Oct. 25, 1966 A. L. MENNESSON 3,281,131

CARBURETTING DEVICES FOR INTERNAL COMBUSTION ENGINES

Filed Dec. 17, 1963 2 Sheets-Sheet 1

Fig. 3.

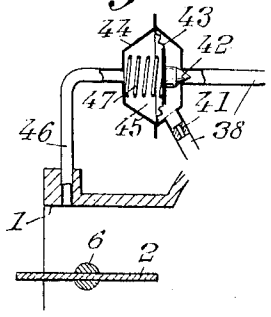


Fig. 1.

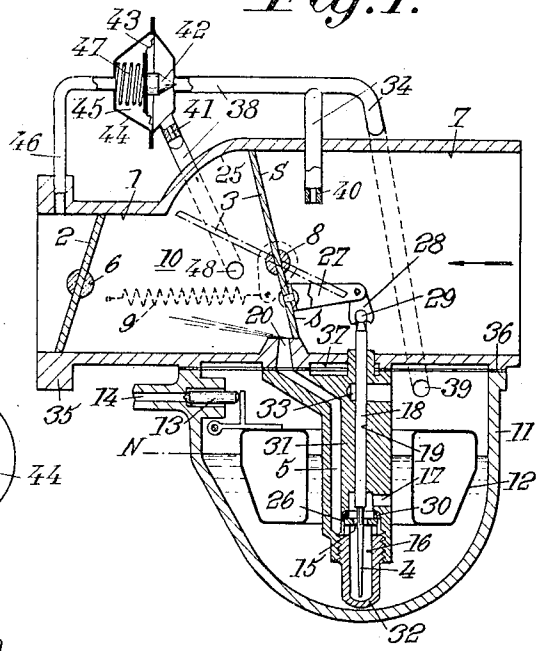


Fig. 2.

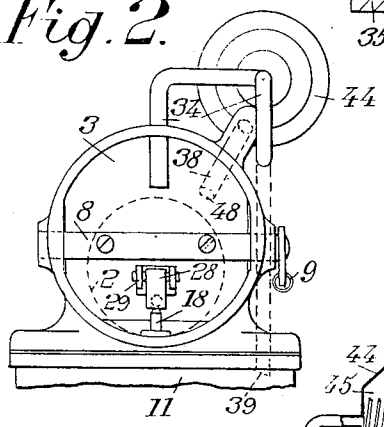
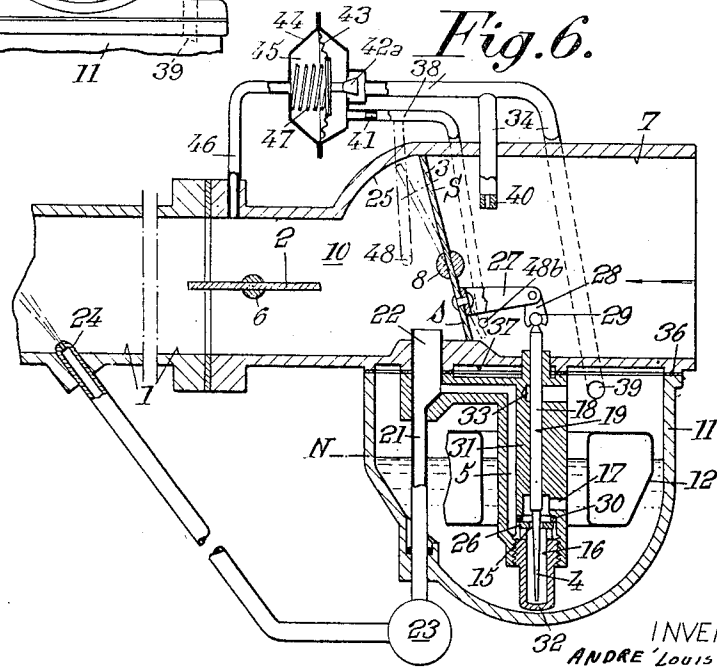


Fig. 6.



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CARBURETTING DEVICES FOR INTERNAL COMBUSTION ENGINES

Filed Dec. 17, 1963 2 Sheets-Sheet 2

Fig. 4.

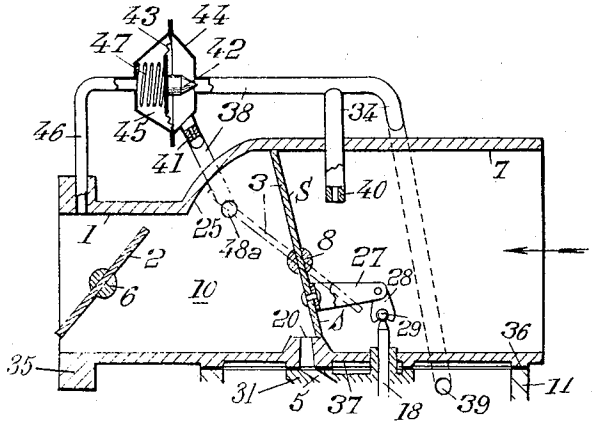


Fig. 5.

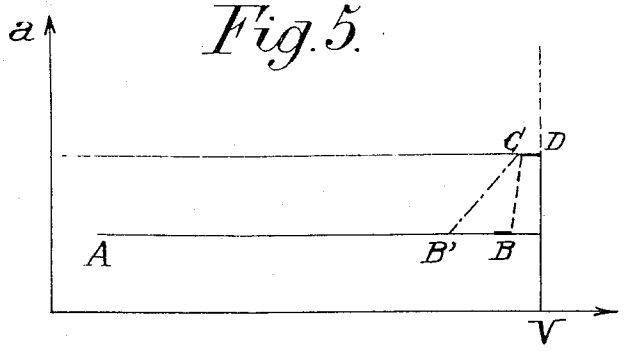
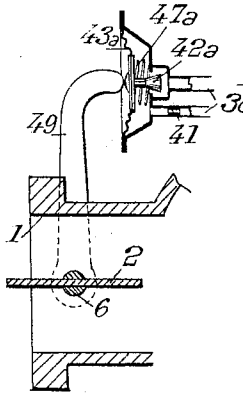


Fig. 7.



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CARBURETTING DEVICES FOR INTERNAL COMBUSTION ENGINES

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Claims priority, application France, Dec. 27, 1962, 919,893
7 Claims. (Cl. 261—50)

The present invention relates to carburetting devices for internal combustion engines comprising, in their intake pipe, upstream of the main throttle valve actuated by the driver, an auxiliary throttle valve which opens automatically and gradually as the flow rate of the air passing through said conduit or pipe increases and which controls a metering member serving to adjust the flow rate of the fuel admitted into said conduit in such manner that the cross section of the air passage controlled by said auxiliary throttle valve and the cross section of the fuel passage controlled by said metering member are substantially proportional to each other.

The fuel is supplied from a constant level chamber the upper portion of which generally communicates exclusively with the external air, or still better with the carburettor air intake (portion of the intake conduit located upstream of the auxiliary throttle valve), downstream of an air filter. In this case, air and fuel are supplied under the same pressure difference and form a mixture of substantially constant richness.

There are known carburetting devices of the above indicated kind wherein the upper portion of the constant level chamber communicates continuously with the external air (or with the carburettor air intake) and in a discontinuous fashion, under control of the driver, with the space located in the intake pipe between said two throttle valves and in which there is generally a substantially constant depression (i.e. sub-atmospheric pressure). When the constant level chamber communicates with said space, there exists in said chamber a sub-atmospheric pressure attenuated with respect to that existing in said space. On the contrary, when the constant level chamber is out of communication with the space between the two throttle valves, the pressure in the constant level chamber is practically equal to the atmospheric pressure. This enables the driver to increase the richness of the air and fuel mixture when the engine is started or is running cold, by cutting off the communication between said constant level chamber and said space between the throttle valves, which increases the pressure existing in the constant level chamber and consequently the pressure difference which determines the flow rate of fuel.

The chief object of the present invention is to provide a carburetting device of this kind which is better adapted to meet the requirements of practice and in particular which is such that the richness of the air and fuel mixture is automatically adapted to conditions of operation of the internal combustion engine independent of its temperature.

A first feature of the present invention relates to devices of the above mentioned kind wherein the upper portion of the constant level chamber communicates on the one hand with the external atmosphere (or with the air intake of the carburetting device) and on the other hand with the space existing in the intake conduit between the two throttle valves, means being provided for cutting off the communication between said chamber and said space. This feature consists in arranging said means in such manner that they are automatically controlled in accordance with the load of the internal combustion engine and possibly further in accordance with the flow rate of air through the intake pipe.

A second feature of the invention relates to carburetting devices of the kind above referred to wherein the auxiliary throttle valve is an eccentrically pivoted flap the axis of rotation of which divides it into a small area portion and a large area portion. This feature consists in providing in the air intake pipe a wall portion surrounding the surface described by the outline of the large area portion of the flap valve during at least part of the movement thereof, the upper portion of the constant level fuel chamber being preferably connected to the portion of the air intake pipe located upstream of the large area portion of the flap valve.

A third feature of the present invention relates to carburetting devices of the kind above referred to wherein the fuel metering member consists of a movable needle of non cylindrical shape which limits an annular passage for fuel between itself and the inner wall of a calibrated orifice provided in a fixed diaphragm. This feature consists in mounting said diaphragm between, on the one hand, a resilient ring bearing upon a rigid and fixed element with respect to which the diaphragm has a radial play, and, on the other hand, a rigid adjusting element capable of screwing in or on said fixed element, in such manner that the radial position of the diaphragm with respect to the needle can be determined by axial displacement of said needle before compression of said ring and that the axial position of the diaphragm with respect to the needle can be determined by screwing of the adjusting element and resilient flattening of said ring, which serves also to ensure fluid-tightness of the path through which fuel flows in the portion of said path located upstream of the diaphragm.

A fourth feature of the present invention relates to carburetting devices of the kind above referred to wherein the fuel metering member is a needle of noncylindrical shape rigidly carried by a rod mounted slidable in a tubular guide, which leads on the one side to the air intake and on the other side to a point below the fuel level in the constant level chamber. This feature consists in providing inside the guide and in an intermediate portion thereof, a groove communicating with the upper portion of the constant level chamber, so that, if the tubular guide is subjected on the side of the air intake to a pressure lower than on the other side, it is air admitted through said groove (and not fuel) which is sucked in from the constant level chamber to the air intake through the annular play existing between said rod and its guide.

A fifth feature of the present invention relates to carburetting devices of the kind above referred to and consists in that the same block carries at least most of the fuel conduits and of the air metering means and that this block is fixed to the air intake in such manner that it dips into the constant level chamber while being at a distance from the walls of this chamber, thermally insulating joints being provided between the block and the air intake and the block and/or the air intake being hollowed out inside their junction zone in such manner as to reduce their mutual contact surface.

Preferred embodiments of the present invention will be hereinafter described with reference to the appended drawings, given merely by way of example, and in which:

FIG. 1 is a vertical axial section of a carburetting device made according to a first embodiment of the invention;

FIG. 2 is an elevational view, in the direction of the arrow of FIG. 1, of the same carburetting device;

FIG. 3 is a part sectional view showing another position of operation of a portion of the device of FIG. 1;

FIG. 4 shows, similarly to FIG. 1, a carburetting device made according to a modification;

FIG. 5 shows a curve relative to the operation of the carburetting device made according to the present invention;

FIG. 6 is a view similar to FIG. 1 of a carburetting device made according to another embodiment of the invention;

FIG. 7 shows a modification of a detail of FIG. 6.

The carburetting device includes an intake pipe **1** containing, upstream of the main throttle valve **2** actuated by the driver (through links not shown), an auxiliary throttle valve **3** which opens automatically and gradually as the flow rate of air passing through said pipe (in the direction of the arrows of FIGS. 1, 4 and 6) increases. Auxiliary throttle valve **3** controls a fuel metering member **4**. Fuel is sucked in toward pipe **1** through a conduit **5** opening into a portion of said pipe **1** where there is a sub-atmospheric pressure substantially equal to that existing between throttle valves **2** and **3**.

As shown, the main throttle valve **2** is mounted on a rotating spindle **6**. The auxiliary throttle valve **3** is mounted in the air intake **7** which constitutes the upstream end of pipe **1** and which is protected by an air filter (not shown). Said auxiliary valve **3** is in the form of a flap eccentrically mounted on a rotating spindle **8**. The eccentricity of said flap is such that it tends to open under the effect of the air stream entering through **7**, against the action of return means such as a counterweight or, as shown, a spring **9**. Spindle **8** divides flap **3** into two zones, to wit, a zone *s* of relatively small area and a zone S of relatively large area. In some particular cases, flap **3** may be replaced by any equivalent throttling member (sliding piston extending transversely to the air intake **7**, slide valve subjected to the action of a return spring, and so on).

As it is known, throttle valve **3**, which limits a space **10** together with the other throttle valve **2**, serves to keep in said space a sub-atmospheric pressure which is substantially constant or at least varies as a given function of the flow rate of air entering pipe **1**.

Fuel is fed from a constant level chamber **11** where the fuel level N is fixed by a float **12**, this float controlling a needle valve **13** mounted in a feed conduit **14**. Fuel is drawn from constant level chamber **11** through a passage **17**, located under the fuel level N in said chamber **11**, into a chamber **16**, whence it passes, through a calibrated orifice **15**, into conduit **5**.

The metering member **4** consists of a needle the cross section of which varies along its length and which is carried by a rod **18** slidable in a tubular guide **19**. This guide **19** opens at it upper end into air intake **7**, upstream of flap valve **3**, whereas the lower end of guide **19** is located below level N. Rod **18** is mechanically connected to flap **3** in such manner that the angular displacements of said flap **3** from its closing position (shown in solid lines in FIGS. 1, 4 and 6) to its maximum opening position produce a sliding displacement of needle **4** with respect to orifice **15**, that is to say a variation of the free annular surface of this orifice. Thus the fuel sucked in through conduit **5** is metered in accordance with the flow rate of the air stream passing through conduit **1**.

According to the embodiment illustrated by FIGS. 1 and 4, conduit **5** opens into space **10** through an orifice **20** so that the fuel metered in orifice **15** by needle **4** is introduced by suction into space **10**. According to a modification, conduit **5** might open into a passage bypassing the main throttle valve **2**.

According to the embodiment illustrated by FIG. 6, conduit **5** opens into a chamber **21** which is subjected to the suction existing in space **10** owing to the provision of an orifice **22** and which is connected with the suction of a pump **23**. This pump delivers fuel, previously metered by needle **4**, toward at least one injector **24** opening into intake pipe **1** downstream of the main throttle valve **2**.

If the constant level chamber **11** is permanently vented either by connection with the air intake **7** or by connection with space **10**, there is maintained in said chamber **11** a constant pressure (which may be subatmospheric). It is clear that in this case the cross section of the air passage determined by flap valve **3** in intake pipe **1** and the cross section of the fuel passage determined by needle **4** in orifice **15** are substantially proportional to each other and that the air and fuel thus supplied under the same pressure difference form a mixture of substantially constant richness.

Now it was found that, in many kinds of internal combustion engines fed by means of such a carburetting device, the optimum richness of the mixture varies in accordance with the load imposed on the engine and/or with the flow rate of air absorbed by the engine.

In order to take this fact into account, the upper portion of chamber **11** is connected on the one hand with the air intake **7** through a conduit **34** and on the other hand with space **10** through a conduit **38** and means are provided for stopping conduit **38**, said means being controlled automatically in accordance with the load of the engine. Preferably, as shown by the drawings, conduit **38** does not open directly into chamber **11** but is branched to conduit **34** in such manner that both of these conduits open through a common orifice **39** into chamber **11**. Furthermore both of these conduits are provided with calibrated orifices **40** and **41** respectively, the respective cross sections of which determine the value of the suction, attenuated with respect to that exerted in space **10**, which is applied to chamber **11** when conduit **38** is opened.

As a rule, correct operation of the engine requires an enrichment of the mixture for high loads, which leads to arranging said means in such manner as to close conduit **38** for high loads of the engine (FIG. 3) but to open it for low and medium loads (FIG. 1), the value of the load being determined by the suction existing in pipe **1** downstream of throttle valve **2**, or again by the degree of opening of this valve.

For this purpose, as shown by FIG. 1, conduit **38** is provided with a throttling member **42** carried by a diaphragm **43** which limits in casing **44** a chamber **45** connected through a conduit **46** with the portion of pipe **1** located downstream of the main throttle valve **2**. A spring **47** is mounted so as yieldingly to oppose the action of the suction transmitted to diaphragm **43** through conduit **46**.

As shown by FIG. 1, conduit **38** communicates through an orifice **48** with a portion of space **10** located downstream of auxiliary throttle valve **3** whatever be the degree of opening of said valve, whereby the pressure in chamber **11** depends only upon the load.

However, for some kinds of engines it was found that the richness of the air and fuel mixture should be modified not only when the load increases above a given limit but also when the air flow rate through pipe **1** increases above another given limit independently of the load. In this case, conduit **38**, instead of having its end **48** (FIG. 1) permanently located downstream of the auxiliary throttle valve **3** has its end **48***a* (FIG. 4) located in such manner that it passes from the downstream side to the upstream side of said secondary throttle valve **3** when the latter is gradually opened. FIG. 4 shows in solid lines the position of throttle valve **3** for which orifice **48***a* is downstream thereof and, in dot-and-dash lines, the position of said valve **3** for which orifice **48***a* is going to pass from the downstream side to the upstream side thereof.

The operation of the carburetting devices of FIGS. 1 to 4 will be explained with reference to FIG. 5 which shows a curve obtained by plotting in abscissas the number of revolution per minute V of the engine and in ordinates the richnesses *a* of the fuel and air mixture to be supplied to the engine, this richness being for instance the ratio of the weight of fuel to the weight of air in the mixture.

It was found that, in the case of engines having a number of cylinders greater than two (that is to say as a rule equal to four, six or eight), the richness of the mixture fed to the engine under full load conditions must be gen-

erally higher than the richness under part load conditions. This is what is obtained with the embodiments of FIGS. 1 to 3 wherein the richness varies along curve ABCD of FIG. 5.

In the portion AB of the curve, the load of the engine is low or medium and the suction transmitted to chamber **45** is relatively low (in absolute value). Throttling member **42** is then out of action and leaves conduit **38** open (FIG. 1) so that an attenuated suction is provided in chamber **11**, the value of this suction depending upon the cross section of calibrated orifices **40** and **41**. The rate of flow of fuel, which is determined by the difference between this attenuated suction and the complete suction existing at orifice **20**, is relatively small and the mixture fed through said orifice **20** is relatively lean.

On the contrary, in the portion CD of the curve of FIG. 5 the load of the engine is high and the suction transmitted to chamber **45** is relatively weak. Throttling member **42** is in action and closes conduit **38** (FIG. 3), so that the pressure in chamber **11** is the same as in air intake **7**. The flow rate of fuel, which is then determined by the difference between this pressure and the suction exerted on orifice **20**, is increased with respect to the preceding case and the fuel and air mixture is therefore richer in fuel.

However, in the case of a vehicle driven by the engine in question, if this engine is to receive a relatively lean mixture for partial loads on nearly the whole of its range of normal use, it must receive a relatively rich mixture when the loads are high, for high speeds of the engine. If, as shown by FIGS. 1 to 3, use is merely made of the suction exerted in pipe **1** downstream of the main throttle valve **2** for lowering the pressure in chamber **11**, a sudden passage from one richness to the other according to the dotted lines BC (FIG. 5) is obtained, which may imply some rough change in operation. The use of an orifice such as shown at **48***a* in the embodiment of FIG. 4 permits a more gradual passage from one richness to the other, as shown by the dot-and-dash line B'C of FIG. 5. When passing from the range of operation AB' to the range CD, orifice **48***a* passes from the downstream to the upstream side of the auxiliary throttle valve **3**. In this case it is no longer the suction existing in space **10**, but a pressure increasing up to that existing in air intake **7** that is transmitted through conduit **38**. Everything therefore takes place as if throttling member **42** gradually entered into action and the mixture is gradually enriched from the partial loads (AB') to the full load (CD) without discontinuity between these two ranges of operation.

Anyway the richness of the mixture fed to the engine is exactly adapted to all circumstances to the conditions of operation of the engine.

On the contrary, it was found that, for ordinary engines having one or two cylinders, the richness of the mixture fed to the engine under full load conditions must, as a rule, be lower than the richness under part load conditions, this case being besides more frequent (although this it not a general rule) when the carburettor is of the type illustrated by FIG. 6, wherein the fuel that has been metered is delivered by a pump such as **23**.

It then suffices to make use of a throttling member **42***a* mounted in reverse fashion with respect to the throttling member **42** of the above described embodiments (FIGS. 1, 3 and 4), that is to say adapted to close conduit **38** when the load is low and to open it (as shown by FIG. 6) when the load is high. In the embodiment of FIG. 6, it has been supposed that, as above, the load is determined by the pressure existing downstream of the main throttle valve **2**. The means for controlling throttle member **42***a* are then identical to those for controlling the throttle member **42** of FIGS. 1, 3 and 4, with the difference that spring **47** tends to open said member **42***a* whereas it tended to close throttle member **42**.

According to the embodiment illustrated by FIG. 7, the load is supposed to be indicated by the angular position of the main throttle valve **2**. In this case, the spindle **6** of said valve **2** carries, fixed thereon, a lever **49** adapted to bear upon throttle member **42***a*, which is carried by a diaphragm **43***a* subjected to the action of a spring **47***a* urging throttle member **42***a* toward the closed position.

As shown in dot-and-dash lines in FIG. 6, conduit **38** may open into space **10** through an orifice **48** located downstream of auxiliary throttle valve **3** whatever be the degree of opening thereof, whereby the pressure in chamber **11** depends only upon the load.

However, as above explained, in order to avoid jerks when passing from a degree of richness to another one, it is of interest to cause the flow rate of air through pipe **1** to act in order to obtain a gradual variation of richness. For this purpose, in this case, conduit **38** opens, as shown in dotted lines, through an orifice **48***b* positioned in such manner that it passes from the upstream side to the downstream side of throttle valve **3** when said valve is gradually opened.

The operation of the carburetting devices of FIGS. 6 and 7 is as follows:

For low and medium loads of the engine (that is to say when the degree of opening of the main throttle valve **2** is small or medium), throttling member **42***a* is brought into play by the suction transmitted to chamber **45** (FIG. 6) or by spring **47***a* (FIG. 7), so that chamber **11** is subjected to the pressure in the air intake **7** transmitted through conduit **34**. The mixture admitted to the engine is normal. On the contrary, for high loads, throttling member **42***a* is brought out of action by spring **47** (FIG. 6) or by lever **49** (FIG. 7) so that chamber **11** is subjected to a suction attenuated with respect to that existing in space **10**. The mixture fed to the engine is leaner.

If conduit **38** ends at **48** (FIG. 6) this reduction of the richness of the mixture is obtained suddenly, for a given limit of the load. On the contrary, if conduit **38** opens at **48***b*, this reduction of the richness is obtained gradually in a manner such as disclosed by the line portion B'C of FIG. 5.

Anyway, in this case also, the richness of the fuel and air mixture fed to the engine is exactly adapted, in all circumstances to the operation of the engine. For a given type of engine and of carburettor, very simple tests will enable anyone skilled in the art to determine in what direction the richness of fuel and air mixture is to vary as a function of the load and whether the air flow rate is to cooperate in controlling this variation.

According to another feature of the present invention, which may be used separately, intake pipe **1** is provided with a wall portion **25** forming the geometrical envelope of the outline of the larger portion S of auxiliary throttle valve **3** when it is moved as shown by FIGS. 1, 4 and 6. This involves an offsetting of the axis of the air intake **7** with respect to the axis of the remainder of pipe **1**, this offsetting being in a direction perpendicular to the spindle **8** of throttle valve **3**.

As the whole edge of the portion S of throttle valve member **3** remains very close to wall portion **25**, the air streams along this edge remain always perpendicular to the portion S of the throttle valve, that is to say their angle of incidence is constant. The opening torque is thus given an increased total value. As a consequence, the angular opening of auxiliary throttle valve **3** is much more accurate and more characteristic of the air flow rate value. Furthermore, it is then possible to use return means, such as spring **9**, which are more powerful and consequently easier to provide since less influenced by frictional resistances.

As a rule the auxiliary throttle valve consists of an eccentrically pivoted flap **3** and the fuel metering member of a needle **4** limiting, in a calibrated orifice **15** provided in diaphragm **26**, an annular passage for the fuel, this needle being rigid with a rod **18** mounted slidable in a rec-

tilinear guide. Rod 18 is connected to flap 3 through an arm 27 fixed to the portion *s* of flap 3, a connecting rod 28 pivoted to said arm 27 and a ball-and-socket joint 29 serving to connect rod 28 to rod 18.

When the metering member consists of a needle such as 4 the tolerances of manufacture are such that the position of diaphragm 26 along the axis of rod 18 is not determined initially in an accurate manner. This lack of accuracy influences the law of variation of the fuel flow rate as a function of the angular position of flap 3. Furthermore, the radial position of diaphragm 26 is also lacking in accuracy with respect to needle 4, which risks being wedged in the diaphragm after it has been driven therein.

In order to obviate this drawback, according to another feature of the invention, diaphragm 26 is set between, on the one hand, a ring 30 of rubber or any other resilient material which is not attacked by the fuel, said ring bearing upon a rigid and fixed element 31, and, on the other hand, a rigid adjustment member 32 adapted to screw in or on fixed element 31, the whole being such that diaphragm 26 has a radial play (that is to say a play in the horizontal direction in FIGS. 1 and 6) with respect to element 31. As shown, fixed element 31 may consist of a block in which are provided conduits 5 and 17 and guide 19 and adjusting member 32 may consist of a plug provided with external screw threads and screwed in block 31.

Thus the radial position of diaphragm 26 with respect to needle 4 can be determined, before compression of ring 30, by driving needle 4 into the diaphragm. Then the axial position of diaphragm 26 with respect to needle 4 can be determined by screwing of plug 32 and resilient flattening of ring 30, which varies the width of the annular space limited inside the diaphragm by needle 4, for a given position thereof. Ring 30 also serves to ensure liquid-tightness of the position of chamber 16 located upstream of the diaphragm whatever be the adjustment position of said diaphragm.

In the construction that is illustrated, it might happen that tubular guide 19 is subjected to a pressure lower on the side of air intake 7 then on that of constant level chamber 11. In this case, fuel might be sucked in from said chamber 11 into air intake 7 through the annular play existing between rod 18 and its guide 19, which would interfere with the good operation of the engine.

In order to obviate this drawback, according to still another feature of the invention, there is provided, in an intermediate zone of guide 19, a groove 33 communicating with the portion of chamber 11 above level N in such manner that, in the case above considered, it is air and not fuel which is sucked in from chamber 11 into air intake 7.

For the same purpose the orifice 40 of conduit 34 is located in the portion of intake pipe 1 located upstream of the portion S of flap valve 3, preferably at a distance from the wall of air intake 7. As this portion S of flap 3 practically does not allow air to pass along wall portion 25, the pressure existing in said portion of pipe 1 is purely static without any dynamic effect: thus the pressure existing in chamber 11 is not influenced by the disturbances due to variations of the air flow rate in intake pipe 1, outside of the action of orifices 48*a* and 48*b*.

Finally, the carburetting device is fixed to the engine through a flange 35 which is generally located close to throttle valve 2. Through this flange the heat developed in the engine is transmitted to pipe 1 and might be transmitted to block 31, thus producing the formation of fuel vapor bubbles in conduits 5 or 17. These bubbles might interfere with the operation of the engine and in particular produce an irregular operation at low speeds, that is to say for low flow rates of fuel.

In order to obviate this drawback, according to still another feature of the invention, which generally does not depend upon the shape of throttle valve 3 and upon that of metering member 4, block 31 is fixed to the air intake 7 of pipe 1 in such manner as to dip into chamber 11 while being at a distance from the walls thereof, a thermally insulating joint 36 being provided between block 31 and pipe 1. Furthermore, block 31 and/or pipe 1 are provided with recesses 37 inside their joining zone so as to reduce to a minimum their surface of contact through joint 36 and consequently the transmission of heat toward element 31.

In a general manner, while the above description discloses what are deemed to be practical and efficient embodiments of the invention, said invention is not limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the invention as comprehended within the scope of the appended claims.

What I claim is:

1. A carburetting device for an internal combustion engine which comprises, in combination, an air intake pipe, a main throttle valve in said pipe, an auxiliary throttle valve in said pipe, located upstream of said main throttle valve, said auxiliary throttle valve being responsive to the opening thrust thereon of the air stream flowing through said pipe, means for resiliently urging said auxiliary throttle valve toward the closed position thereof, a constant level fuel chamber, fuel feed means for leading fuel from said chamber to said pipe, means operatively connected with said auxiliary throttle valve for metering the flow of fuel through said fuel feed means so that the cross section afforded to air by said auxiliary throttle valve through said pipe and that afforded to fuel through said fuel feed means are substantially proportional to each other, means for placing the upper portion of said constant level fuel chamber in communication with the atmosphere, a casing fixed in position with respect to said pipe, a resiliently mounted deformable diaphragm partition dividing said casing into two chambers, a first one and a second one, a first conduit connecting said first chamber with the portion of said intake pipe downstream of said main throttle valve, a second conduit connecting the second of said chambers with the portion of said intake pipe upstream of said auxiliary throttle valve, a third conduit connecting said second chamber with the portion of said intake pipe between said two thorttle valves, means for connecting said second conduit with the top of said constant level fuel chamber, and means carried by said diaphragm partition for throttling said second conduit more and more as said diaphragm partition is being deformed in one direction.

2. A carburetting device for an internal combustion engine which comprises, in combination, an air intake pipe, a main throttle valve in said pipe, an auxiliary throttle valve in said pipe, located upstream of said main throttle valve, said auxiliary throttle valve being responsive to the opening thrust thereon of the air stream flowing through said pipe, means for resiliently urging said auxiliary throttle valve toward the closed position thereof, a constant level fuel chamber, fuel feed means for leading fuel from said chamber to said pipe, means operatively connected with said auxiliary throttle valve for metering the flow of fuel through said fuel feed means so that the cross section afforded to air by said auxiliary throttle valve through said pipe and that afforded to fuel through said fuel feed means are substantially proportional to each other, means for placing the upper portion of said constant level fuel chamber in communication with the atmosphere, a casing fixed in position with respect to said pipe, a resiliently mounted deformable diaphragm partition dividing said casing into two chambers, a first one and a second one, a first conduit connecting said first chamber with the portion of said intake pipe downstream of said main throttle valve, a second conduit connecting the second of said chambers with the portion of said intake pipe upstream of said auxiliary throttle valve, a third conduit connecting said second chamber with the portion of said intake pipe between said two throttle valves,

means for connecting said second conduit with the top of said constant level fuel chamber, and means carried by said diaphragm partition for throttling said second conduit more and more as said diaphragm partition is being deformed by a decreasing suction in said first conduit.

3. A carburetting device for an internal combustion engine which comprises, in combination, an air intake pipe, a main throttle valve in said pipe, an auxiliary throttle valve in said pipe, located upstream of said main throttle valve, said auxiliary throttle valve being responsive to the opening thrust thereon of the air flowing through said pipe, means for resiliently urging said auxiliary throttle valve toward the closed position thereof, a constant level fuel chamber, fuel feed means for leading fuel from said chamber to said pipe, means operatively connected with said auxiliary throttle valve for metering the flow of fuel through said fuel feed means so that the cross section afforded to air by said auxiliary throttle valve through said pipe and that afforded to fuel through said fuel feed means are substantially proportional to each other, means for placing the upper portion of said constant level fuel chamber in communication with the atmosphere, a casing fixed in position with respect to said pipe, a resiliently mounted deformable diaphragm partition dividing said casing into two chambers, a first one and a second one, a first conduit connecting said first chamber with the portion of said intake pipe downstream of said main throttle valve, a second conduit connecting the second of said chambers with the portion of said intake pipe upstream of said auxiliary throttle valve, a third conduit connecting said second chamber with the portion of said intake pipe between said two throttle valves, means for connecting said second conduit with the top of said constant level fuel chamber, and means carried by said diaphragm partition for throttling said second conduit more and more as said diaphragm partition is being deformed by an increasing suction in said first conduit.

4. A carburetting device for an internal combustion engine which comprises, in combination, an air intake pipe, a main throttle valve in said pipe, an auxiliary throttle valve in said pipe, located upstream of said main throttle valve, said auxiliary throttle valve being responsive to the opening thrust thereon of the air stream flowing through said pipe, means for resiliently urging said auxiliary throttle valve toward the closed position thereof, a constant level fuel chamber, fuel feed means for leading fuel from said chamber to said pipe, means operatively connected with said auxiliary throttle valve for metering the flow of fuel through said fuel feed means so that the cross section afforded to air by said auxiliary throttle valve through said pipe and that afforded to fuel through said fuel feed means are substantially proportional to each other, means for placing the upper portion of said constant level fuel chamber in communication with the atmosphere, a casing fixed in position with respect to said pipe, said casing having a resilient wall, an arm rigid with said main throttle valve bearing against said resilient wall so as to deform it inwardly more and more as said main throttle valve is being opened, a first conduit connecting the inside of said casing with the portion of said intake pipe upstream of said auxiliary throttle valve, a second conduit connecting the inside of said casing with the portion of said intake pipe between said two throttle valves, means for connecting said first conduit with the top of said constant level fuel chamber, and means carried by said resilient wall for throttling said second conduit more and more as said main throttle valve is being displaced more and more.

5. A carburetting device for an internal combustion engine which comprises, in combination, an air intake pipe, a main throttle valve in said pipe, an auxiliary throttle valve in said pipe, located upstream of said main throttle valve, said auxiliary throttle valve being responsive to the opening thrust thereon of the air stream flowing through said pipe, means for resiliently urging said auxiliary throttle valve toward the closed position thereof, a constant level fuel chamber, fuel feed means for leading fuel from said chamber to said pipe, means operatively connected with said auxiliary throttle valve for metering the flow of fuel through said fuel feed means so that the cross section afforded to air by said auxiliary throttle valve through said pipe and that afforded to fuel through said fuel feed means are substantially proportional to each other, means for placing the upper portion of said constant level fuel chamber in communication with the atmosphere, a casing fixed in position with respect to said pipe, said casing having a resilient wall, an arm rigid with said main throttle valve bearing against said resilient wall so as to deform it inwardly more and more as said main throttle valve is being opened, a first conduit connecting the inside of said casing with the portion of said intake pipe upstream of said auxiliary throttle valve, a second conduit connecting the inside of said casing with the portion of said intake pipe between said two throttle valves, means for connecting said first conduit with the top of said constant level fuel chamber, and means carried by said resilient wall for throttling said second conduit more and more as said main throttle valve is being closed more and more.

6. A carburetting device for an internal combustion engine which comprises, in combination, an air intake pipe, a main throttle valve in said pipe, an auxiliary throttle valve in said pipe, located upstream of said main throttle valve, said auxiliary throttle valve being responsive to the opening thrust thereon of the air stream flowing through said pipe, means for resiliently urging said auxiliary throttle valve toward the closed position thereof, a constant level fuel chamber, fuel feed means for leading fuel from said chamber to said pipe, means operatively connected with said auxiliary throttle valve for metering the flow of fuel through said fuel feed means so that the cross section afforded to air by said auxiliary throttle valve through said pipe and that afforded to fuel through said fuel feed means are substantially proportional to each other, means for placing the upper portion of said constant level fuel chamber in communication with the external atmosphere, means for placing the upper portion of said constant level chamber in communication with the portion of said intake pipe between said two throttle valves and means for automatically controlling said last mentioned means in response both to variations of the load of said engine and to variations of the air flow rate through said intake pipe.

7. A carburetting device for an internal combustion engine which comprises, in combination, an air intake pipe, a main throttle valve in said pipe, an auxiliary throttle valve in said pipe upstream of said main throttle valve, said auxiliary throttle valve being responsive to the opening thrust thereon of the air stream flowing through said pipe, means for resiliently urging said auxiliary throttle valve toward the closed position thereof, a fuel chamber, a fuel feed conduit opening into said pipe, a supporting element fixed with respect to said pipe and provided with a fuel passage connecting said fuel chamber with said fuel feed conduit, a needle slidably guided with respect to said element and operatively connected with said auxiliary throttle valve, a portion of said needle forming the inner wall of a portion of said passage, a rigid element having a hollow portion coaxially surrounding a portion of said needle, said rigid element being carried by said supporting element adjustably in the direction of said needle, an annular diaphragm formed as a separate unit surrounding said needle, a resilient ring mounted on said supporting element, said diaphragm bearing on one side thereof against said ring and on the other side against the edge of said rigid element hollow portion, the annular space between said needle and said diaphragm forming a portion of said fuel passage between said fuel chamber and said fuel feed conduit, and means for operatively connecting said needle to said auxiliary throttle

valve so that the cross section afforded to air by said auxiliary throttle valve through said intake pipe and that afforded to fuel through said annular space are substantially proportional to each other.

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