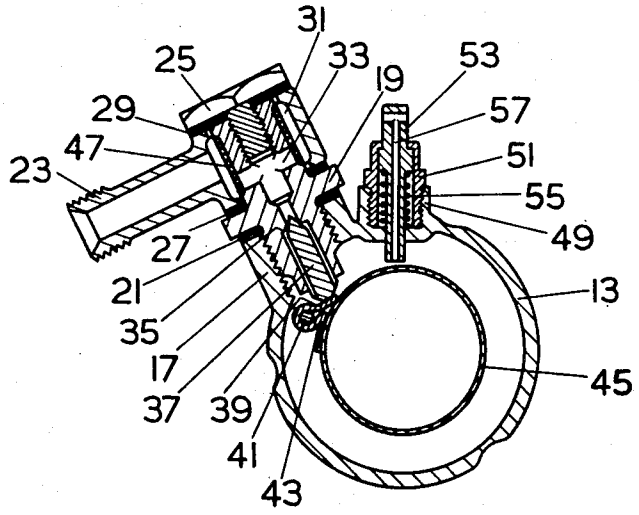


FIG. 3

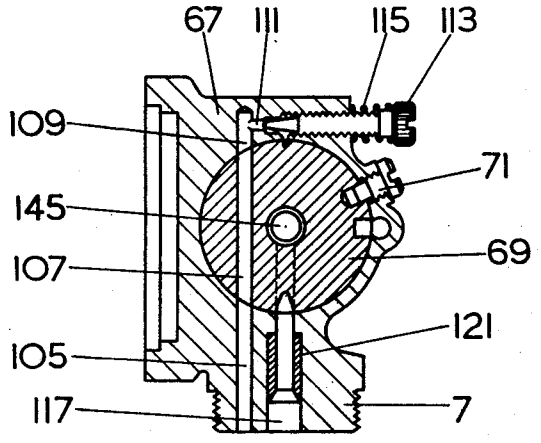


FIG. 4

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CARBURETTORS FOR INTERNAL COMBUSTION ENGINES

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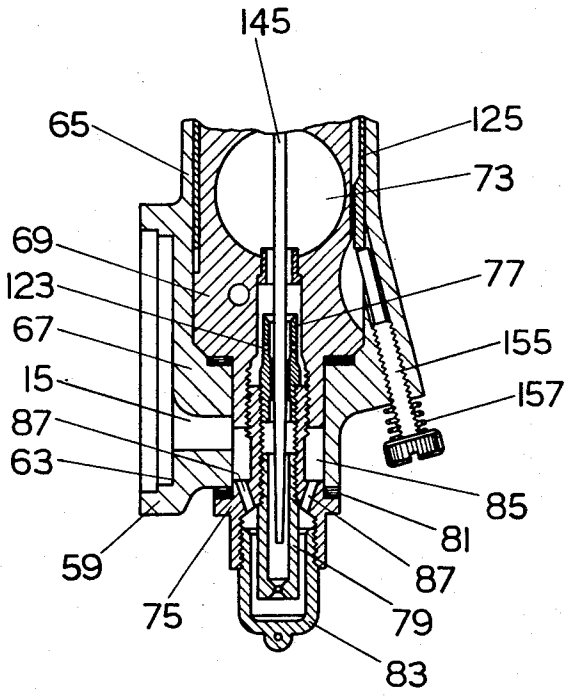


FIG. 5

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2,756,033

CARBURETTORS FOR INTERNAL COMBUSTION ENGINES

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Application November 8, 1954, Serial No. 467,475

Claims priority, application Great Britain November 19, 1953

3 Claims. (Cl. 261—44)

This invention relates to carburettors for internal combustion engines, particularly those employed in association with motor cycles.

It is an object of this invention to provide an improved carburettor for an internal combustion engine.

According to this invention a carburettor for an internal combustion engine comprises in combination a main body portion, a float chamber for fuel, a float in the float chamber, a fuel-cut-off device associated with said float to control the admission of fuel into the float chamber in accordance with the volume of fuel in the float chamber, a passage formed through said main body portion, said passage forming an air-intake passage, a chamber in which air and fuel may be mixed and a mixture outlet passage, a piston-type throttle adapted to control the amount of air passing along the air-intake passage, a needle jet indirectly connected to the float chamber and in communication with the mixing chamber, a metering needle movable with the piston-type throttle valve and adapted to co-operate with the needle jet to control the amount of fuel entering the mixing chamber in accordance with the amount of air passing along the air-intake passage, a primary air-intake passage separate from, and uninfluenced by any turbulence in, the air-intake passage, said primary air-intake passage communicating with an annular space around said needle jet, a pilot fuel passage discharging into the mixture outlet passage, a pilot air supply associated with the pilot fuel passage, and a bleed hole in the needle jet communicating with the annular space around said needle jet.

According to one feature of the invention, at least one wall of the float chamber is formed by part of the main body portion.

According to another feature of the invention, the float is pivotally-mounted in the float chamber.

A carburettor in accordance with an embodiment of the invention is shown in the accompanying drawings of which:

Figure 1 is an elevational view of the carburettor;

Figure 2 is a sectional view of the carburettor taken along the line II—II of Figure 1;

Figure 3 is a sectional view of the float chamber, taken along the line III—III of Figure 1;

Figure 4 is a sectional view taken along the line IV—IV of Figure 2; and

Figure 5 is a sectional view taken along the line V—V of Figure 2.

Referring to the drawings, the carburettor comprises a main body portion 1, generally of cruciform cross-section. This body portion has a main transverse bore which provides an air-intake passage 3, and a mixture outlet passage 5. The air-intake passage 3 is bored eccentrically in the part 7 of the main body portion which has screwed to it a funnel 9. The open end-portion of the mixture outlet passage 5 is provided with a flange 11 which will be utilised for attaching the carburettor to an associated internal combustion engine (not shown).

A cup-shaped member 13 co-operates with part of the main body portion in a fluid tight manner so as to form a float chamber and an aperture 15 in that part of the main body portion allows access of fuel from the float chamber to the interior of the main body portion as will be described later.

The cup-shaped member 13 (see particularly Figure 3) is provided with an integral upstanding substantially cylindrical hollow boss 17 into which is threaded a hollow plug 19 generally of cruciform cross-section. A fibre gasket 21 is provided between the boss and the plug 19 in order to prevent any leakage of fuel. A connecting plug 23 (which will be secured to a source of fuel) is slipped over the upper end portion of the hollow plug 19 and is secured to it by a screw 25 which is threaded into the upper end portion of the hollow plug 19. Gaskets 27 and 29 prevent leakage of the fuel between the several parts. A cylindrical chamber 31 is provided between the upper end portion of the hollow plug 19 and the connecting plug 23, and a diametral bore 33 connects the cylindrical chamber 31 with the interior of the hollow plug 19. The interior of the hollow plug 19 has a shouldered portion 35 with which a needle-type fuel supply valve 37, triangular in cross-section, co-operates. The needle-type valve 37 is guided for movement by the hollow plug and passes into the cup-shaped member 13 and its end is supported upon one arm 39 of a lever. The lever is pivotally-mounted upon a pin 41 secured to the internal wall of the cup-shaped member 13 and the other arm 43 of the lever is secured to a cylindrical float 45. A substantially-cylindrical wire gauze filter 47 is disposed in the chamber 31.

A second integral upstanding substantially-cylindrical boss 49 on the cup-shaped member 13 is internally-threaded and co-operates with a sleeve 51. A tickler 53 is resiliently mounted in the sleeve 51 by a spring 55 and a bore 57 in the tickler acts as an air vent for the float chamber.

The cup-shaped member carrying its associated parts is attached to the hollow boss 59 formed on the main body portion by screws 61 (see Figure 1) and a circular wire gauze filter (not shown) is disposed within the boss and abuts against the shoulder 63.

The lower part 65 of the main body portion has an inwardly-directed portion 67 and a cylindrical jet block 69 is disposed within the main body portion, resting upon the inwardly-directed portion, and is secured in position by a set screw 71 (see Figure 4). The jet block 69 has a substantially-cylindrical bore 73 which is aligned with the air-intake passage and the mixture outlet passage and which forms a mixing chamber. A hollow plug 75 is threaded into the lower portion of the jet block 69 and this hollow plug has threaded into its upper end portion a needle jet 77 and into its lower end portion a main jet 79. The hollow plug co-operates with a fibre washer 81 to form a fluid-tight joint with the bottom of the main body portion (as shown in Figures 2 and 5). A closure well member 83 is threaded into the lower end portion of the hollow plug 75 so as to seal the bottom of the hollow plug 75.

A fuel-receiving chamber 85 is formed between the hollow plug 75 and the lower part 65 of the main body portion and communicates with the aperture 15. Inclined holes 87 in the hollow plug 75 connect the fuel-receiving chamber 85 with the closure well member 83 and hence indirectly with the main jet 79 and the needle jet 77.

The fuel-receiving chamber 85 also is in communication with a pilot fuel passage 89 (see Figure 2) which discharges into the mixture outlet passage 5 by way of the communicating passage 91, 93 and 95 in the lower part 65 of the main body portion. By-pass passages 97 and one not designated, bored in the main body portion and in the jet block 69 respectively, are associated with the

pilot fuel supply. The amount of fuel passing from the pilot fuel jet **89** is controllable by pilot fuel jet **100** and a screw **101** threaded into a sleeve **103** which, in turn, is threaded into a hole in the lower part **65** of the main body portion is provided for reaming the pilot fuel jet.

A supply of pilot air (see Figure 4) is supplied to the passage **95**, for mixing with the supply of pilot fuel by way of passages **105**, **107**, **109**, and **111** bored in the lower part **65** of the main body portion and in the jet block **69**. The amount of pilot air supplied is controllable by a pilot air control screw **113** which is threaded into a hole in the lower part **65** of the main body portion, there being a coiled spring **115** disposed between the head of the screw and the main body portion. The passage **105** commences in that part **7** of the main body portion which is not bored eccentrically and so is uninfluenced by any turbulence which may occur in the air intake passage **3**.

Primary air is supplied to the mixing chamber side of the metering tube (see Figures 2 and 4) by way of passage **117** bored in that part **7** of the main body portion which is not bored eccentrically, and passage **119** which is bored in the jet block **69** and which communicates with an annular space around the needle jet. A primary air jet tube **121** is provided in the passage **117**, its internal diameter determining the amount of primary air passing. Since the passage **117** commences in that part **7** of the main body portion which is not bored eccentrically, the supply of primary air is not influenced by turbulence in the air-intake passage **3**.

A bleed hole **123** in the needle jet **77**, communicating with the annular space around the needle jet allows fuel to be mixed with the primary air to be available for rapid acceleration. The bleed hole is arranged to be slightly below the mean level of the fuel, e. g. 5/32 of an inch, and slightly above, e. g. 1/16 of an inch, the calibrated orifice of the needle jet.

A piston-type throttle sleeve **125** of orthodox form is disposed within the upper portion of the main body portion and co-operates with the mixing chamber to determine the amount of air passing from the air-intake passage **3** to the mixture outlet passage **5**. The piston-type throttle sleeve is controlled by means of a Bowden wire **127** which passes through a sleeve **129** threaded in a cap **131** to the outside of the carburettor. A spring **133** is disposed between the cap **131** and the upper part of the throttle sleeve.

A strangler member **135** of orthodox form is associated with the throttle sleeve and is operable against the action of a spring **137** by a Bowden wire **139** which passes through a sleeve **141** threaded in the cap **131**. A cylinder **143** disposed about part of the spring **137** guides the strangler member during its movement.

A metering needle **145** adapted to co-operate with the needle jet **77** to control the main amount of fuel supplied to the mixing chamber is fastened to the head of the throttle sleeve by a bifurcated spring clip **147** which engages with one of a series of grooves formed at the upper end portion of the needle.

The cap **131** is secured to the upper part of the main body portion by a locking ring **149** which is threaded on to the outer surface of the main body portion. A spring clip **151** secured by a screw **153** to the cap prevents undesired rotation of the locking ring.

A throttle stop **155** is threaded into the body portion (see Figure 5) and its upper end determines the location of the throttle sleeve when in its closed position. Movement of the throttle stop due to vibration is prevented by a coiled spring **157** disposed between the head of the throttle stop and the main body portion.

It appears that by providing the bleed hole **123**, a small well of fuel is always available in the annular space around the needle jet for snap acceleration. When this well of fuel has been used, and the engine has responded, the consequent level drop which takes place allows air to pass through the bleed hole with a consequent weakening of the mixture at mid-throttle positions. This weakening at the mid-throttle positions leads to an increased performance.

In a modified form of the carburettor just described, a hollow boss cast in one with the main body portion co-operates with a cover plate to provide the float chamber.

For instance with a motor cycle having a 650 cc. engine, working under identical conditions, the following results were obtained:

Speed, miles per hour	Old type carburettor miles per gallon	Carburettor in accordance with invention, miles per gallon
40	71	95
50	68.4	84.7
60	52.3	64.5
68	43.2	50.4

With a motor cycle having a 250 cc. engine, working under identical conditions, the following results were obtained:

Speed, miles per hour	Old type carburettor miles per gallon	Carburettor in accordance with invention, miles per gallon
30	88.4	106
40	67	86.2
50	50.4	59.2

Consequently there is a 15–20% reduction in fuel consumption with superior acceleration properties.

We claim:

1. A carburettor for an internal combustion engine comprising in combination a main body portion, a float chamber for fuel, a float in said float chamber, a fuel cut-off device associated with said float to control the admission of fuel into said float chamber in accordance with the volume of fuel contained therein, a passage formed through said main body portion, said passage forming an air-intake passage, a chamber in which air and fuel may be mixed and a mixture outlet passage, a piston-type throttle adapted to control the amount of air passing along the air-intake passage, a needle jet indirectly connected to the float chamber and in communication with the mixing chamber, a metering needle movable with the piston-type throttle valve and adapted to cooperate with said needle jet to control the amount of fuel entering the mixing chamber in accordance with the amount of air passing along the air-intake passage, a primary air-intake passage separate from, and uninfluenced by any turbulence in said first mentioned air-intake passage, said primary air-intake passage communicating with an annular space around said needle jet, a pilot fuel passage discharging into the mixture outlet passage, a pilot air supply associated with the pilot fuel passage, and a bleed hole in said needle jet communicating with the annular space around said needle jet, said bleed hole being disposed slightly below the mean level of the fuel and slightly above the calibrated orifice of the needle jet.

2. The structure defined in claim 1 wherein at least one wall of the float chamber is formed by part of the main body portion.

3. The structure defined in claim 1 wherein said float is pivotally mounted in said float chamber.

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