United States Patent [19]

Laprade et al.

[11] **3,713,630**

[45] **Jan. 30, 1973**

[54] **MULTICYLINDER CARBURETOR**

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[22] Filed: **Aug. 3, 1971**

[21] Appl. No.: **168,620**

[30] **Foreign Application Priority Data**

Sept. 11, 1970 France....................7033001

[52] **U.S. Cl.** ....**261/23 A**, 261/50 A, 123/119 R, 3/139AW

[51] **Int. Cl.**............................**F02m 9/08**

[58] **Field of Search** ....261/50 A, 44 R, 23 A; 123/119R, 139 AW

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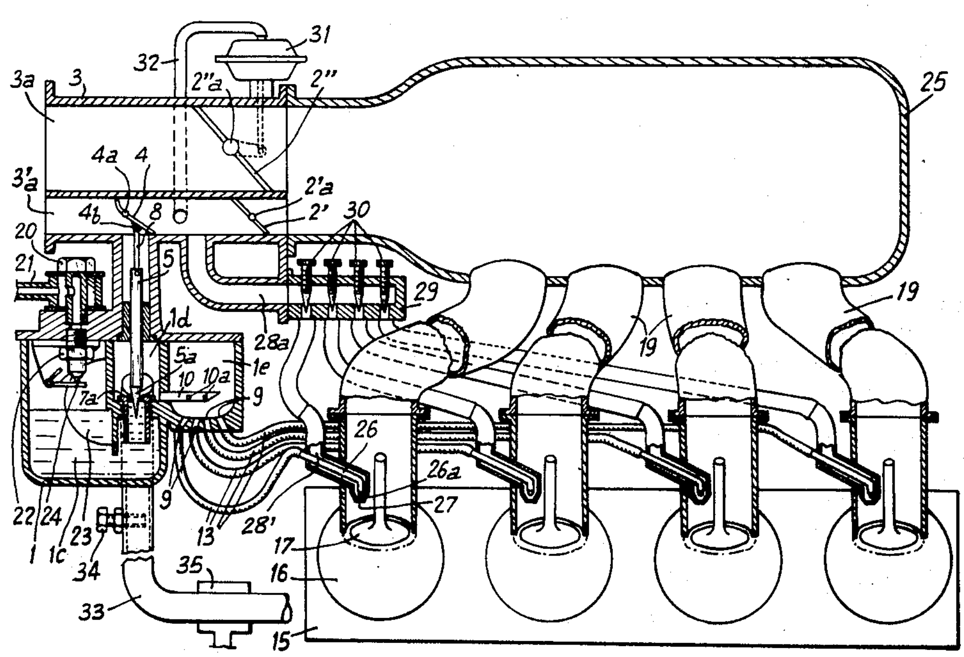
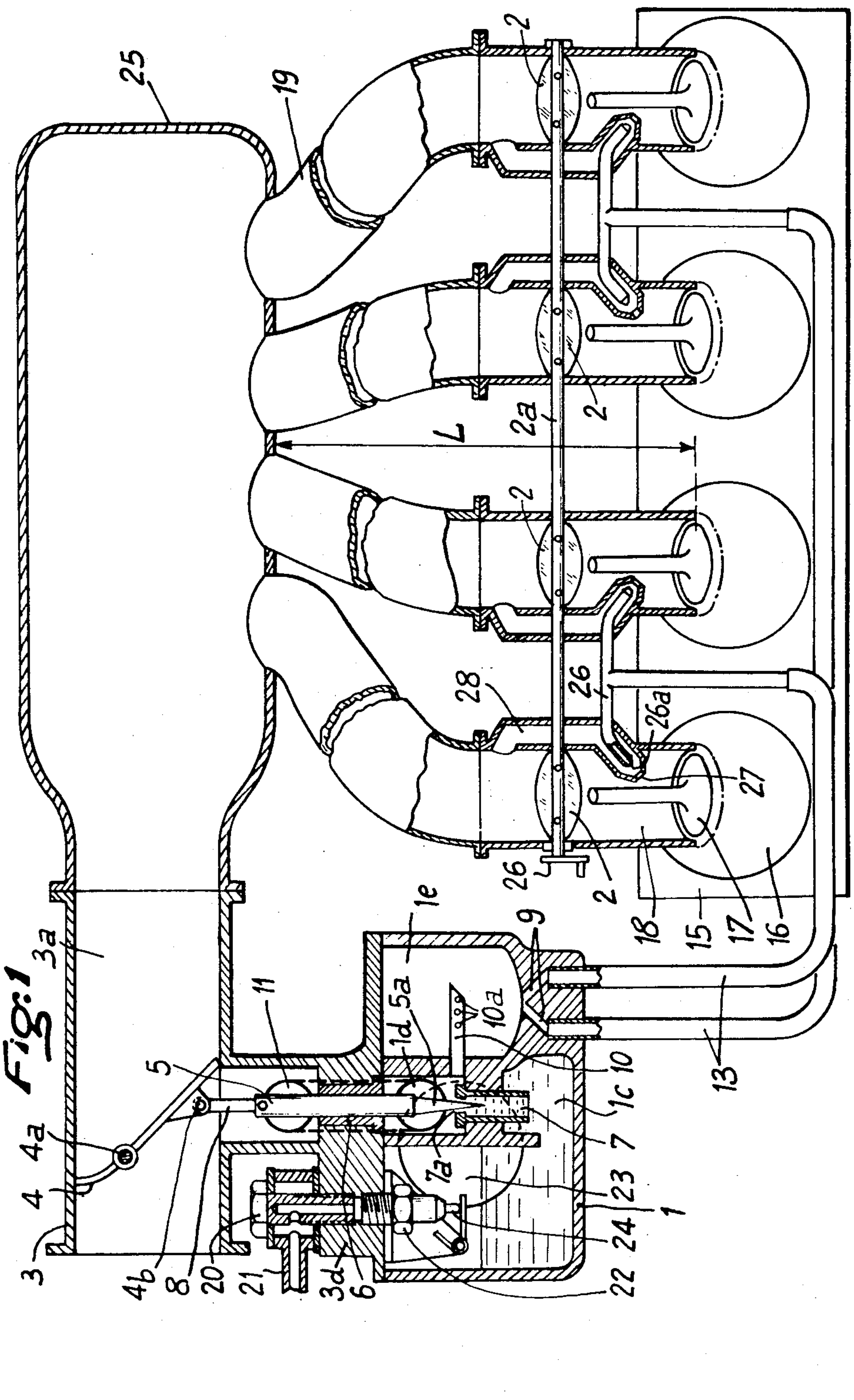
[57] **ABSTRACT**

A carburation system for multicylinder engines having an auxiliary throttle member in the intake pipe upstream of the main throttle member and controlled by the rate of air flow through the intake pipe and serving to control the rate of fuel delivery.

2 Claims, 2 Drawing Figures




25
19
2
2a
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1e
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4b
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17
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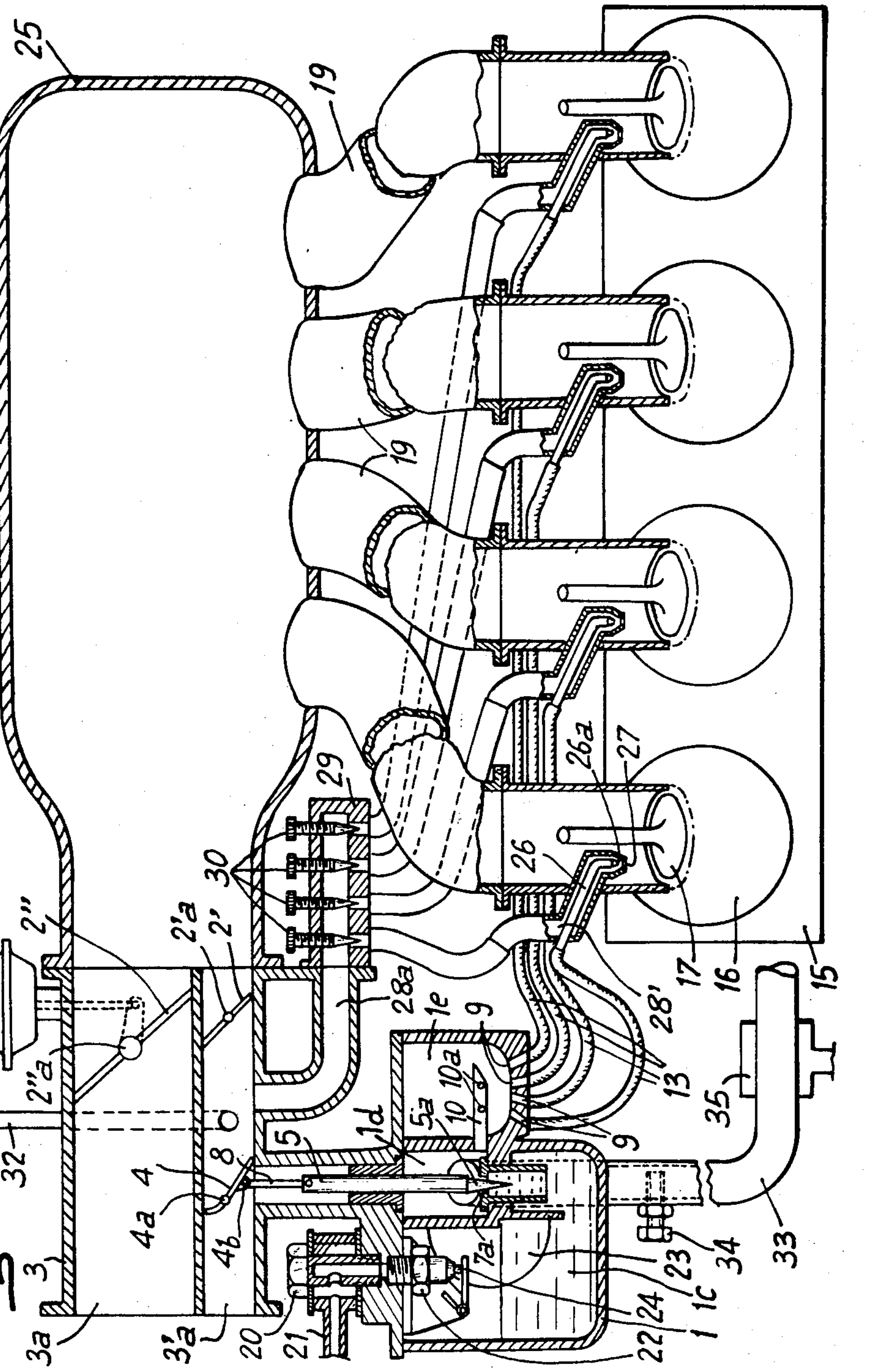
7a

Fig:1

Fig. 2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MULTICYLINDER CARBURETOR

This invention relates to improvements in carburation internal combustion engines for multicylinder systems.

When carburation devices of this kind are used, engine power can of course be increased if the inlet pipe for each cylinder has a main throttle member disposed at a short distance from the distribution element or intake valve of the cylinder, and an auxiliary throttle member actuating a fuel-dosing element to control fuel flow. It then becomes possible to make use of the pulsations produced in the inlet pipe by the consecutive engine aspirations to increase the feed of carburated mixture to the engine.

Also, if the fuel is delivered to a zone near the main throttle member, there is the advantage of having an inlet system for air not mixed with fuel which extends from the main throttle members to the auxiliary throttle members. The walls of such inlet systems are therefore completely dry, and so mixture distribution is unaffected. This feature is of course one of the main advantages of fuel injection, since the fuel can more readily be controlled to cause minimum exhaust gas pollution of the atmosphere. Unfortunately a disadvantage of the known carburation facilities is that a complete carburation unit comprising the main throttle member, auxiliary throttle member and fuel-dosing facilities must be provided for each cylinder, so that assembly is of course costly and complex.

It is an object of this invention to obviate this disadvantage.

The invention is for improvements in or relating to carburation systems for multicylinder internal combustion engines of the kind in which an auxiliary throttle member is provided upstream of the main, driver-controlled, throttle member in the intake pipe, the auxiliary throttle member opening automatically and progressively in proportion as the rate of air flow through the intake pipe increases, the auxiliary throttle member actuating a dosing element controlling fuel delivery, the fuel going to the air intake pipe through a passage which joins the intake pipe at a place where the negative pressure is substantially the same as in the chamber bounded by the two throttle members in the intake pipe, an individual pipe of length L being provided for each cylinder to make good use of the pulsations produced by consecutive engine aspirations, characterized in that the individual pipes of length L extend into a common chamber or enlarged manifold of predetermined volume, the manifold chamber having an air inlet in which one or two auxiliary throttle members are disposed, the same actuating a fuel-dosing element associated with a constant-level chamber, one or more main throttle elements being disposed downstream of the auxiliary throttle element, individual pipes for each cylinder for the dosed fuel and subject to the pressure in the chamber between the auxiliary throttle member and the main throttle member and extending from the dosing element to the engine inlet pipes near the inlet distribution element or inlet valve.

In particular embodiments of the invention, the following features can be provided:

One main throttle member per cylinder is provided and is disposed near the inlet distribution element:

Each individual pipe joins, downstream of its corresponding main throttle member, passages connected to the chamber between the auxiliary throttle member and the main throttle member;

Each individual pipe joins the manifold chamber immediately upstream of its main throttle member;

A main throttle member may be disposed in the inlet of the manifold chamber; and the dosed fuel mixed with air at the pressure in the chamber between the main throttle member and the auxiliary throttle member goes through individual ducts to the inlet pipes near the inlet distribution elements;

The air inlet in the manifold chamber may be subdivided into two independent passages, one of which is of relatively small diameter and includes an auxiliary throttle member and a main throttle member while the other is of relatively large diameter and includes an auxiliary throttle member and/or a main throttle member, the latter being controlled mechanically and/or by a diaphragm which is subject to the pressure in the chamber between the auxiliary throttle member and the main throttle member in the relatively small diameter passage;

The channels which extend around the dosed-fuel pipes communicate with the chamber between the auxiliary throttle member and the at least one main throttle member by way of a distributor having means such as screws for adjusting each passages;

The dispensing element is disposed in an emulsifying chamber having an air inlet connected via an adjusting screw to an air pipe heated by the engine exhaust gases or by the cooling water;

The individual pipes and/or the passages connected to the chamber between the auxiliary throttle member and the main throttle member are heated by the engine exhaust gases or by the cooling water;

Closure means disposed in the individual pipes and/or the passages connected to the chamber between the auxiliary throttle member and the at least one main throttle member are controlled by the at least one main throttle member and/or by the pressure in the inlet pipes upstream of the inlet distribution elements, but downstream of the or each main throttle member, to interrupt the fuel and/or air flow in such pipes and passages when the at least one main throttle member is closed and/or when the pressure in the inlet pipes drops below a critical value; and

Acoustic filters in the manifold chamber may keep pulsations away from the auxiliary throttle member.

For a better understanding of the invention, further description will be with reference to the accompanying drawings in which:

FIG. 1 shows a first embodiment of a carburation system according to the invention, and

FIG. 2 shows a second embodiment of a carburation system according to the invention.

Referring first to FIG. 1, an engine **15** comprises in this example four cylinders **16**, four inlet valves **17**—i.e., the inlet distribution elements—and four inlet pipes **18**. A main throttle member **2** is provided in each pipe **18** and is mounted on a spindle **2*a*** common to the four main throttle members, spindle **2*a*** having a lever **2*b*** connected to driver-operated control linkages. Each pipe **18** is extended by a pipe **19** which extends to a manifold **25** common to the four pipes **19**. The combined lengths of the pipes **18**, **19** are determined by calculation and adjusted experimentally to a value L so as to make use of the pulsations produced by consecutive engine suction strokes. At the inlet of manifold chamber **25** is a dosing facility comprising an element **3** having a passage **3***a* receiving an auxiliary throttle member in the form of an offset lid **4** mounted on a spindle **4***a*. Without departure from the scope of the invention, the auxiliary throttle member can of course take the form of a piston sliding in a cylindrical capacity whose top part communicates permanently via a passage with the negative pressure operative in the passage **3***a*.

In the example shown, lid **4** has a pivot **4***b* to which a rod **8** connecting a fuel-disposing needle **5** to the lid **4** is secured. Conical tip **5***a* of needle **5** co-operates with orifice **7***a* and jet **7** and is guided in a guide **6** mounted in cover **3***d* of float chamber **1**. Also disposed in cover **3***d* are a fuel supply connection **21**, secured by screw **20**, and a connector **22** receiving a needle valve **24** operated by a float **23**. The air goes to emulsifying chamber **1***d* through pipe **11** and leaves chamber **1***d* through emulsion tube **10** which is formed with small apertures **10***a*. The dosed fuel and the air which has entered through pipe **11** go through orifices **9** into pipes **13** extending to a T-union **26**, each outlet of which is received in a passage **28**, the same starting upstream of the main throttle members **2** and communicating via aperture **27** with pipe **18**. At the ends of the unions **26** are apertures **26***a*, and the respective diameters of the apertures **27** and **26***a* are such that the apertures **26***a* are subject to substantially the same negative pressure as is present in passage **28** and also in the manifold chamber **25** between the main throttle elements **2** and the auxiliary throttle element **4**. The passages **28** can be omitted if the ends of the unions **26** terminate immediately upstream of the main throttle members **2**, the ends being disposed if necessary, in an auxiliary venturi tube. Also, the passages **28** can, if required, have air adjusting screws giving individual air adjustment for each cylinder.

Referring now to FIG. **2**, the inlet of manifold chamber **25** is supplied through two different passages—a relatively narrow passage **3'***a* having a main throttle member in the form of a driver-controlled flap or lid or the like **2'** disposed on a spindle **2'***a*, and an auxiliary throttle member in the form of an offset flap or lid or the like **4** disposed on its spindle **4***a* and, as in the embodiment in FIG. **1**, controlling needle **5**. The relatively large passage **3***a* has another main throttle member in the form of flaps or lids or the like **2''** mounted on a spindle **2''***a*, the lid being adapted to be opened by a diaphragm **31** which communicates via passage **32** with the pressure operative in the chamber between the main lid **2'** and the auxiliary lid **4**. The air entering the emulsifying chamber **1***d* comes from a passage **33** having an adjusting screw **34**, the passage **33** passing through heating means **35** heated by the engine exhaust gases. The emulsion in mixing chamber **1***e* is sucked in by the engine through the apertures **9**, flexible pipes **13** and pipes **26** formed with apertures **26***a*. As in the first embodiment, the pipes **26** deliver into passages **28'** formed with apertures **27** and connected to a distributor **29** having an individual adjusting screw **30** for each passage **28'**. Distributor **29** communicates

via passage **28***a* with the chamber between the main throttle member **2'** and the auxiliary throttle member **4**. Consequently, the emulsion issuing through the apertures **26***a* is subject to substantially the same pressure as is operative in the chamber between the members **2'** and **4**, provided of course that the aperture **27** is chosen appropriately. The aperture **27** is disposed very near the inlet valve **17**, but if the aperture **27** is disposed upstream of the members **2** (see FIG. **1**), the same must be disposed very near the inlet valves **17**.

In connection with FIG. **2** there is a disclosure of exhaust heating of the air entering the passage **33**. The heating can of course be provided by any other means, such as the engine cooling water. Also, the passages and pipes **13**, **28'** can be heated by the same means, to enhance the evaporation of gasoline without impairing proper engine filling, since there is no need to heat the main air arriving through the pipes **19** and **18**.

According to another feature (not shown) of the invention, the pipes **13** and/or the passages **28** or **28'** can have closure facilities which are connected to the main throttle member and/or to the negative pressure upstream thereof to stop the arrival of fuel and air through the passages **28'** or **28** when the main throttle member is fully closed and/or when the pressure downstream thereof drops below a critical value. This step helps to reduce the toxic gas content of the exhaust on overun with the main throttle member closed and is very advantageous in this system; it causes no difficulties with pick-up since delivery can restart instantaneously and, the pipes **19** and **18** always being dry, there is no risk of any disturbance. Since the pulsations in the pipes **19**, **18** depend upon the length or distance L between the valves **17** and the place where the pipes **19** join the manifold chamber **25**, any element disposed either in the manifold chamber **25** or further upstream cannot affect the pulsations. Consequently, in the system according to the invention acoustic filters may be provided at the inlet of the manifold **25** to keep the pulsations caused by the repeated suctions of the engine away from the auxiliary throttle member. The same then has less tendency to oscillate and so does not have to have a damper; consequently engine response during acceleration is faster since the auxiliary throttle member can more quickly follow pressure variations in the chamber between the main and auxiliary throttle members.

In FIG. **2**, an auxiliary throttle member is provided only in the relatively narrow passage **3'***a*, fuel dosage being the result solely of the association between the auxiliary throttle member **4** and the needle **5**. Of course, the invention is not limited just to this example, for if circumstances warrant it, an auxiliary throttle member **4** can be provided in the relatively large passage **3***a* and also be connected to the dosing needle **5**, the whole being so adjusted that the main throttle member and the auxiliary throttle member in the passage **3***a* start to open only when the corresponding throttle members in the relatively narrow passage **3'***a* are already fully open or are almost fully open, the system then virtually corresponding to the compound double-barrel carburator used for some engines.

Clearly, therefore, the carburation system according to the invention provides the same advantages as an installation comprising one carburator per engine cylinder, but with much less complication, the means used corresponding substantially to a single-barrel carburator or to a compound double-barrel carburator such as are now often used on "GT" vehicles.

What we claim is:

1. A carburation system for multicylinder internal combustion engines comprising an intake means including an enlarged manifold and a large diameter and a small diameter air inlet to said enlarged manifold, a main throttle member in said small air inlet, an auxiliary throttle member in said small air inlet and upstream of said main throttle member, the space between said throttle members defining a chamber, a second main throttle member in said large air inlet, the position of said auxiliary throttle means in the small air inlet varying in proportion to the rate of air flow through said small air inlet, individual inlet pipes of predetermined length leading from said enlarged manifold to the individual cylinders, inlet valve means for each cylinder, a dosing element for controlling the delivery of fuel to the engine, means actuated by said auxiliary throttle member for controlling said dosing element, passage means for conducting the fuel from said dosing element to each individual inlet pipe adjacent each inlet valve means, and means actuated by the pressure in the chamber between the auxiliary throttle means and the main throttle means of the small air inlet for controlling the position of the second main throttle member in the large air inlet.

2. A carburation system as claimed in claim 2 and further comprising air passage means connecting the chamber with each individual inlet pipe downstream of said main throttle members and including a passage for each inlet pipe and adjustment means for controlling the amount of air passing through each passage.

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