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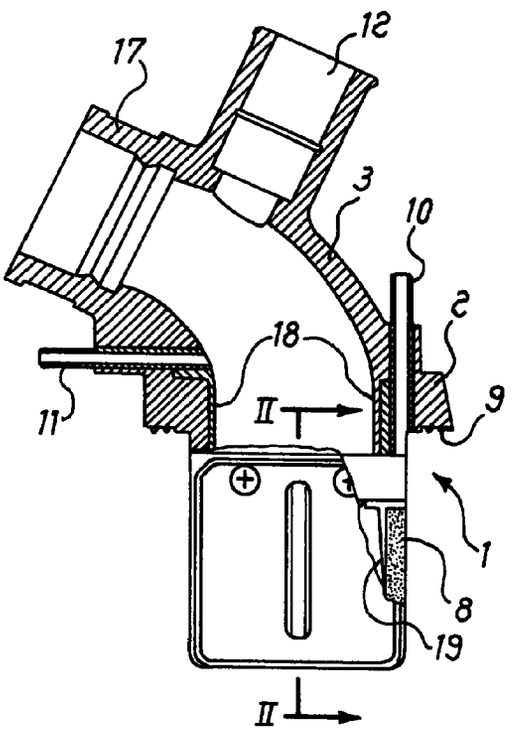
(54) Single-body reed valve for internal combustion engine, integrally joined with the intake pipe

(57) Non-return valve with resilient reeds or tongues for the feeding of internal-combustion engines, comprising in a single body a flange (2) for mounting on the engine, a connection duct (3) which can be connected to the device feeding the fresh mixture to the engine, means (10) for the pressure outlet downstream of the valve, means (11) for supplying the lubricant to the engine, a seat (12) for housing the means supplying idle air to the engine and a seat (17) for housing a fuel injector.

Fig.1



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Description

[0001] The present invention relates to a non-return valve with resilient reeds or tongues for the feeding of internal-combustion engines, which is formed as a single body with a flange for mounting on the engine, with a connection duct which can be connected to the device feeding the fresh mixture to the engine, and with means for the pressure outlet downstream of the valve and for supplying lubricant to the engine.

[0002] It is known in the art that automatic non-return valves used for the feeding of internal-combustion engines are positioned between the equipment for feeding the engine and the part of the latter designed for intake of the charge itself. This equipment consists of the cylinder head, in the case of a four-stroke cycle, and the cylinder or the pump housing, in the case of engines with a two-stroke cycle.

[0003] These automatic non-return valves are able to increase the performance of the engines since they prevent the losses of fresh charge from the engine due to the unfavourable conditions of the pressure waves existing in the intake duct.

[0004] It is known that the technical evolution of engines, associated with the demand for increasingly better performance, with the need for a reduction in atmospheric pollution and with the need to include new engine components, has resulted in an increase in the number of separate parts, such as, for example, pressure outlets for operation of the fuel shut-off valve, seats for fuel injectors, seats for lubricant injectors, seats for supplying the idle air, pressure outlets for the petrol diaphragm pumps, means for guiding the flow of the fresh charge through the reed valve and the like, which are contained in the engine feed devices.

[0005] These component parts must therefore be mounted separately with obvious loss of time and increase in costs.

[0006] The technical problem which is posed, therefore, is that of providing an automatic non-return valve which may be mounted between the devices feeding the mixture to the engine and the engine itself, which consists of a small number of parts and is provided initially with all the components mounted individually in the feed system, and which can be inserted in the engine as a single body by means of a few rapid assembly operations.

[0007] These technical problems are solved according to the present invention by a non-return valve with resilient reeds or tongues for the feeding of internal-combustion engines, characterized in that it comprises, in a single body, a flange for mounting on the engine, a connection element which can be connected to the device feeding the fresh mixture to the engine, means for the pressure outlet downstream of the valve, means for supplying the lubricant to the engine, a seat for housing the means supplying the idle air to the engine and a seat for housing a fuel injector.

[0008] Further details may be obtained from the following description of a non-limiting example of embodiment of the invention, provided with reference to the accompanying drawings, in which:

Figure 1 shows a partially sectioned side view, perpendicular to the axial plane, of the non-return reed valve according to the invention;
Figure 2 shows a front view of the non-return reed valve, partially sectioned along the plane II-II of Fig. 1;
Figure 3 shows a side view of a variation of embodiment of the valve with a seat for a fuel injector;
Figure 4 shows a variation of the flange and the sealing element of the sleeve for connecting the valve to the engine;
Figure 5 shows a partial cross-sectional view of a first variation of embodiment of the valve according to the invention; and
Figure 6 shows a partial cross-sectional view of a second variation of embodiment of the valve according to the invention.

[0009] As shown in Figures 1 and 2, a non-return reed valve, according to the invention, for internal-combustion engines, comprises a valve body 1 which is made preferably of metallic material or a plastic composite and can be connected to the internal-combustion engine (not shown) by means of the flange 2 which is integrally joined to the valve body itself.

[0010] A sealing element 9 which may have the shape shown in the drawings or have a flat shape is arranged around the flange 2.

[0011] The valve body 1 comprises, moreover, a series of apertures 4 (Fig. 2) which can be closed by means of resilient reeds or tongues 5 which are fixed to the valve body 1 by means of screws 6, opening of which is limited by by an abutment element 7; sealing gaskets 8 for the resilient reeds or tongues 5 are also provided in the region of said apertures.

[0012] The valve body 1 is provided with a connection element 3 which can be connected to the device (not shown) for feeding the internal-combustion engine, by means of a sleeve 17.

[0013] Said element 3 has internal zones 18 and 19 forming connection zones for the flow of the fresh mixture through the valve.

[0014] The elastomer used for the manufacture of the connection element 3 is used for providing the uniform jointing of the sections for the flow of fresh mixture through the whole valve and in particular the jointing in the internal zones 18 and 19 of the valve body 1.

[0015] The said connection element 3 contains a rubber-mounting pipe 10 for the pressure outlet downstream of the reed valve for operating, for example, a diaphragm pump for the fuel or for operating the fuel shut-off valve, and a rubber-mounting pipe 11 for injecting the lubricating oil into the engine.

[0016] The rubber-mounting pipes 10 and 11 are generally made of metal and the seat 13 for the fuel injector may be made of metal or a plastic composite.

[0017] The connection element 3 may also have, formed in it, a seat 12 for mounting a device supplying the air for adjustment of the engine idle speed.

[0018] Fig. 3 shows an alternative embodiment of the valve according to the invention, which has a seat 13a for mounting a support piece 13 inside which a fuel injector 14 is inserted.

[0019] Figure 4 shows a variation of the element for fixing the connection part 3 onto the engine feed device: said fixing element is formed as a flange 15, on which flange 15 the sealing elements 16 are formed.

[0020] The elastomer used for manufacture of the connection element 3 may be used also for manufacture of the sealing element 16 on the flange 15; alternatively, and in order to obtain a reduction in costs, it is nevertheless possible to manufacture the sealing element 16 alone using an elastomer with superior characteristics compared to those of the elastomer used for the connection element 3.

[0021] Figs. 5 and 6 show two variations of embodiment of the valve according to the invention which envisage a flow guiding insert 20 which has a suitable shape and is designed to optimize the flow of fresh charge through the valve body.

[0022] In the two embodiments shown, the flow guiding element 20 is respectively formed with its larger dimension positioned parallel to the plane of symmetry of the cusp of the valve (Fig. 5) or with its larger dimension positioned perpendicularly with respect to the said plane of symmetry (Fig. 6).

[0023] It is envisaged, however, that said flow guiding element may be oriented in different angular positions with respect to said plane of symmetry.

[0024] It is therefore obvious how, as a result of the single-body valve according to invention, it is possible to manufacture the valve itself and the engine intake duct as one piece which can be easily installed, and how this single piece is designed to house all the elements necessary for operation of the engine, integrated in the valve body, thereby avoiding the separate assembly operations necessary for the corresponding parts known in the art.

[0025] In addition to this, owing to the use of elastomer materials, the section of the intake duct connecting the valve and engine may be manufactured in a precise manner, at a low cost and with the desired shape.

Claims

1. Non-return valve with resilient reeds or tongues for the feeding of internal-combustion engines, characterized in that it comprises in a single body a flange (2) for mounting on the engine, a connection duct (3) which can be connected to the device feeding the fresh mixture to the engine, means (10) for the pressure outlet downstream of the valve, means (11) for supplying the lubricant to the engine, a seat (12) for housing the means supplying idle air to the engine and a seat (17) for housing a fuel injector.

2. Valve according to Claim 1, characterized in that said flange (2) is associated with sealing means (9) coaxial therewith.

3. Valve according to Claim 1, characterized in that the free end of said connection element is provided with a sleeve (17) for connection to the devices feeding the fresh mixture.

4. Valve according to Claim 1, characterized in that said the free end of said connection element is provided with a flange (15) on which the sealing means (16) for the connection are provided.

5. Valve according to Claim 1, characterized in that said connection element (3) has internal joined surfaces (18,19) made of elastomer material.

6. Valve according to Claim 1, characterized in that said means (10) for the pressure outlet downstream of the valve consist of a rubber-mounting pipe.

7. Valve according to Claim 1, characterized in that said means (11) for supplying the lubricant to the engine consist of a rubber-mounting pipe.

8. Valve according to Claim 1, characterized in that said connection element is extended so as to form the sealing gaskets on the flanges (2,16) of the valve body.

9. Valve according to Claim 1, characterized in that it comprises a flow guiding insert (20) for the fresh charge to be fed to the engine.

Fig.1

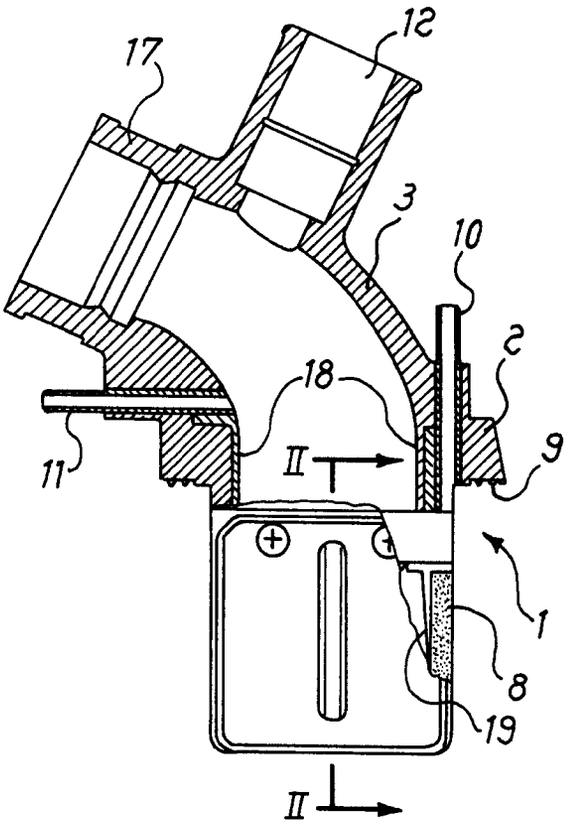
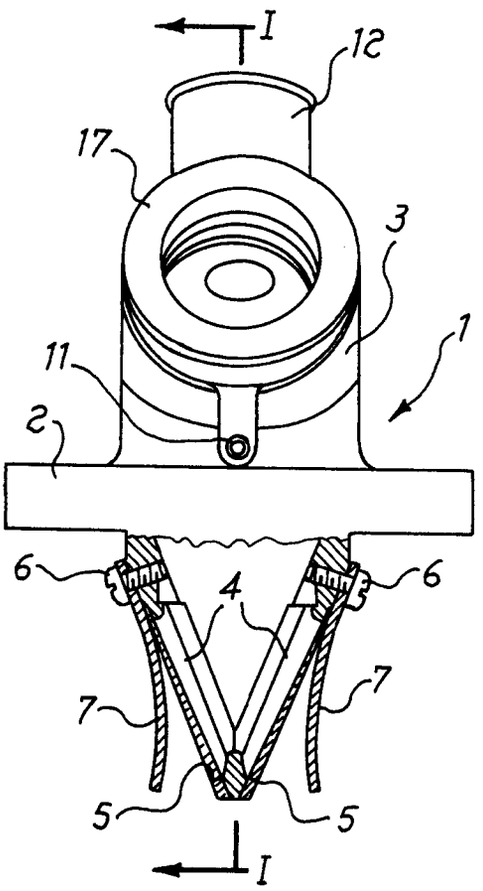


Fig.2



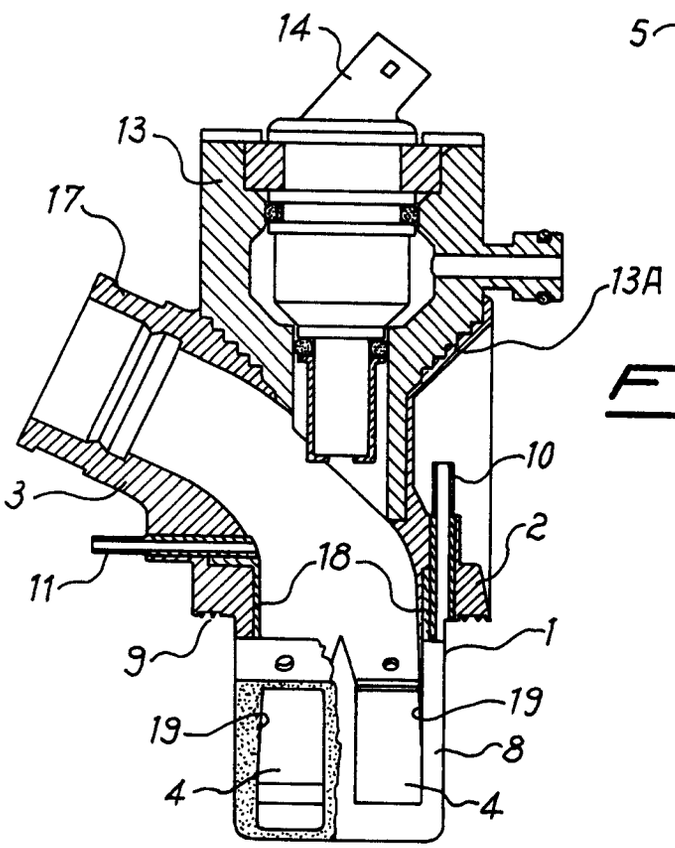


Fig.3

Fig.4

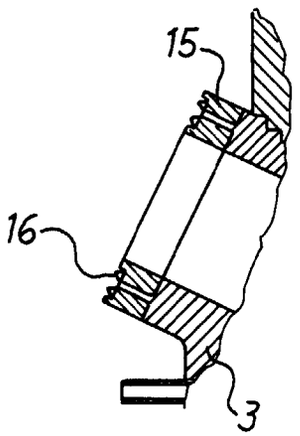
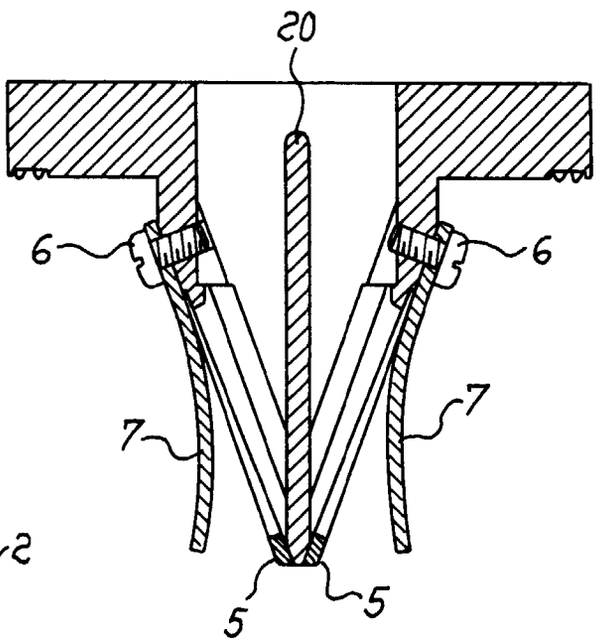


Fig.5



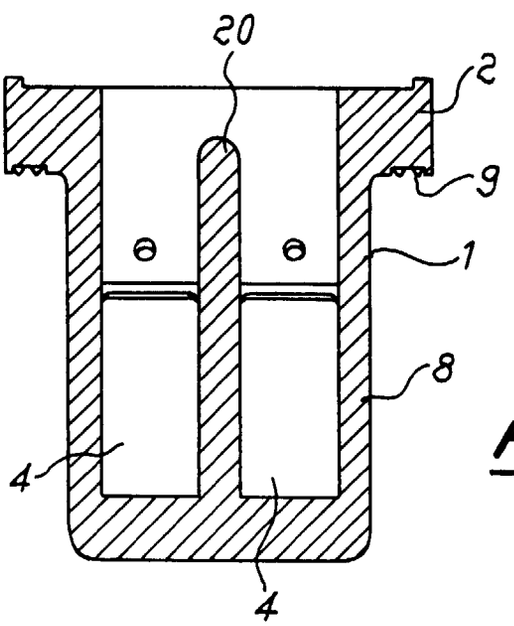


Fig.6

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EUROPEAN SEARCH REPORT

Application Number
EP 98 20 2603

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)
A	FR 2 517 748 A (KIORITZ CORPORATION) 10 June 1983 * page 3, line 30 - page 4, line 19; figures 1-5 *	1	F01L3/20
A	US 5 076 218 A (GRAZIADEI) 31 December 1991 * claim 1; figures 4-7 *	1	
A	US 4 879 976 A (PERFORMANCE INDUSTRIES INC) 14 November 1989 * figures *	1	
A	EP 0 548 993 A (YAMAHA HATSUDOKI KK) 30 June 1993 * column 5, line 25 - column 7, line 51; figures *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

F01L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11 November 1998	Klinger, T

CATEGORY OF CITED DOCUMENTS

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