



NEW EUROPEAN PATENT SPECIFICATION

Date of publication of the new patent
specification : **08.06.94 Bulletin 94/23**

Int. Cl.⁵ : **F02M 69/00**

Application number : **83105627.0**

Date of filing : **08.06.83**

Fuel injector body assembly.

Priority : **09.06.82 JP 97715/82**
28.06.82 JP 109994/82

Date of publication of application :
28.12.83 Bulletin 83/52

Publication of the grant of the patent :
04.03.87 Bulletin 87/10

Mention of the opposition decision :
08.06.94 Bulletin 94/23

Designated Contracting States :
CH DE FR GB IT LI

References cited :
DE-A- 3 019 544
DE-A- 3 032 066
DE-A- 3 044 152
FR-A- 2 461 112
GB-A- 2 082 252
US-A- 4 264 961

Proprietor : **HITACHI, LTD.**
6, Kanda Surugadai 4-chome
Chiyoda-ku, Tokyo 100 (JP)

Inventor : **Karino, Kimiji**
2387-136, Oaza Koya
Katsuta-shi (JP)
Inventor : **Kosuge, Tokuo**
2330-11, Sugaya
Nakamachi
Naka-gun Ibaraki-ken (JP)

Representative : **Patentanwälte Beetz - Timpe -**
Siegfried Schmitt-Fumian - Mayr
Steinsdorfstrasse 10
D-80538 München (DE)

EP 0 096 842 B2

Description

This invention relates to fuel injector body assemblies of the type comprising an injector and an air flow meter located upstream of the throttle valve.

In the recent years attention has been directed to fuel injector body assemblies comprising a fuel injector located upstream of the throttle valve for supplying pressurized fuel to an engine in accordance with the amount of air intake and the operating conditions of the engine.

One type of fuel injector body assembly known in the art is disclosed in GB-A-2082252 (corresponding to DE-A-3 032 067).

In the fuel injector body assembly described in the document referred to hereinabove, air intake measuring means comprising an air bypass passageway having a hot wire air flow meter arranged therein are provided as an entity separate from the main air conduit in which an injector is mounted. The air conduit consists of an air chamber part, a venturi chamber and a throttle chamber part which are fixedly connected to each other. The air intake measuring means which is a separate entity is connected to the air conduit from outside.

Some disadvantages are associated with the fuel injector body assembly of the aforesaid prior art construction. The main disadvantages are:

(1) Since the air intake measuring means are located outside the air conduit, the air intake measuring means would be damaged when foreign matters of a large mass would impinge thereon, and

(2) the longer the bypass passageway, the higher is the measurement accuracy of the hot-wire air flow meter (if the length of the bypass passageway is short, pulsations of the air intake would not be damped in the bypass passageway and would be sensed by the hot-wire air flow meter, so that the accuracy of the measurement of the air intake could be improved by increasing the length of the bypass passageway). However, if the length of the bypass air passageway would be increased, also the overall length of the fuel injector body assembly and consequently the size thereof would be increased, thereby raising problems in designing the engine space layout.

Another fuel injector body assembly is disclosed in US-A-4 264 961 which comprises an air conduit comprising a venturi and a throttle chamber, and an air bypass passageway formed in the body of the venturi chamber. The air bypass passageway having an L-shaped cross-sectional form begins in the wide portions of the venturi chamber and ends in the narrowest area thereof, the length of it therefore being relatively short. Therefore, the air intake is not free from pulsations. Furthermore, a cover is provided above the venturi chamber so as to prevent dust and

other foreign matter from entering the air bypass passageway.

DE-A-3 019 544 describes a fuel injector body assembly with an air conduit in which a fuel injector is centrally arranged and which comprises an air chamber in which an air cleaner is provided, a venturi chamber and a throttle valve chamber, whereby the air conduit is designed as one single piece. The air bypass passageway begins upstream the narrowest section of the venturi chamber and ends near this section in the air conduit. It comprises two portions, a first portion which is approximately parallel to the axis of the venturi chamber and a second, end portion perpendicular thereto. The length of the air bypass passageway therefore is rather short which brings up the risk of pulsations.

In DE-A-3 032 066 a fuel injection body assembly is disclosed comprising an air conduit consisting of an air chamber, a venturi chamber and a throttle chamber, and an injector being mounted in the vicinity of the center of the air conduit. In this construction the air inlet conduit is made of different separate members. The air flow meter is arranged directly in the air stream, and no air bypass passageway is provided.

From the DE-A-30 44 152 an air flow rate meter device for measuring the intake air of an internal combustion engine is known. In a passageway by-passing the venturi portion of the manifold a hot wire element is disposed. The inlet and the outlet opening of the bypass passageway are formed as a small annular slot directed in the circumferential direction and disposed at the upper and lower end of the venturi portion, respectively. This slotted openings expand into a narrow continuous annular space defined by the conical outer surface at the upper edge of the venturi portion, wherein lugs at a sleeve fill this annular space and divide that space into several short portions. For this reason the air does not flow sufficiently uniformly in the portion of the bypass passageway comprising the hot wire element.

It is the object of this invention to provide a fuel injector body assembly of compact size and high precision which allows measurement of the air intake without the risk of pulsations and damages due to impinging foreign matters.

The above object is achieved according to claim 1. Advantageous embodiments of the invention are defined in the dependent claims.

The solution in accordance with the invention is based on the principle of increasing the length of the air bypass passageway, while keeping it mounted inside the fuel injector body assembly. This is performed by forming a part of the air bypass passageway as a ring segment shaped portion provided at the joint interface of the air chamber part and the venturi chamber part. Thereby the height of the fuel injector body can remain unchanged. Since the ring shaped portion of the passageway is disposed at the inter-

face of the air chamber part and of the venturi chamber part, it can be made by providing grooves at the joint surfaces thereof, forming an air bypass passageway after connection of these parts. This construction is simple in comparison with usual fuel injector body assemblies where complicated drilling techniques are to be applied, and allows using a die casting method for producing the fuel injector body assembly in accordance with the invention. In the following, the invention will be described with reference to preferred embodiments and the drawings.

Fig. 1 is a plan view of the fuel injector body assembly according to one embodiment of the invention;

Fig. 2 is a sectional view along the line II-II in Fig. 1;

Fig. 3 is a plan view of a fuel injector body assembly according to a second embodiment of the invention;

Fig. 4 is a sectional view along the line IV-IV in Fig. 3;

Fig. 5 is a plan view of the fuel injector body assembly according to a third embodiment of the invention;

Fig. 6 is a sectional view along the line VI-VI in Fig. 5;

Fig. 7 is a plan view of the fuel injector body assembly according to a fourth embodiment of the invention;

Fig. 8 is a sectional view along the line VIII-VIII in Fig. 7;

Fig. 9 is a schematic diagram showing the dependence of the output of a hot wire air flow meter on the air intake, and

Fig. 10 is a sectional view of the fuel injector body assembly according to a fifth embodiment of the invention.

Figs. 1 and 2 show a first embodiment of the fuel injector body assembly according to the invention. As shown, a throttle valve 1 is mounted in a throttle chamber part forming a throttle chamber 2, which constitutes, together with an air chamber part forming an air chamber 4 and a venturi chamber part forming a venturi chamber 5, an air conduit 12. The air chamber part is connected with its upper end to an air cleaner 3. The air conduit 12 is accordingly composed of three members which are fixedly connected. The lower end of the air chamber part is connected to the venturi chamber part through a gasket I_1 for avoiding air leaks, while the venturi chamber part is connected with its upper end to the air chamber part and with its lower end to the throttle chamber part, with an insulator I_2 being arranged between these parts for avoiding heat transfer. The venturi chamber part has a venturi structure 6 provided on its inner peripheral surface which is open in a bell shaped form at the upper portion which is joined to the air chamber part to reduce thereby the diameter of the air conduit 12.

A fuel injector 7 is supported by an injector support 8 located in a central portion of the air conduit 12 and comprises a lower injector support 9 secured to the wall of the venturi chamber 5 and an upper injector support 10 secured to the wall of the air chamber 4. The lower injector support 9 is open at its upstream end for receiving the fuel injector 7 so that its nozzle is directed against the throttle valve 1. The upper injector support 10 is open at its downstream end and connected to the open upstream end of the lower injector support 9 so as to support the injector 7 in hermetically sealed condition in the injector support 8. The upper and lower injector supports 9 and 10 are secured to the walls of the venturi chamber 5 and the air chamber 4 through upper support arms 11A and lower support arms 11B, respectively. Thus the air conduit 12 provides a circular air channel 12A through which air is supplied to the throttle valve 1. The lower injector support 9 has a conical forward end portion to obtain good mixing of air with fuel injected through the nozzle of the fuel injector 7.

The joint interface between the air chamber part and the venturi chamber part has a groove formed therein to provide an air bypass passageway 13 to allow a portion of the air intake to flow in a bypass stream. As can be clearly seen in Fig. 1, the air bypass passageway 13 is in the form of an arc and concentric with the air channel 12A, i.e. following the inner peripheral wall of the air conduit 12. The air bypass passageway 13 has an inlet opening 14 provided in the air chamber 4 and an outlet opening 15 in the venturi structure 6 of the venturi chamber 5. The inlet opening 14 opens peripherally at the inner peripheral surface of the wall of the air chamber 4. Thus the inlet opening 14 is open in the form of an arc which is concentric with the air channel 12A. A hot wire air flow meter 16 is mounted in the vicinity of the outlet opening 15 in the air bypass passageway 13. More specifically, the hot wire air flow meter 16 is located inwardly of the outlet-opening 15 of the air bypass passageway 13 so that it will be cooled by air flowing in the air bypass stream through the air bypass passageway 13. The hot wire air flow meter 16 is electrically connected to an air flow rate measuring circuit 17 mounted on an outer surface of the venturi chamber part.

The wall of the throttle chamber 2 in which the throttle valve 1 is provided with an annular groove 18 which is connected for circulating cooling water of the engine so as to heat the throttle chamber 2 and the throttle valve 1. Thus the fuel air mixture flowing at the outer periphery of the throttle valve 1 can be heated, whereby the atomization of the fuel is improved and icing of the outer periphery of the throttle valve under high humidity conditions is prevented.

In the fuel injector body assembly according to the invention, air drawn by suction into the engine flows through the air channel 12A. A portion of the air

intake is introduced into the air bypass passageway 13 formed at the joint interface between the air chamber part and the venturi chamber part by virtue of the pressure difference existing between the inlet opening 14 and the outlet opening 15 of the air bypass passageway 13, so that the amount of air intake is measured by the hot wire air flow meter 16 while the hot wire itself is cooled. The fuel is pressurized by a fuel pump (not shown) and fed through a fuel pipe 19 located in the lower support arms 11 B into the fuel injector 7 where it is injected in a controlled manner by means of the period of time and the number of times the injector valve is opened.

The air-fuel ratio of the air fuel mixture supplied to the engine is controlled by processing information, such as the amount of air intake, the opening degree of the throttle valve, the pressure of the air intake, the engine speed, the atmospheric pressure, the ambient temperature, the engine temperature, etc., by means of a microcomputer and deciding the amount of fuel injected through the fuel injector 7 and the corresponding injection timing.

The fuel injector body assembly in conformity with the invention offers the following advantages. The arrangement of the air intake measuring means comprising the air bypass passageway 13 and the hot wire air flow meter 16 inside the fuel injector body assembly allows to increase the length of the air bypass passageway 13 without the risk of having the air measuring means damaged by foreign matters impinging thereon and without increasing the length of the fuel injector body assembly which would otherwise be necessary because of the arcuate form of the air bypass passageway 13. This is conducive to increased precision of the air intake measurement and allows a compact construction of the fuel injector body assembly. The composition of the upper portion of the air conduit 12 of the air chamber part and the venturi chamber part makes it possible to mount the fuel injector 7 and to form the air bypass passageway 13 at the same time, which improves the productivity.

Figs. 3 and 4 shows a second embodiment which is distinct from the first embodiment in that the air bypass passageway 13 has an inlet opening 20 of the dynamic pressure type. More specifically, the inlet opening 20 of the air bypass passageway 13 opens toward the upstream side of the air channel whereby a portion of the air intake is directly introduced into the air bypass passageway 13.

In this construction, air in turbulent flow tending to develop at the upper end of the venturi structure 6 is prevented from being introduced into the air bypass passageway 13. Thereby variations in the output of the hot wire air flow meter with regard to the air intake caused by introduction of air in turbulent flow can be avoided, and accordingly, there is no need for an additional correction circuit for the control circuit of the hot wire flow meter 16. Besides of the simpli-

fication of the control circuit this construction allows a relatively stable measurement of the air intake.

A third embodiment will be described with reference to Figs. 5 and 6 in which parts similar to those shown in Figs. 1 to 4 are designated by the same reference numerals and signs. In Figs. 5 and 6, the inlet opening 21 for introducing a portion of the air intake into the air bypass passageway 13 is provided in the side wall of the upper injector support 10. To this end, an inlet portion 22 of the air bypass passageway 13 is formed in the upper support arms 11A of the upper injector support 10 which is in communication with an inner space of the injector support 8; By this arrangement, a portion of the air intake is led through the inlet opening 21 in the side wall of the upper injector support 10 into the air bypass passageway 13 through the inner space of the injector support 8 and the inlet portion 22 of the upper support arm 11A. The inlet opening 21 is of course disposed upstream the outlet opening 15.

In the embodiment of the fuel injector body assembly of the aforesaid construction, the air intake is led through the air conduit 12 to the throttle valve 1. A portion of the air intake is introduced into the air bypass passageway 13 by virtue of the pressure difference between the inlet opening 21 and the outlet opening 15 thereof. After being measured at the hot wire air flow meter 16, the portion of the air intake flowing through the air bypass passageway 13 joins the air stream flowing through the air conduit at the outlet opening 15. In this embodiment, a turbulent flow B of air develops at the upper end of the venturi structure 6 at which the inner diameter of the air conduit shows a sudden change. However, since the inlet opening 21 is provided in the side wall of the injector support 8 located in a central portion of the air conduit, the turbulent flow B of air exerts almost no influence on the inlet opening 21 of the air bypass passageway 13.

A fourth embodiment is shown in Figs. 7 and 8 in which the inner space of the injector support 8 is merely shaped to contain the fuel injector 7, and the inlet portion 22 of the air bypass passageway 13 is formed in the head portion of the upper injector support 10 while an inlet opening 23 is formed in the side wall of the head portion. Thus the fourth embodiment is distinct from the other embodiments in that the inlet opening 23 directly opens in the side wall, and not through the inner space of the injector support 8. The embodiment shown in Figs. 7 and 8 operates in the same manner and achieves the same results as the embodiments shown in Figs. 1 to 6.

When the air cleaner is directly mounted on the air chamber part in the third and fourth embodiments, a problem might occur with regard to the position of the inlet of the air cleaner and the inlet openings 21, 23 of the air bypass passageway 13. More specifically, the output voltage V_{out} of the hot wire air

flow meter 16 changes in dependence of the amount of air intake G_A as shown in Fig. 9 depending on the relative direction of the inlet of the air cleaner and the inlet openings 21, 23 of the air bypass passageway 13. For example, when the inlet opening of the air cleaner is disposed in the same direction as the inlet openings 21, 23 of the air bypass passageway 13, the amount of air flowing through the air bypass passageway 13 increases as shown by the dashed curve in Fig. 9 due to the influence of the dynamic pressure applied to the inlet openings 21, 23, and the output V_{out} increases. However, when the inlet openings 21, 23 of the air bypass passageway 13 are turned by 45 or 90 degrees with respect to the inlet opening of the air cleaner, the amount of air flowing through the air bypass passageway 13 decreases, and the output V_{out} also decreases as shown by the solid curve of the dash-and-dot curve of Fig. 9. Since the pulse duration of fuel injection by the fuel injector 7 may vary depending on the amount of air intake G_A , it is necessary to increase the precision of the air intake calculation and to thereby increase the precision of the control of fuel consumption by avoiding development of variations in the output voltage V_{out} of the hot wire air flow meter 16 is dependence of the amount of the air intake G_A as shown in Fig. 9.

To cope with this situation, a shield wall is provided in a fifth embodiment of the invention shown in a sectional view of Fig. 10, to render the inlet openings 21, 23 of the air bypass passageway 13 impervious to the influences exerted by the dynamic pressure of air drawn through the air cleaner. As shown, a ring shaped shield wall 25 is provided which surrounds the outer periphery of the upper part of the upper injector support 10 at which the inlet opening 24 of the air bypass passageway 13 is formed. The shield wall 25 is juxtaposed against the inlet opening 24 with a predetermined spacing therebetween and surrounds the peripheral surface as a whole including the inlet opening 24. The shield wall 25 extends unitarily from the upper injector support 10, and is provided with respect to the inlet 26 of the air cleaner mounted on the air chamber part in such a manner that it is in face-to-face relation to the inlet opening 24.

In the construction of the fifth embodiment air introduced through the inlet 26 of the air cleaner is led in a circular way from the opening of the ring shaped shield wall 25 at its upper end to the inlet opening 24 of the air bypass passageway 13. By this arrangement, dynamic pressure is prevented from exerting influence on the hot wire air flow meter 16 in the air bypass passageway 13. This eliminates differences which might otherwise exist between the calculated amount of air intake based on the output of the hot wire air flow meter 16 and the real amount of air intake due to dynamic pressure. As a result, the fuel injection can be controlled with higher accuracy to achieve the desired air-fuel ratio under all engine operation

conditions.

5 Claims

1. A fuel injector body assembly comprising
 - (a) an air conduit (12) consisting of the following separate parts:
 - an air chamber part (4) forming an air chamber and being connectable with its upper end to an air cleaner (3),
 - a venturi chamber part (5) forming a venturi chamber and being fixedly connected with its upper end to the lower end of the air chamber part (4) and
 - a throttle chamber part (2) forming a throttle chamber, housing a throttle valve (1) and being fixedly connected to the lower end of the venturi chamber part (5),
 - (b) a fuel injector (7) supported in the vicinity of the center of the air conduit (12) upstream of the throttle valve (1) by support arms (11A, 11B)
 - (c) an air bypass passageway (13) its inlet opening (14, 20, 21, 23, 24) being provided at the upstream side of the venturi chamber (5) and its outlet opening (15) being provided in the venturi chamber (5), and comprising an enclosed ring segment shaped portion formed at the joint interface of the air chamber part and the venturi chamber part and being connected at its one end to said inlet opening and at its other end to a portion of said air bypass passageway (13) in which an air flow meter (16) is located in the vicinity of the outlet opening (15).
2. A fuel injector body assembly according to claim 1, wherein the air conduit (12) has a circular cross section in a plane perpendicular to the air flow direction, and the ring segment shaped portion of the air bypass passageway (13) is concentric to the air conduit (12).
3. A fuel injector body assembly according to claim 1 or 2, wherein the inlet opening (14) of the air bypass passageway (13) is provided in the inner peripheral wall of the air conduit (12) (Fig. 2).
4. A fuel injector body assembly according to claim 1 or 2, wherein the inlet opening (20) of the air bypass passageway (13) is directed against the direction of the air flow through the air conduit (12) (Fig. 4).
5. A fuel injector body assembly according to one of claims 1 to 4, wherein the ring segment shaped

portion of the air bypass passageway (13) is formed by grooves provided in the joint interface of the air chamber part and the venturi chamber part.

6. A fuel injector body assembly according to one of claims 1 to 5, wherein a gasket (I_1) for avoiding air leaks is provided at the joint interface between the air chamber part and the venturi chamber part. 10
7. A fuel injector body assembly according to one of claims 1 to 6, wherein an air flow rate measuring circuit (17) is mounted on an outer wall surface of the venturi chamber part. 15
8. A fuel injector body assembly according to one of claims 1 to 7, wherein the fuel injector (7) is held between an upper injector support (10) located on upper support arms (11A) secured to the wall of the air chamber part and a lower injector support (9) located on lower support arms (11B) secured to the wall of the venturi chamber part. 20
9. A fuel injector body assembly according to claim 8, wherein a fuel pipe (19) is provided in said lower support arms (11B) for feeding fuel into the fuel injector. 25
10. A fuel injector body assembly according to claim 8 or 9, wherein the inlet opening (23) of the air bypass passageway opens in the upper injector support (10) through an inlet portion (22) formed in the upper support arms (11A) (Fig. 5, 6). 30
11. A fuel injector body assembly according to claim 10, wherein the inlet opening (23) is disposed at a right angle to the air flow direction flowing through the air conduit (12). 35
12. A fuel injector body assembly according to claim 11, wherein the upper injector support (11A), is provided with a ring shaped shield wall (25) located at a right angle to the axis of the inlet opening (24). 40
13. A fuel injector body assembly according to one of claims 1 to 12, wherein an insulator (I_2) is provided between the lower end of the venturi chamber part and the upper end of the throttle chamber part for avoiding heat transfer to the venturi chamber part. 45
14. A fuel injector body according to one of claims 1 to 13, wherein a groove (18) is formed in the wall of the throttle chamber part for cooling water circulation. 50

Patentansprüche

1. Kraftstoffeinspritzdüsen-Aggregat, umfassend
 - (a) eine Luftleitung (12), die aus folgenden Einzelteilen besteht:
 - einem Luftkammerteil (4), der eine Luftkammer bildet und mit seinem Oberende an einen Luftfilter anschließbar ist,
 - einem Lufttrichterkammerteil (5), der eine Lufttrichterkammer bildet und mit seinem Oberende fest mit dem Unterende des Luftkammerteils (4) verbunden ist, und
 - einem Drosselklappenkammerteil (2), der eine Drosselklappenkammer bildet, eine Drosselklappe (1) aufnimmt und mit dem Unterende des Lufttrichter-kammerteils (5) fest verbunden ist,
 - (b) eine Kraftstoffeinspritzdüse (7), die nahe der Mitte der Luftleitung (12) stromauf der Drosselklappe (1) durch Tragarme (11A, 11B) festgelegt ist,
 - (c) einen Luftbypaßkanal (13), dessen Einlaßöffnung (14, 20, 21, 23, 24) an der Stromaufseite der Lufttrichterkammer (5) und dessen Auslaßöffnung (15) in der Lufttrichterkammer (5) vorgesehen sind, und der einen ringsegmentförmigen Abschnitt enthält, der an der gemeinsamen Grenzfläche zwischen dem Luftkammerteil und dem Lufttrichter-kammerteil ausgebildet und mit seinem einen Ende mit der Einlaßöffnung sowie mit seinem anderen Ende mit einem Teil des Luftbypaßkanals (13) verbunden ist, in welchem ein Luftstrommesser (16) in der Nähe der Auslaßöffnung (15) angeordnet ist.
2. Kraftstoffeinspritzdüsen-Aggregat nach Anspruch 1, wobei die Luftleitung (12) in einer zur Luftströmungsrichtung senkrechten Ebene Kreisquerschnitt hat und wobei der ringsegmentförmige Abschnitt des Luftbypasskanals (13) mit der Luftleitung (12) konzentrisch ist.
3. Kraftstoffeinspritzdüsen-Aggregat nach Anspruch 1 oder 2, wobei die Eintrittsöffnung (14) des Luftbypasskanals (13) in der Innenumfangswand der Luftleitung (12) ausgebildet ist (Fig. 2).
4. Kraftstoffeinspritzdüsen-Aggregat nach Anspruch 1 oder 2, wobei die Eintrittsöffnung (20) des Luftbypasskanals (13) der Richtung des Luftstroms durch die Luftleitung (12) entgegen-gerichtet ist (Fig. 4).
5. Kraftstoffeinspritzdüsen-Aggregat nach einem der Ansprüche 1-4, wobei der ringsegmentförmige Abschnitt des Luftbypasskanals (13) durch

Nuten gebildet ist, die in der gemeinsamen Grenzfläche von Luftkammerteil und Lufttrichter-kammerteil ausgebildet sind.

6. Kraftstoffeinspritzdüsen-Aggregat nach einem der Ansprüche 1-5, wobei eine den Luftaustritt verhindernde Dichtung (I_1) an der gemeinsamen Grenzfläche von Luftkammerteil und Lufttrichter-kammerteil vorgesehen ist.

7. Kraftstoffeinspritzdüsen-Aggregat nach einem der Ansprüche 1-6, wobei an einer Außenwandfläche des Lufttrichter-kammerteils ein Luftdurchsatz-Meßkreis (17) angeordnet ist.

8. Kraftstoffeinspritzdüsen-Aggregat nach einem der Ansprüche 1-7, wobei die Kraftstoffeinspritzdüse (7) zwischen einer oberen Düsenhalterung (10), die auf an der Wand des Luftkammerteils befestigten oberen Haltearmen (11A) positioniert ist, und einer unteren Düsenhalterung (9), die auf an der Wand des Lufttrichter-kammerteils befestigten unteren Haltearmen (11B) positioniert ist, gehalten ist.

9. Kraftstoffeinspritzdüsen-Aggregat nach Anspruch 8, wobei eine Kraftstoffleitung (19) in den unteren Haltearmen (11B) zur Kraftstoffzufuhr in die Kraftstoffeinspritzdüse vorgesehen ist.

10. Kraftstoffeinspritzdüsen-Aggregat nach Anspruch 8 oder 9, wobei die Eintrittsöffnung (23) des Luftbypasskanals sich in die obere Düsenhalterung (10) durch einen in den oberen Haltearmen (11A) ausgebildeten Eintrittsabschnitt (22) öffnet (Fig. 5, 6).

11. Kraftstoffeinspritzdüsen-Aggregat nach Anspruch 10, wobei die Eintrittsöffnung (23) rechtwinklig zur Strömungsrichtung der die Luftleitung (12) durchströmenden Luft angeordnet ist.

12. Kraftstoffeinspritzdüsen-Aggregat nach Anspruch 11, wobei die obere Düsenhalterung (11A) mit einer ringförmigen Abschirmwand (25) versehen ist, die rechtwinklig zur Achse der Eintrittsöffnung (24) angeordnet ist.

13. Kraftstoffeinspritzdüsen-Aggregat nach einem der Ansprüche 1-12, wobei zwischen dem Unterende des Lufttrichter-kammerteils und dem Oberende des Drosselklappen-kammerteils ein Isolierkörper (I_2) zur Vermeidung einer Wärmeübertragung zum Lufttrichter-kammerteil vorgesehen ist.

14. Kraftstoffeinspritzdüsen-Aggregat nach einem der Ansprüche 1-13, wobei in der Wand des Dros-

selklappen-kammerteils eine Nut (18) für den Kühlwasserumlauf ausgebildet ist.

5

Revendications

1. Ensemble formant corps d'injecteur de carburant comprenant :

10

(a) un conduit d'air (12) constitué par les pièces séparées suivantes :

15

- une partie (4) formant chambre à air et pouvant être raccordée par son extrémité supérieure à un filtre à air (3),

- une partie (5) qui forme une chambre à venturi et est raccordée à demeure, par son extrémité supérieure, à l'extrémité inférieure de la partie (4) formant chambre à air, et

20

- une partie (2) formant chambre à papillon des gaz logeant un papillon des gaz (1) et raccordée à demeure à l'extrémité inférieure de la partie (5) formant chambre à venturi,

25

(b) un injecteur de carburant (7) supporté au voisinage du centre du conduit d'air (12), en amont du papillon des gaz (1), par des bras de support (11A, 11B),

30

(c) un passage de dérivation d'air (13), dont l'ouverture d'admission (14, 20, 21, 23, 24) est prévue sur le côté amont de la chambre à venturi (5) et dont l'ouverture de sortie (15) est prévue dans la chambre à venturi (5), et comprenant une partie renfermée en forme de segment annulaire, formée au niveau d'une interface de jonction de la partie formant chambre à air et de la partie formant chambre à venturi et raccordée, par l'une de ses extrémités, à ladite ouverture d'admission et, par son autre extrémité, à une partie dudit passage de dérivation d'air (13), dans lequel un débitmètre d'air (16) est disposé au voisinage de l'ouverture de sortie (15).

35

40

45

50

55

2. Ensemble formant corps d'injecteur de carburant selon la revendication 1, dans lequel le conduit d'air (12) possède une section transversale circulaire dans un plan perpendiculaire à la direction d'écoulement de l'air, et la partie en forme de segment annulaire du passage de dérivation d'air (13) est concentrique au conduit d'air (12).

3. Ensemble formant corps d'injecteur de carburant selon la revendication 1 ou 2, dans lequel l'ouverture d'admission (14) du passage de dérivation d'air (13) est ménagée dans la paroi périphérique intérieure du conduit d'air (12) (figure 2).

4. Ensemble formant corps d'injecteur de carburant

- selon 1 ou 2, dans lequel l'ouverture d'admission (20) du passage de dérivation d'air (13) est dirigée à l'encontre de la direction de l'écoulement de l'air à travers le conduit d'air (12) (figure 4). 5
5. Ensemble formant corps d'injecteur de carburant selon l'une des revendications 1 à 4, dans lequel la partie en forme de segment annulaire du passage de dérivation d'air (13) est formée par des gorges ménagées dans l'interface de jonction entre la partie formant chambre à air et la partie formant chambre à venturi. 10
6. Ensemble formant corps d'injecteur de carburant selon l'une quelconque des revendications 1 à 5, dans lequel une garniture d'étanchéité (I_1) servant à éviter des fuites d'air est prévue au niveau de l'interface de jonction entre la partie formant chambre à air et la partie formant chambre à venturi. 15 20
7. Ensemble formant corps d'injecteur de carburant selon l'une quelconque des revendications 1 à 6, dans lequel un circuit (17) de mesure du débit d'air est monté sur une surface extérieure d'une paroi de la partie formant chambre à venturi. 25
8. Ensemble formant corps d'injecteur de carburant selon l'une des revendications 1 à 7, dans lequel l'injecteur de carburant (7) est maintenu entre un support supérieur (10) de l'injecteur, situé sur des bras supérieurs de support (11A) fixés à la paroi de la partie formant chambre à air et un support inférieur (9) de l'injecteur, situé sur des bras de support inférieurs (11B) fixés à la paroi de la partie formant chambre à venturi. 30 35
9. Ensemble formant corps d'injecteur de carburant selon la revendication 8, dans lequel une canalisation de carburant (19) est prévue dans lesdits bras inférieurs de support (11B) pour l'envoi du carburant dans l'injecteur de carburant. 40
10. Ensemble formant corps d'injecteur de carburant selon la revendication 8 ou 9, dans lequel l'ouverture d'admission (23) du passage de dérivation d'air débouche, dans le support supérieur (10) de l'injecteur, dans une partie d'admission (22) ménagée dans les bras supérieurs de support (11A) (figures 5, 6). 45 50
11. Ensemble formant corps d'injecteur de carburant selon la revendication 10, dans lequel l'ouverture d'admission (23) est disposée perpendiculairement à la direction de l'écoulement de l'air traversant le conduit d'air (12). 55
12. Ensemble formant corps d'injecteur de carburant
- selon la revendication 11, dans lequel le support supérieur (11A) de l'injecteur est muni d'une paroi de protection (25) de forme annulaire, perpendiculaire à l'axe de l'ouverture d'admission (24).
13. Ensemble formant corps d'injecteur de carburant selon l'une quelconque des revendications 1 à 12, dans lequel un isolant (I_2) est prévu entre l'extrémité inférieure de la partie formant chambre à venturi et l'extrémité supérieure de la partie formant chambre à papillon afin d'éviter un transfert thermique à la partie formant chambre à venturi.
14. Corps d'injecteur de carburant selon l'une quelconque des revendications 1 à 13, dans lequel une gorge (18) est ménagée dans la paroi de la partie formant chambre à papillon pour la circulation de l'eau de refroidissement.

FIG. 1

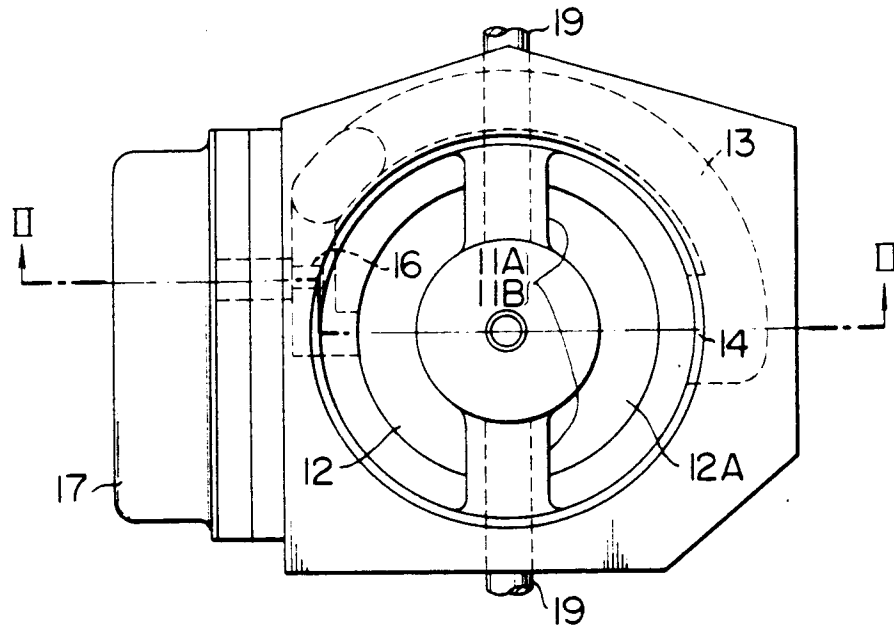


FIG. 2

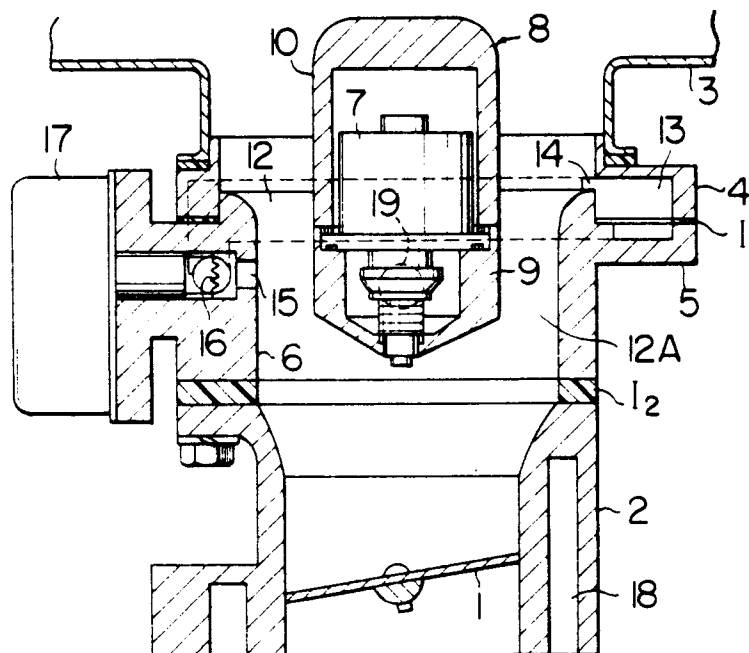


FIG. 3

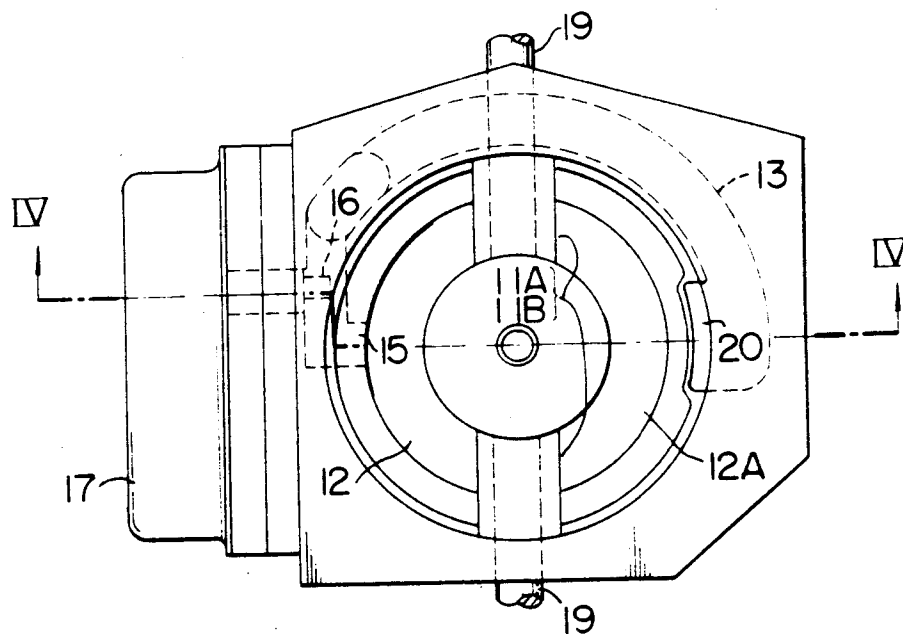


FIG. 4

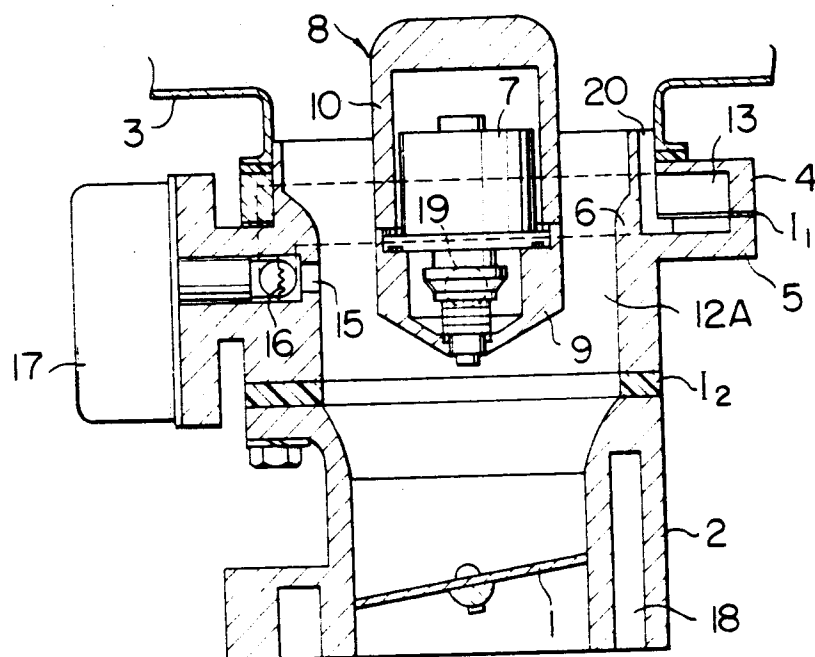


FIG. 5

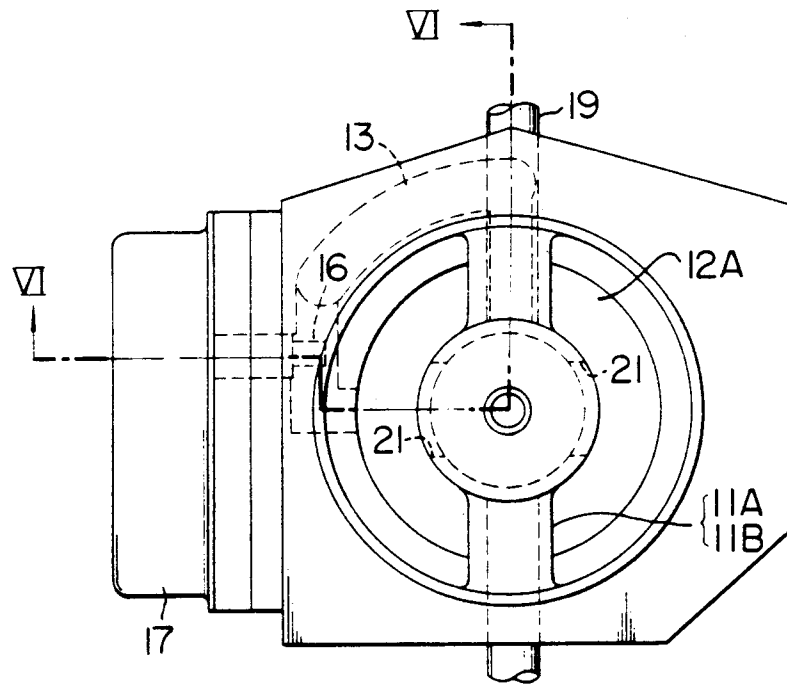


FIG. 6

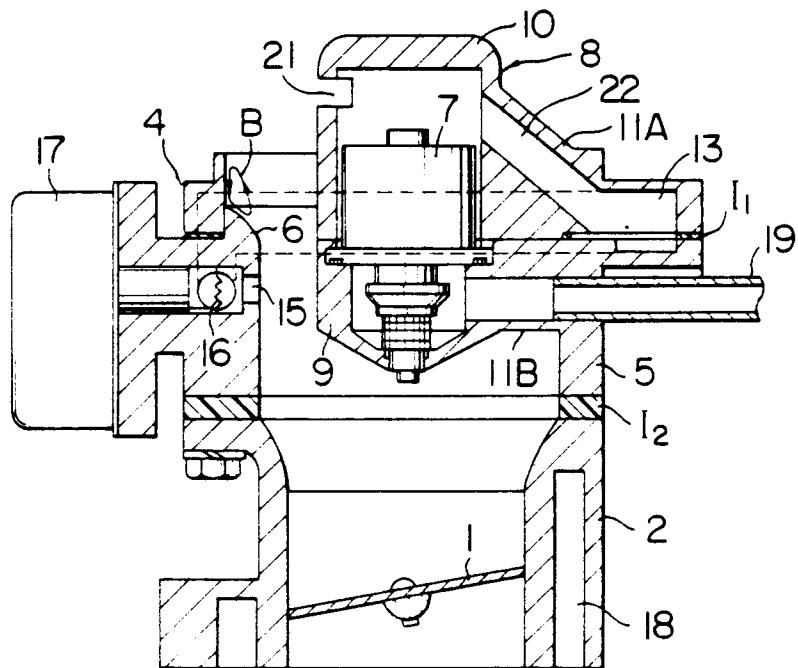


FIG. 7

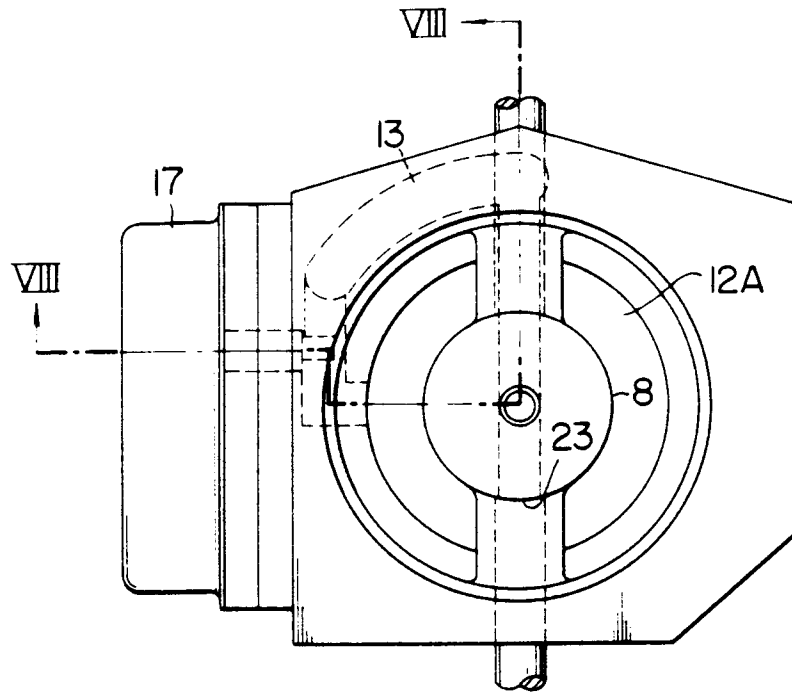


FIG. 8

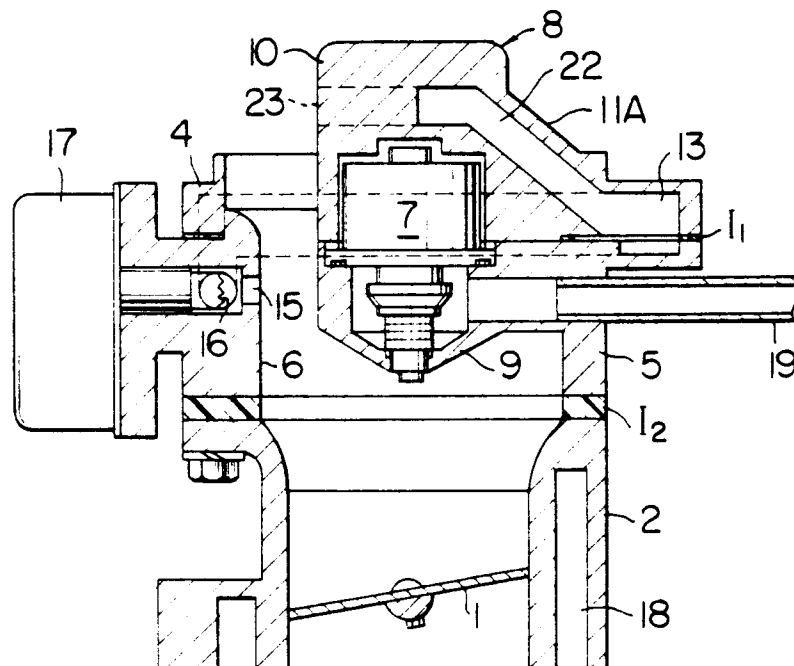


FIG. 9

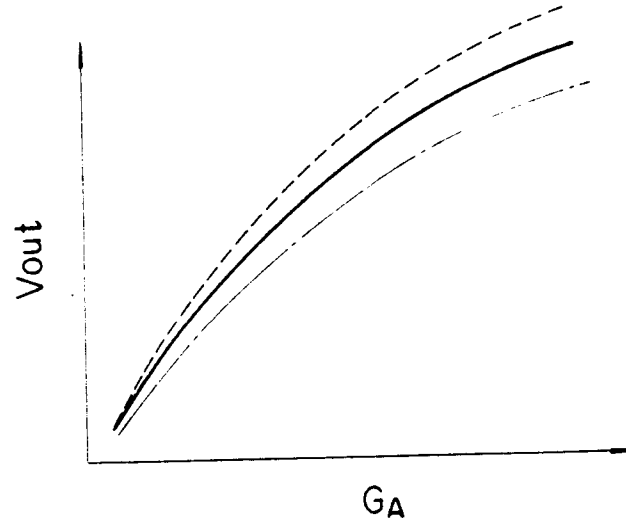


FIG. 10

