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CARBURETORS FOR INTERNAL COMBUSTION ENGINES

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2 Sheets-Sheet 1

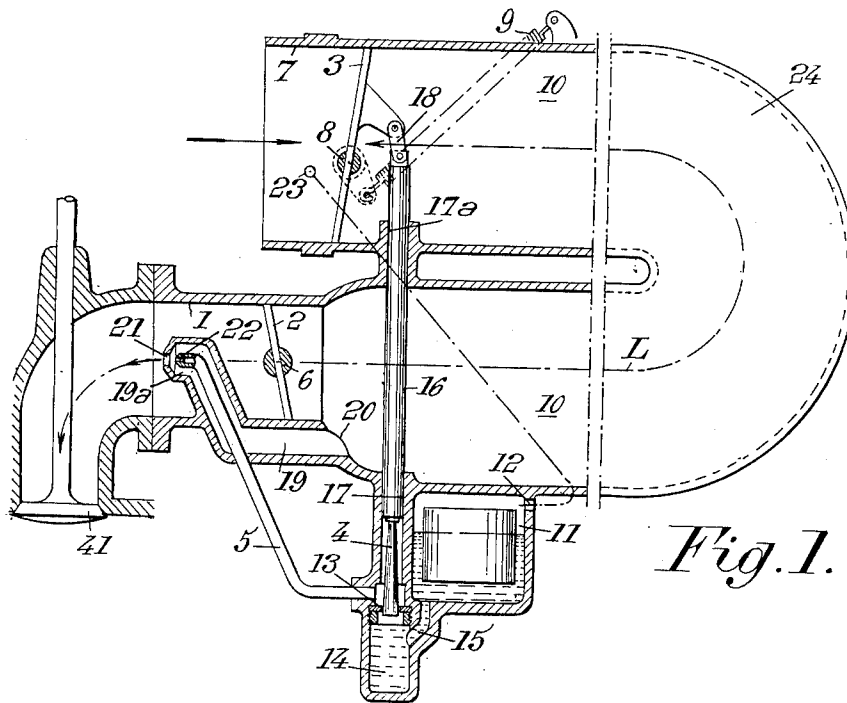


Fig. 1.

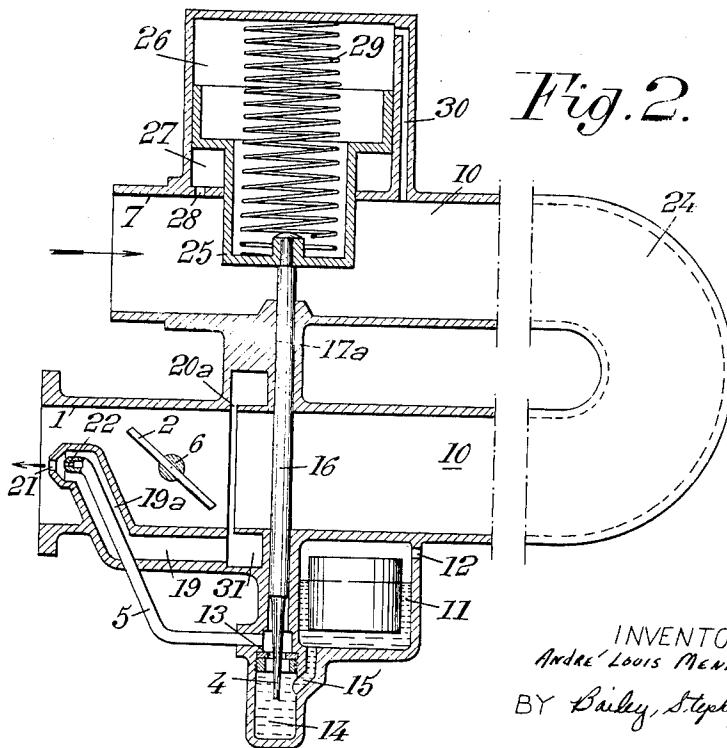


Fig. 2.

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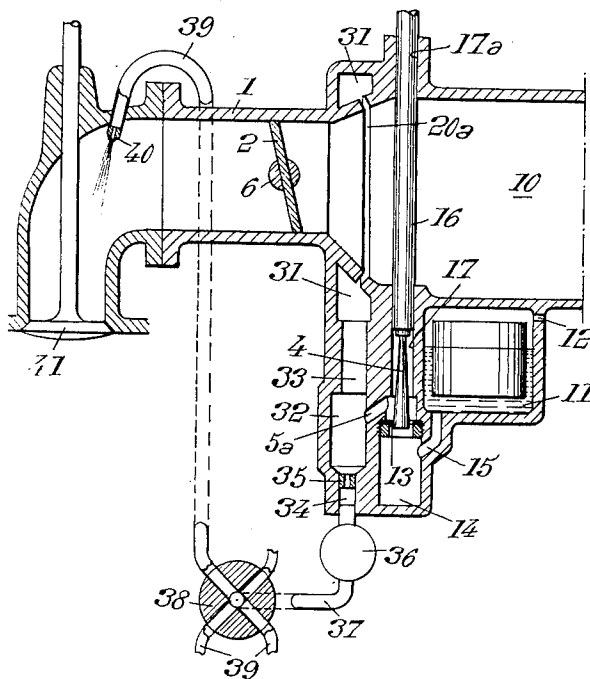
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Fig. 3.



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3,259,378 CARBURETORS FOR INTERNAL COMBUSTION ENGINES

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3 Claims. (Cl. 261—50)

In a carburetor for an internal combustion engine comprising at least one cylinder provided with an inlet valve, said carburetor having just a throttle valve actuated by the driver, it is known to increase the power of said engine, more particularly when working close to the conditions where the full amount of fuel and air mixture is supplied to this engine, by making use of an inlet pipe having, between the inlet valve of said engine and a throttled portion, such as the throat of a venturi, provided in the induction pipe of the carburetor, a length L (which may be determined either experimentally or by calculation for every type of engine) such as to produce, for a given range of engine speeds, a ram effect (which takes place in the pipe under the effect of the successive suction from the engine) capable of substantially improving the filling of said engine with the air and fuel mixture.

The present invention relates to carburetors the induction pipe of which is provided, upstream of the main throttle valve, with an auxiliary throttle valve which opens automatically and gradually as the flow rate of the air passing through said induction pipe increases, said auxiliary throttle valve controlling a fuel metering member.

The present invention consists in providing, in such a carburetor, an induction pipe forming a loop such that the path of travel between the auxiliary throttle valve and the engine inlet valve is of such a length L, the portions of said loop adjoining said auxiliary throttle valve and the fuel metering means, respectively, being in close proximity to each other and a rod, rigid at one end with the fuel metering means and directly connected at the other end with said auxiliary throttle valve, extending slidably, with a fluidtight fit, through the walls of the portions of said loop located close to each other.

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

FIG. 1 is a diagrammatic sectional view of a carburetor made according to a first embodiment of the invention;

FIG. 2 is a similar view showing another embodiment of the invention;

FIG. 3 is a partial diagrammatic sectional view of a carburetor made according to a third embodiment of the invention.

The construction illustrated by FIG. 1 includes an induction pipe 1, leading to the orifice of the inlet valve 41 of the engine cylinder, in which the main throttle valve 2, to be actuated by the driver, is pivoted about a spindle 6. The auxiliary throttle valve 3 is located in the main air intake 7 of the carburetor. Said auxiliary throttle valve 3 is carried by a spindle 8 mounted eccentrically with respect to said air intake 7, this spindle being urged, in the auxiliary throttle valve closing direction, by return means consisting of a spring 9, against the action of the air stream which tends to open it, due to its eccentric mounting. Said auxiliary throttle valve 3, which thus determines the amount of air that is admitted, is connected through a link 18 with a sliding rod 16 which carries the fuel metering member, consisting of a needle 4 of a cross section variable along its length. This needle

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4 moves in a metering orifice 13 so that the annular space left between needle 4 and the edge of orifice 13 determines the rate of flow of fuel from a constant level chamber 11 toward fuel feed conduit 5. For this purpose, the space upstream of orifice 13 consists of a chamber 14 communicating through a passage 15 with the fuel constant level chamber 11. In the drawing, this chamber 11 is shown as vented through an orifice 12 which may either open into the external atmosphere or be connected, according to the dot-and-dash lines of FIG. 1, with an orifice 23 opening into the main air intake 7 of the carburetor.

Fuel feed conduit 5 opens into a chamber 19a through an orifice 22 located opposite an orifice 21 connecting the inside of said chamber 19a with the portion of induction pipe 1 downstream of throttle valve 2, said orifice 21 having a cross section slightly larger than that of orifice 22. As for chamber 19a, it communicates through a passage 19 with a portion 10 of the induction pipe extending between the main throttle valve 2 and the auxiliary throttle valve 3. Said passage 19 starts from a point 20 of pipe portion 10 immediately upstream of the main throttle valve 2.

It will be understood that if orifice 21 is small with respect to the cross section of passage 19 and to that of chamber 19a, the orifice 22 provided at the end of fuel conduit 5 is subjected to the suction existing in passage 19, that is to say to the suction existing in induction pipe 1 upstream of the main throttle valve 2.

The distance L, measured along the mean line of said induction pipe portion 10, between auxiliary throttle valve 3 and inlet valve 41 is chosen to obtain the above mentioned ram effect. By way of example, particular cases may be cited where length L ranges from 0.25 m. to 1 m.

Portion 10 of the induction pipe form a loop in the shape of a U forming a bend at 24, so that the auxiliary throttle valve 3 is located substantially above the main throttle valve 2 and close thereto.

The space occupied by the carburetor can thus be reduced to a minimum by disposing the metering member 4 as close as possible to the main throttle valve 2 so that conduit 5 is as short as possible.

The air intake 7 being located above the portion of induction pipe 1 which contains the main throttle valve 2, the rod 16 which supports needle 4 extends vertically on the one hand through a guide 17a common to the upper branch of induction pipe portion 10 and to the lower branch thereof and, on the other hand, through a guide 17 carried by the lower wall of said pipe lower branch.

FIG. 2 shows a carburetor analogous to that above described but where the air flow rate is adjusted in a different manner. The embodiment of FIG. 2 comprises, same as that of FIG. 1, a pipe 1 containing the main throttle valve 2 connected through spindle 6 to the throttle control means. It also comprises means for adjusting the fuel flow rate and a conduit 5 opening as above explained on the downstream side of throttle valve 2.

In this embodiment, passage 19 has its upstream end located not in pipe 10 but in an annular space 31 communicating with pipe 10 through a slot 20a.

The auxiliary throttle valve, which automatically opens in accordance with the air flow rate, consists in this case of a piston 25 slidable in a cylindrical chamber 26-27. The upper portion 26 of said chamber is subjected permanently to the suction existing in pipe portion 10, owing to the provision of a conduit 30. This suction, acting upon a large area of piston 25 tends to move it upwardly against the action of an antagonistic spring 29. The lower portion 27 of the cylindrical chamber is subjected, owing to the provision of a passage 28, to the action of the atmospheric pressure or of the pressure existing in the air intake 7 of the carburetor. Such an arrangement, known in itself, acts in such manner that the area of the

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passage left between the lower end of piston 25 and the wall of the air intake 7 is automatically adjusted so that the suction in pipe portion 10 is constant or anyway determined by the resiliency characteristics of spring 29. Thus, for every value of the air flow rate, piston 25 assumes a given position and, as it is connected through rod 16 with needle 4, said needle modifies the annular section of fuel flow through orifice 13 so that the flow rate of fuel remains proportional to the flow rate of air through the apparatus.

As in the case of FIG. 1, the air intake 7 which contains the auxiliary throttle valve 25 and the air and fuel mixture outlet, located downstream of the main throttle valve 2, are located one above the other and in close proximity to each other. The two portions of pipe 10 thus located one above the other are connected together by a bend 24 of any suitable shape. The distance L between throttle valve 25 and inlet valve 41 is chosen as stated with reference to FIG. 1.

According to the embodiment of FIG. 3, the fuel, or fuel mixture, after having been metered by the needle as above explained, is delivered by a pump into pipe 1 instead of being introduced therein by suction through a conduit 5.

In said FIGURE 3 all the elements for feeding air and fuel and for metering fuel are similar to those above described and the parts of the carburetor comprising pipe portion 10 and the elements mounted in the upstream end of said pipe have portion not been shown. The distance L between the auxiliary throttle valve and inlet valve 41 is chosen as above stated.

But in the embodiment of FIG. 3 the metered fuel passes through a channel 5a into a chamber 32 the upper portion of which communicates, through a conduit 33 of large cross section, with an annular space 31, of large cross section itself, in communication through slot 20a with the pipe portion between the main throttle valve 2 and the auxiliary throttle valve 3 (or 25).

The lower portion of chamber 32 communicates through a channel 34, preferably fitted with a calibrated orifice 35, as shown, with the suction side of a pump 36 which delivers fuel through a conduit 37. This flow of fuel takes place through one or several conduits 39 and nozzles 40 and advantageously, as shown, with the provision of a distributing member 38, capable of distributing this fuel amongst the respective valves or ports of the engine.

The carburetor according to the present invention has, when the main throttle valve 2 is fully open, characteristics such that there is a distance equal to L between the auxiliary throttle valve (consisting either of element 3 or of piston 25) and the inlet valve 41 of the engine cylinder, and this distance L may be given the desired value without substantially modifying the structure of the carburetor.

Of course, it is advantageous, as shown, to arrange said carburetor so that the fuel enters the induction pipe 1 only downstream of the main throttle valve 2. This permits of avoiding the presence of too great an amount of fuel remaining in the induction pipe which, in this case, is of particularly great length, the walls of this pipe remaining dry since the only fluid flowing therethrough consists of air as far as a point located downstream of the main throttle valve 2.

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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 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. For use to feed a fuel and air mixture to an internal combustion engine having an inlet valve, a carburetor which comprises, in combination,
 - an induction pipe leading to said inlet valve,
 - a main throttle valve in said induction pipe,
 - an auxiliary throttle valve in said induction pipe upstream of said main throttle valve, said auxiliary throttle valve being arranged to open automatically more and more as the air flow rate through said induction pipe increases,
 - the portion of said induction pipe between said two throttle valves forming a loop of a length such that the distance from said auxiliary valve to said inlet valve corresponds to the production of a ram effect in said induction pipe capable of improving the filling of the engine,
 - a fuel feed conduit the downstream end of which opens into said induction pipe,
 - two cooperating means, the first one fixed with respect to said induction pipe and the second one slidable in the first one, forming together a metering device controlling the size of the cross section of said fuel feed conduit at a point thereof close to the downstream branch of said induction pipe loop portion, the branches of said induction pipe loop portion adjoining said auxiliary throttle valve and said metering orifice, respectively, being in close proximity to each other,
 - a rod, rigid with said metering device slidable means, mounted slidable with a fluidtight fit in both of said branches of said induction pipe loop portion, said rod having one end thereof rigid with said metering device slidable means,
 - and means for directly connecting the other end of said rod with said auxiliary throttle valve.

2. A carburetor according to claim 1 wherein said main throttle valve and said auxiliary throttle valve are located immediately above each other.

3. A carburetor according to claim 1 wherein the downstream end of said fuel feed conduit opens into said induction pipe at a point located downstream of said main throttle valve.

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