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(54) Carburettor for an endothermic engine

(57) Carburettor (1) for an endothermic engine (1a), having a float chamber (3) capable of receiving fuel (2) from an inlet (5) of the carburettor (1) and of feeding fuel (2) to an outlet (6) of the carburettor (1), the inlet (5) being engageable by a first pin (20) which is integral with a floating body (18) contained in the float chamber (3) and the outlet (6) being engageable by a second pin (24) which can be actuated by means of a first device (13) with a cam and rocker, a second device (14) with a cam and rocker being mobile in phase with said first device (13) with a cam and rocker to move a second body (45) inside the float chamber (3) to obtain determinate variations in the level of fuel (2) inside the float chamber (3).

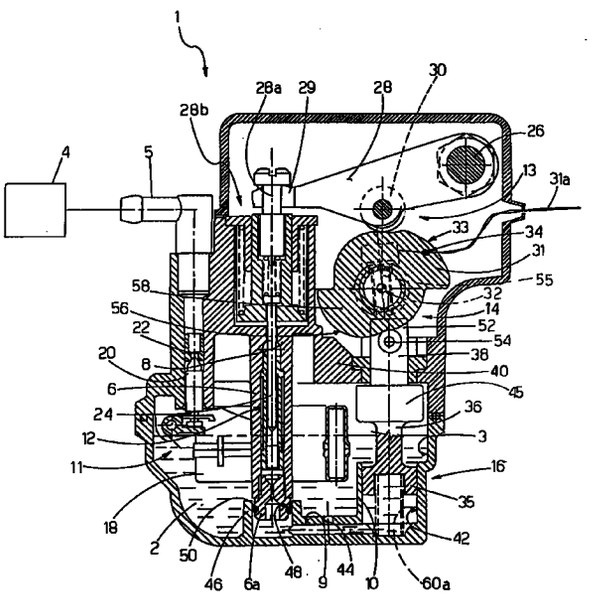

Fig.1

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Description

The present invention relates to a carburettor for an endothermic engine.

It is known that an endothermic engine functions if fed with a mixture composed of air drawn from the atmosphere outside the engine and of fuel, in turn drawn from a carburettor fed by a tank. The two components of the mixture are mixed with one another inside an induction pipe shaped like a Venturi tube which is arranged downstream of the engine and ends with a valve for regulation of the flow of air having a throttle which can be actuated by means of the accelerator. Inside the induction pipe, a pressure prevails which is all the lower, the more the throttle keeps the induction pipe itself open. Therefore, the drawing of fuel from the carburettor and the number of revolutions of the engine are all the greater, the more the induction pipe is open. Furthermore, the head between the fuel contained inside the carburettor and the induction pipe is all the smaller, the more the depression inside the induction pipe is accentuated, and therefore the more the throttle valve is open.

To vary the functioning conditions of the engine rapidly, some carburettors are provided with a supercharging pump which is activated to reduce the head mentioned for the purpose of providing, until the moment when the new operating conditions prevail, a fuel flow leaving the carburettor of a greater value than that otherwise provided for the one pressure difference.

The aim of the present invention is to produce a carburettor for an endothermic engine which makes it possible to vary rapidly the functioning conditions of the engine without the need to resort to the use of an additional pump and, therefore, is particularly simple and economical.

According to the present invention, a carburettor for an endothermic engine is produced, comprising a float chamber arranged at the bottom and capable of containing fuel, an inlet for feeding fuel to said float chamber, and an outlet for feeding, by induction, fuel to outside the carburettor, said inlet and outlet being respectively engaged by a first and by a second essentially vertical pin, said first pin being integral with a vertically mobile body floating in the fuel contained in the float chamber, first actuating means arranged above said float chamber for moving axially said second pin, characterized in that it comprises a second body shaped in a determinate manner, and guide means constraining said second body to move vertically inside said float chamber, and second actuating means which are mobile in phase with said first actuating means being provided to control the movement of said second body inside the float chamber so as to cause determinate variations of the free surface of the fuel contained by the float chamber.

The invention will now be described with reference to the attached drawings which illustrate some non-limiting exemplary embodiments thereof and in which:

Figure 1 is a cross-section of a first preferred embodiment of a carburettor according to the present invention;

Figure 2 illustrates diagrammatically a system in which the carburettor in Figure 1 is normally inserted;

Figure 3 is a view in lateral elevation and on an enlarged scale of a detail extracted from Figure 2;

Figures 4 and 5 are views in lateral elevation and on an enlarged scale of some embodiments of the detail in Figure 3, and

Figure 6 illustrates, on an enlarged scale, a detail of a second preferred embodiment of a carburettor according to the present invention.

In Figure 1, 1 indicates as a whole a carburettor for an engine 1a (Figure 2) with controlled ignition which can be fed with liquid fuel 2.

The carburettor 1 comprises a float chamber 3 arranged at the bottom and capable of receiving the fuel 2 from a tank 4 through an essentially cylindrical inlet pipe 5 which is essentially vertical and is arranged on the side of the tank 4 in Figure 1. The carburettor 1 is also provided with an outlet pipe 6 which receives fuel 2 from the float chamber 3 and feeds it to an essentially horizontal outlet mouth 8 which is arranged above, and at a determinate distance from the bottom of, the float chamber 3. The carburettor 1 also comprises another pipe 9 for the fuel 2 made in the bottom of the float chamber 3 for connecting hydraulically the pipe 6 to a cylinder 10 which is open upwards and extends vertically from the bottom of the float chamber 3.

The carburettor 1 also comprises a group 11 for controlling the opening of the pipe 5 for dosing the flow of fuel 2 inside the float chamber 3 in a manner inversely proportional to the level of the fuel 2 contained inside the float chamber 3 itself, and a group 12 for control of the flow of fuel 2 leaving the carburettor 1 through the pipe 6.

The carburettor 1 also comprises two actuating devices 13 and 14 with cam and rocker arranged above the float chamber 3, and a group 16 for pumping of the volumetric type which is capable of pumping fuel 2 from the float chamber 3 to the pipe 6 through the pipe 9. In particular, the device 13 and the device 14 can be actuated in phase, and the device 14 is capable of actuating the pumping group 16.

The group 11 comprises an internally hollow toroidal body 18 which is coupled externally to the pipe 6 in a freely sliding and angularly fixed manner and bears, in the region of an outlet mouth of the pipe 5 facing downwards, a cylindrical pin 20 having a cross-section, the diameter of which approximates to the nearest greater whole number the internal dimension of the pipe 5, and ends towards the top with a conical end portion 22 in such a manner that, at a determinate position of the level of the fuel 2 inside the float chamber 3, the inlet mouth of the pipe 5 has a passage port of determinate dimensions. In particular, an increase in the port for

passage of the fuel 2 corresponds to the falling of the level of fuel 2 inside the float chamber 3 so as to obtain rapidly the reestablishment of a determinate level of fuel 2 inside the float chamber 3.

In the same manner, the control group 12 comprises a pin 24, the lateral surface of which has a slight conicity in such a manner that a passage port for the fuel 2 from the float chamber 3 of determinate width corresponds to a determinate axial position inside the pipe 6, and, in any case, the port falls with the lowering of the pin 24 itself.

The actuating device 13 comprises a pivot 26 which is orthogonal to the longitudinal axis of the pin 24 and on which a rocker 28 is fulcrumed. The rocker 28 is connected to the pin 24 by means of the interposition of a rod 28a which is coaxial with the pin 24 and belongs to an elastic device 28b which is capable of rotating the rocker 28 in the anti-clockwise direction (Figure 1) to bring the pin 24 back into a respective rest position, to which a minimum flow of fuel 2 through the pipe 6 corresponds. Furthermore, the rocker 28 is provided, in an essentially intermediate position between the pivot 26 and a portion 29, with a tappet roller 30 parallel to the pivot 26. The rocker 28 is mobile with an oscillatory motion under the thrust of a cylindrical body 31 which is arranged below the rocker 28 and fulcrumed in the region of a spindle 32 parallel to the pivot 26 and is rotatable about the spindle 32 through an angle which approximates to the nearest smaller whole number 180°. The body 31 is delimited laterally by a peripheral surface orthogonal to the pin 24, one lateral portion 33 of which (facing upwards in Figure 1) is shaped so as to define a cam 34, about which more will be said below. The body 31 is rotatable about the spindle 32 under the thrust of a metal wire 31a and against the action of a known return spring (not illustrated). Of course the device 13 also comprises, in addition to the pivot 26, the rocker 28, the cam 34 and the roller 30.

With reference to Figure 2, it is appropriate to note that the wire 31a is actuated together with a known pull rod (not illustrated) which actuates the throttle valve 32a of the carburettor 1 itself to increase the flow of air to a contracted section 32b of an induction pipe 32c of the engine 1a.

The pumping group 16 has a piston 35 which engages the sealed cylinder 10 and constitutes the lower part of a vertical rod 36 which passes, with its upper end 38, through a separating wall 40 capable of isolating an upper zone of the carburettor 1 containing the actuating devices 13 and 14 from a lower zone of the carburettor 1 itself. Therefore the cylinder 10 and the piston 35 define a guide device which keeps the rod 36 constantly vertical.

It is appropriate to note that the pumping group 16 also comprises a chamber 42 defined by a lower face of the piston 35 and by the lateral walls and lower wall of the cylinder 10, and that the chamber 42 is fed by the fuel 2 during the travel upwards of the piston 35 through an induction hole 44 made in the pipe 9 in essentially intermediate position between the cylinder 10 and the pipe 6. Furthermore, the rod 36 is provided, below the wall 40 and in a raised position in relation to an upper edge of the float chamber 3, with a cylindrical body 45 which is more clearly visible in Figure 3 having a longitudinal axis and two faces essentially transverse to the longitudinal axis itself. The body 45 is integral with the rod 36, is therefore guided vertically by the cylinder 10 and by the piston 35 and its own function will be clarified further below.

It is appropriate to note also that the pipe 9 ends on the side of the pipe 6 with a cylindrical portion 46 facing and open upwards which surrounds an inlet mouth 6a of the pipe 6 itself isolating an annular portion 48 which, in the case in question, is engaged by an annular "O ring" type seal 50, by means of which the pipes 6 and 9 are interconnected in a sealed manner.

The rod 36 ends above the wall 40 with an end piece 52, and the device 14 comprises a tappet roller 54 orthogonal to the rod 36 and supported by the end piece 52, and a rocker 55 integral with the cylindrical body 31 which, therefore, is mobile with an oscillatory motion about the spindle 32. The roller 54 is freely rotatable about its own longitudinal axis and is tangent at the bottom to the body 31 in the region of a respective lateral portion 56 opposite the portion 33 and shaped so as to define a cam 58.

The use of the carburettor will now be described with reference to Figures 1 and 2 and starting from a functioning state in which the engine 1a functions in operating conditions and brings about a depression of a determinate value between the contracted section 32b and the inside of the carburettor 1.

At this point, in a case in which the user of the engine 1a wishes to increase the number of revolutions, he acts on the accelerator to rotate a rotor 60 known as a "throttle" and, in this manner, open to a greater extent the induction pipe 32c. At the same time, the wire 31a is pulled so as to rotate the body 31 in the anti-clockwise direction in Figure 1 as far as a determinate angular position. The body 31, and in particular the cam 34, sets the roller 30 in clockwise rotation about the pivot 26, as a result of which the pin 24 is raised by the rocker 28 to open to a greater extent the pipe 6. Furthermore, the rod 36 is pushed downwards by the cam 58 against the thrust of a spring 60a which is contained inside the body 10 between the bottom of the float chamber 3 and the face of the piston 35 facing downwards. Consequently, the rod 36 moves downwards causing the body 45 to be submerged in the fuel 2 contained in the float chamber 3. Therefore, the head of the fuel 2 in relation to the mouth 8 is reduced very rapidly by virtue of the principle of communicating vessels and by the thrust which the fuel 2 contained inside the chamber 42 and inside the pipe 9 receives from the piston 35.

Keeping the body 31 and the rod 36 in the respective final positions occupied has as a consequence the establishment of new operating conditions which depend on the greater requirement for fuel 2 caused by

the lowering of the body 18 and, of course, by the descent of the pin 20, and by a greater opening of the pipe 5.

In a case in which the user of the engine 1a wishes to reduce the number of revolutions, he acts on the accelerator to bring it into the preceding position. This operation causes the partial closing of the induction pipe 32c but, more importantly, brings the body 45 back up, and the rocker 28, rotating in the clockwise direction, tends to close to a greater extent the pipe 6. Therefore the piston 35 is raised, and the flow of fuel 2 towards the mouth 8 is reduced with great rapidity. In fact, in this case, the device 14 takes care of raising the rod 36, as a result of which the body 45 and the piston 35 return to the respective positions occupied previously.

By virtue of the principle of communicating vessels and the induction of the fuel 2 contained in the pipe 6 and in the float chamber 3 through the hole 44 by the piston 35, the flow through the mouth 8 falls considerably and in truly rapid times, and this is by virtue of the use of instruments which have no parts in rapid movement and therefore with low breakage risk. From what has been described above, it is easy to deduce that in the deceleration phase the quantity of fuel 2 which is introduced into the pipe 32c is particularly reduced, as a result of which the consumption of fuel 2 is limited to the quantity sufficient for keeping the engine 1a moving, and the emissions of waste gases, notoriously pollutant, also fall decisively with the consumption.

Of course the shape of the outline of the cams 34 and 58 conditions the law with which the rod 36 moves along the vertical and the law of rotation of the rocker 28. Therefore, modification of the external surface of the body 31 makes it possible to vary the response in acceleration and deceleration of the engine 1a.

The same thing can be obtained much more simply by varying the lateral outline of the body 45, for example by making it frustoconical as in Figures 4 and 5. It is clear that the two faces of the body 45 have a different extension; in particular, in Figure 4, the face of greater extension is arranged below the remaining face to bring about a reduction of the head of the fuel 2 of gradual nature. On the other hand, the body 45 in Figure 5, which is inverted in relation to the body 45 in Figure 4, brings about a very sudden reduction of the head with a successive gradual reaching of the new operating conditions. Of course the combination of the two shapes of the body 45 in Figures 4 and 5 can give rise to particularly advantageous laws of variation of the head, according to the areas of use of the engine 1a.

It is clear, finally, that the carburettor 1 described and illustrated here can be subjected to modifications and variations without nevertheless leaving the protective scope of the present invention.

For example, to simplify the construction and assembly of the carburettor 1, the hole 42 and the seal 50 could be omitted so as to leave to the annular portion 48 the function of communication between the pipe 9 and the float chamber 3, carried out originally by the hole 44. Or, in a case in which it is desired to reduce the energy quota necessary to feed the fuel 2 to the chamber 42, the seal 50 could be omitted leaving the hole 44.

For the purpose of simplifying as much as possible the carburettor 1, it is possible to modify the carburettor 1 itself according to what is illustrated in Figure 6 which relates to a carburettor 61, the component parts of which are indicated, where possible, with the same reference numbers which mark the corresponding parts of the carburettor 1 itself.

In particular, the carburettor 61 differs from the carburettor 1 in the fact that it has no connection pipe 9 between the cylinder 10 and the pipe 6, therefore the cylinder 10 of the carburettor 61 is closed at the bottom and communicates with the float chamber 3 by means of a pipe 62 made inside the piston 35.

Claims

1. Carburettor (1) (61) for an endothermic engine (1a), comprising a float chamber (3) arranged at the bottom and capable of containing fuel (2), an inlet (5) for feeding fuel (2) to said float chamber (3), and an outlet (6) for feeding, by induction, fuel (2) to outside the carburettor (1) (61), said inlet (5) and outlet (6) being respectively engaged by a first and by a second essentially vertical pin (20, 24), said first pin (20) being integral with a vertically mobile body (18) floating in the fuel (2) contained in the float chamber (3), first actuating means (13) arranged above said float chamber (3) for moving axially said second pin (24), characterized in that it comprises a second body (45) shaped in a determinate manner, and guide means (10, 35) constraining said second body (45) to move vertically inside said float chamber (3), and second actuating means (14) which are mobile in phase with said first actuating means (13) being provided to control the movement of said second body (45) inside the float chamber (3) so as to cause determinate variations of the level of the fuel (2) contained by the float chamber (3).

2. Carburettor according to Claim 1, characterized in that said second body (45) is partially contained inside the float chamber (3).

3. Carburettor according to Claim 1 or 2, characterized in that said second body (45) has a vertical axis and two faces which delimit it transversely.

4. Carburettor according to Claim 3, characterized in that said second body (45) has an essentially cylindrical shape.

5. Carburettor according to Claim 3, characterized in that said second body (45) has an essentially conical shape, said two faces having different extensions.

6. Carburettor according to Claim 5, characterized in that one of said two faces having a greater extension is arranged at the bottom.

7. Carburettor according to Claim 6, characterized in that one of said two faces having a greater extension is arranged at the top.

8. Carburettor according to Claim 8, characterized in that it comprises a connection pipe (9) arranged between said float chamber (3) and said outlet (6) and a pumping group (16) for pumping fuel (2) through said connection pipe (9) towards said outlet (6) of the carburettor (1).

9. Carburettor according to any one of the preceding claims, characterized in that said guide means (10, 35) comprise a tubular body (10) which is integral with the float chamber (3) and connected hydraulically to said connection pipe (9) on the side opposite said outlet (6), a hydraulic piston (35) being accommodated inside said tubular body (10) and mobile axially under the thrust of said second actuating means (14).

10. Carburettor according to Claim 9, characterized in that said pumping group (16) is contained inside the float chamber (3).

11. Carburettor according to Claim 9 or 10, characterized in that said pumping group (16) is a pumping group of volumetric type.

12. Carburettor according to Claim 11, characterized in that said pumping group (16) comprises said tubular body (10) which is integral with the float chamber (3) and connected in a sealed manner to said connection pipe (9) on the side opposite said outlet pipe (6), said hydraulic piston (35) being accommodated inside said tubular body (10) and mobile axially under the thrust of said second actuating means (14) and against the thrust of a spring (60a).

13. Carburettor according to Claim 12, characterized in that said spring (60a) is contained inside said tubular body (10).

14. Carburettor according to Claim 12, characterized in that said first and second actuating means (13, 14) are devices with a cam and rocker.

15. Carburettor according to any one of the preceding claims, characterized in that it comprises a cylindrical body (31) having a longitudinal peripheral surface orthogonal to said second pin (24), said cylindrical body (31) being freely rotatable through an angle approximating to the nearest smaller whole number 180° about its own longitudinal spindle (32), said peripheral surface having a first and a second portion (33, 56) of angular extensions essentially identical with one another, each of which is shaped in a determinate manner to define a first and a second cam (34, 58).

16. Carburettor according to Claim 15, characterized in that said second actuating means (14) comprise a first rocker (28) which is mobile with an oscillatory motion about a respective axis parallel to, and arranged above, said cylindrical body (31), a rod (36) coaxial with said piston (35) and connected thereto, and a tappet roller (54) parallel to said longitudinal axis (32) and fulcrumed on said rod (36) in a position underneath said cylindrical body (31) so as to be tangent to said second cam (58).

17. Carburettor according to any one of the preceding claims, characterized in that said first actuating means (13) comprise a pivot (26) orthogonal to said second pin (24) and a second rocker (28) which is fulcrumed on said pivot (26) and mobile with an oscillatory motion about said pivot (26), a further rod (28a) coaxial with said second pin (24) and connected thereto, and a further tappet roller (30) parallel to said pivot (26) and fulcrumed on said further rod (28a) in a position above said cylindrical body (31) so as to be tangent to said first cam (34).

18. Carburettor according to Claim 12, characterized in that it comprises means of hydraulic communication (44) (48) for connecting said connection pipe (9) and said float chamber (3).

19. Carburettor according to Claim 18, characterized in that said means of hydraulic communication (44) comprise a hole (44) made in said connection pipe (9).

20. Carburettor according to Claim 19, characterized in that said connection pipe (9) and said outlet pipe (6) communicate with one another by means of respective end portions (46, 6a) which are parallel to and transversely facing one another.

21. Carburettor according to Claim 20, characterized in that said respective end portions (46, 6a) delimit between them an annular portion (48).

22. Carburettor according to Claim 21, characterized in that said annular portion (48) is engaged by a seal (50) to connect in a fluidtight manner said end portions (46, 6a), said communication means (44) comprising a hole (44) made in said connection pipe (9).

23. Carburettor according to Claim 22, characterized in that said communication means (48) also comprise said annular portion (48).

24. Carburettor according to Claim 21, characterized in that said communication means (48) are defined by said annular portion (48).

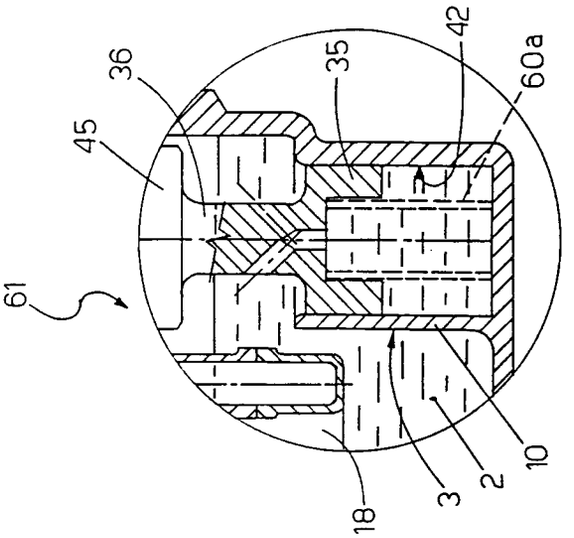
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Fig.6

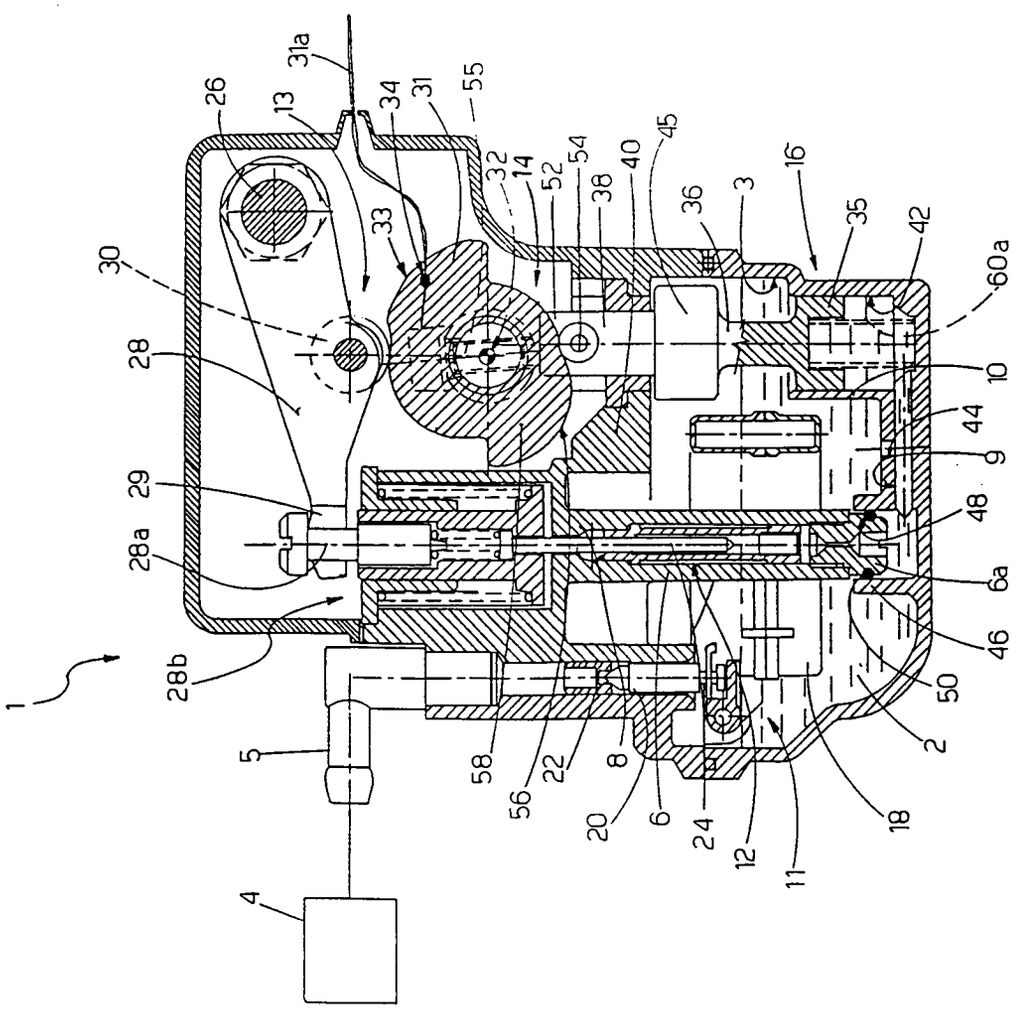
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Fig.1

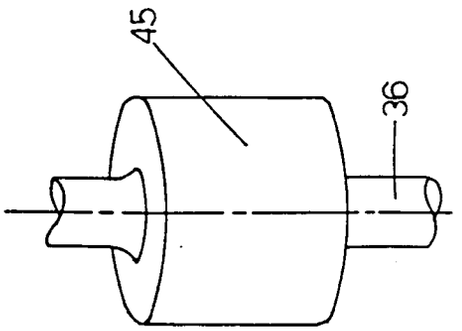

Fig.3

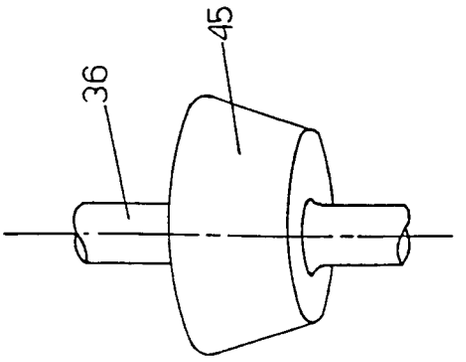

Fig.4

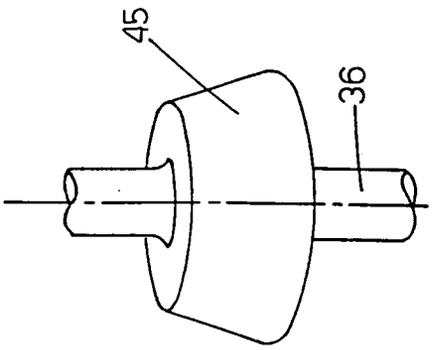

Fig.5

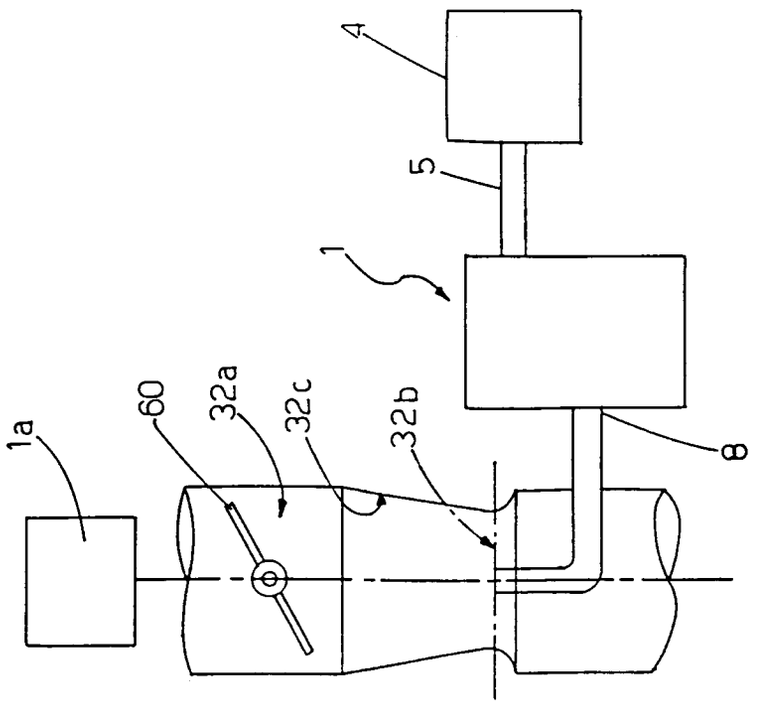

Fig.2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 11 5975

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	US-A-4 305 368 (PHELAN) * column 2, line 50 - line 68 * * column 3, line 31 - line 36 * * column 3, line 55 - line 65; figure 1 *	1-4	F02M7/06
A	DE-C-697 404 (BECK) 14 October 1940 * figure 2 *	1	
Y	FR-A-617 094 (SOLEX) * page 1, line 1 - line 9 * * page 3, line 13 - line 33; figure 3 *	1-4	
A	FR-A-672 250 (CAILLON) * page 1, line 12 - line 15 * * page 1, line 34 - line 49 * * page 2, line 18 - line 40; figure 2 *	5-7	
A	GB-A-10 541 (DAIMLER-MOTOREN) * page 2, line 35 - line 45; figure 1 *	1-5	
A	GB-A-348 179 (CHILD) * page 2, line 45 - line 51 * * page 2, line 90 - line 104 *	8	TECHNICAL FIELDS SEARCHED (Int.Cl.6) F02M
A	FR-A-2 347 542 (GM) * figure 1 *	9	
A	US-A-1 803 012 (GOUDARD) * page 1, line 41 - line 96 *	8,9	
A	US-A-1 872 555 (BALL) * page 1, line 19 - line 42 * * page 2, line 52 - line 64 * * page 2, line 92 - line 103 * * page 2, line 117 - line 120 *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 December 1996	Joris, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
L : document cited for other reasons

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