(57) Abstract: The present invention relates to an apparatus for automatically controlling supply of fuel for a motor vehicle which is arranged between a liquid fuel tank of the motor vehicle and an engine, wherein inside an oil reservoir are arranged a plurality of disks each of which has an oil hole and a plurality of spacers such that the disks and the spacers are disposed alternately one on another so as to form fuel passages in a configuration of a plurality of layers, at the lower part of which is formed an uniform air buffering chamber so that an air layer is established when the fuel is supplied, wherein on the middle of a fuel supply chamber, at the lower part of which is mounted a fuel supply unit, is arranged a fuel inlet pipe with a fixed space, such that the fuel inlet pipe is connected to the upper part of the fuel passages in a fuel chamber so as to supply the fuel into the engine combustion chamber, whereby the fuel pressures, such as the fuel pump pressure, the liquid fuel load pressure, the liquid fuel flowing pressure or the like, are buffered by means of the air layer of the air buffering chamber, with the results that it is possible to accomplish the uniform fuel supply into the engine combustion chamber, to control automatically the amount of the fuel supply consumed in the engine, and to prevent the occurrence of the excessive fuel pressure by additionally mounting a fuel pressure feedback pipe in the fuel chamber above the oil reservoir so that the fuel pressure is fed back into the liquid fuel tank.
TITLE

APPARATUS FOR AUTOMATICALLY CONTROLLING
SUPPLY OF FUEL FOR MOTOR VEHICLE

TECHNICAL FIELD

The present invention relates to an apparatus for automatically controlling supply of fuel for a motor vehicle arranged between a liquid fuel tank of the motor vehicle and an engine. More particularly, the present invention relates to an apparatus for automatically controlling supply of fuel for a motor vehicle capable of accomplishing appropriate amount of the fuel supply based on the intake of the fuel into the engine by means of the buffering action at an air layer in an air buffering chamber in the apparatus of the present invention to fuel pressures, such as fuel pump pressure caused by the operation of the fuel pump in the liquid fuel tank, liquid fuel load pressure, the liquid fuel flowing pressure or the like, with the results that there not occur an abnormal condition of the engine, the unnecessarily supplied amount of the fuel is saved, the excessive fuel is fed back into the liquid fuel tank, the perfect combustion in the combustion chamber of the engine is accomplished by virtue of the stabilized supply of the fuel, the discharged gas is decreased, the output of power is increased during the
driving of the motor vehicle, the noise is decreased due to the harmonization of the explosion sound, and the expected life span of the engine is extremely increased since the there not occur an abnormal condition of the engine.

BACKGROUND ART

An apparatus for supplying fuel of the liquid fuel tank of the motor vehicle is disclosed from Korean Patent No. 273168 (registered on September 1, 2000), the invention of which is made by the inventor of the present application. According to the aforesaid patent, the apparatus for supplying fuel is mounted separately from the liquid fuel tank. The fuel, which passes through a tube for controlling oil pressure in an oil reservoir, is supplied into a combustion chamber of the engine.

According to the apparatus mentioned above, a plurality of disks each of which has a oil inlet hole formed therein and a plurality of spacers are arranged alternately one on another in the tube for controlling oil pressure, so that an oil passage chamber is defined between the upper and lower disks. However, additional air buffering chamber is provided at the lower part of the disks, with a result that a fuel supply chamber is only provided. On this account, the buffering action of the air layer is insignificant, the fuel is not supplied at the
fixed rate, and the automatic control of the fuel supply is not carried out smoothly. In addition, since the fuel pump of the liquid fuel tank is operated to supply constantly the fuel pressure even when the motor vehicle is stopped or driven at the lower speed, the excessive liquid fuel pressure is accumulated in the oil reservoir. As a result, it is not possible to control the fuel pressure smoothly in the tube for controlling oil pressure.

**DISCLOSURE OF THE INVENTION**

It is an object of the present invention to eliminate the drawbacks mentioned above and to supply the fuel stably into the fuel chamber of the engine.

The foregoing object is accomplished by providing an apparatus for automatically controlling supply of fuel for a motor vehicle, comprising a plurality of fuel passages in the form of multi-layers with small gaps, said fuel passages being defined between a plurality of disks each of which has an oil hole and a plurality of spacers such that the disks and the spacers are disposed alternately one on another in a fuel chamber in an oil reservoir, by which a fuel pump of a liquid fuel tank and a combustion chamber of an engine are connected to each other, characterized in that ring-shaped fixing members are formed one on another at the lowest of the disks to define an air buffering
chamber forming an air layer, a flange of a fuel supply unit is mounted at the circumferences thereof to said lower ring-shaped fixing member by means of several threaded bars and nuts, that supporters of the same size as the ring-shaped fixing members are connected to the middle of the lower surface of the lowest disk in the center of a fuel supply chamber of the fuel supply unit such that a fuel inlet pipe is formed through said fuel passages vertically, and combined by means of upper and lower nuts, that a bent pipe is connected to the upper end of the fuel inlet pipe, which is in turn connected to a fuel discharge pipe, and that at the wall of the upper fuel chamber of the fuel reservoir is arranged a fuel pressure feedback pipe, which is connected to the liquid fuel tank via a fuel hose so that the excessive fuel pressure is fed back into the liquid fuel tank.

With the present invention, the liquid fuel in the liquid fuel tank is supplied into the fuel chamber of the oil reservoir via the fuel hose and the fuel supply pipe by operation of the fuel pump mounted in the liquid fuel tank. By virtue of the intake and explosion action of the piston in the engine, when the fuel is supplied into the combustion chamber, the fuel supplied into the fuel chamber of the oil reservoir is passed along the wide and long fuel passages defined by a plurality of the disk, and the ring-
shaped spacers mounted alternately with the disk, and through the oil holes formed diagonally in the disks, so that the molecules of the fuel are diffused by means of a plurality of the disks and stabilized. Furthermore, as the fuel is passed through the air buffering chamber, the air layer of the air buffering chamber established between the ring-shaped fixing members and the supporters mounted about the fuel inlet pipe relieves the fuel pump pressure, the liquid fuel load pressure and the liquid fuel flowing pressure by the physical buffering action when it is supplied into the fuel supply chamber of the fuel supply unit. As a result, the fuel can be supplied into the combustion chamber of the engine stably and smoothly. Moreover, since the amount of the fuel supplied from the fuel supply chamber of the fuel supply unit to the fuel inlet pipe is supplied only with the amount of the intake by means of the piston action of the combustion chamber of the engine, it is possible to accomplish the prefect combustion in the combustion chamber of the engine of the motor vehicle, to prevent the excessive supply of the fuel, and to carry out the automatic control for the appropriate supply of the fuel. As a result, the unnecessarily supplied amount of the fuel is saved. Besides, when the excessive fuel pressure is generated in the fuel chamber of the oil reservoir, the excessive fuel pressure is fed back into the
liquid fuel tank via the fuel pressure feedback pipe, whereby it is possible to control smoothly the amount of the supply of the fuel in the oil reservoir.

BRIEF DESCRIPTION OF THE DRAWINGS

The preferred embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a front view partly in section showing a fuel supply path between a liquid fuel tank and an engine according to the present invention;

Fig. 2 is an enlarged longitudinal sectional view of essential parts of the present invention;

Fig. 3 is a cross sectional view taken along line A-A of Fig. 2; and

Fig. 4 is a cross sectional view taken along line B-B of Fig. 2.

BEST MODE FOR CARRYING OUT THE INVENTION

The present invention will be now described in detail. As shown in the accompanying drawings, inside a oil reservoir 1, which is closed by means of a top lid 2, is arranged a plurality of disks 3, 3' and 3". Between the disks 3, 3' and 3" are inserted a plurality of ring-shaped spacers 4, 4' and 4" at the circumferences of the disks,
such that the disks and the spacers are disposed alternately one on another. Between the upper and lower disks 3, 3' and 3" are formed fuel passages 5 with small gaps. Each of disks 3, 3' and 3" is provided with oil holes 6 and 6', which are formed diagonally, so that the fuel passages 5 are extended in the width and length thereof. At the lower part of the disks 3, 3' and 3" are arranged a plurality of ring-shaped fixing members 7 and 7' of the same size. To the lowest ring-shaped fixing member 7 is mounted closely a flange 10' of a fuel supply unit 10. Ant the circumferences of the upper spacer 4 and the flange 10' of the lower fuel supply unit 10 are combined by means of a plurality of threaded bars 11 and 11' and nuts 12, such that a air buffering chamber is defined in the ring-shaped fixing members 7 and 7'.

Also, on the middle of the fuel supply chamber 13 of the fuel supply unit 10, supporters 15 and 15' of the same size as the ring-shaped fixing members 7 and 7' are mounted to the lowest disk 3, such that a fuel inlet pipe 16 is formed through the middle portion of the disks 3 and the fuel passages 5 vertically. And they are finally combined by means of upper and lower nuts 12' and 12". A bent pipe 17 is connected to the upper end of the fuel inlet pipe 16, which is in turn connected to a fuel discharge pipe 18 for supplying the fuel into a combustion chamber 31 of an
engine 30. The fuel discharge pipe 18 is connected to a fuel hose 19'. At the side wall of the upper fuel chamber 9 of the oil reservoir 1 is arranged a fuel supply pipe 20, which is in turn connected to a fuel pump 22 of a liquid fuel tank 21 via a fuel hose 19. Also, at the upper wall of the upper fuel chamber 9 of the fuel reservoir 1 is arranged a fuel pressure feedback pipe 23, which is connected to the liquid fuel tank 21 via a fuel hose 19a so that the excessive fuel pressure is fed back into the liquid fuel tank 21 during the supply of the fuel.

Now, the operation of the invention will be explained with reference to the drawings. As shown in Fig. 1, the oil reservoir 1, which is the apparatus for automatically controlling the supply of the fuel according to the present invention, is arranged between the fuel pump 22 of the liquid fuel tank 21 and the combustion chamber 31 of the engine 30. Each of the fuel hoses 19, 19' and 19'' is connected to the fuel supply pipe 20, the fuel discharge pipe 18 and the fuel pressure feedback pipe 23, respectively. According to the present invention, the liquid fuel in the liquid fuel tank 21 is supplied into the fuel chamber 9 of the oil reservoir 1 via the fuel hose 19 and the fuel supply pipe 20 by operation of the fuel pump 22 mounted in the liquid fuel tank 21. By virtue of the intake and explosion action of the piston in the engine 30,
when the fuel is supplied into the combustion chamber 31, the fuel supplied into the fuel chamber 9 of the oil reservoir 1 is passed along the wide and long fuel passages defined by a plurality of the disk 3, 3′ and 3″, and the ring-shaped spacers 4, 4′ and 4″ mounted alternately with the disk 3, 3′ and 3″, and through the oil holes 6 and 6′ formed diagonally in the disks 3, 3′ and 3″, so that the molecules of the fuel are diffused by means of a plurality of the disks 3, 3′ and 3″ and stabilized. Furthermore, as the fuel is passed through the air buffering chamber 14, the air layer of the air buffering chamber 14 established between the ring-shaped fixing members 7 and 7′ and the supporters 15 and 15′ mounted about the fuel inlet pipe 16 relieves the fuel pump pressure, the liquid fuel load pressure and the liquid fuel flowing pressure by the physical buffering action when it is supplied into the fuel supply chamber 13 of the fuel supply unit 10. As a result, the fuel can be supplied into the combustion chamber 31 of the engine 30 stably and smoothly. Moreover, since the amount of the fuel supplied from the fuel supply chamber 13 of the fuel supply unit 10 to the fuel inlet pipe 16 is supplied only with the amount of the intake by means of the piston action of the combustion chamber 31 of the engine 30, it is possible to accomplish the prefect combustion in the combustion chamber of the engine of the motor vehicle, to
prevent the excessive supply of the fuel, and to carry out the automatic control for the appropriate supply of the fuel. As a result, the unnecessarily supplied amount of the fuel is saved. Besides, when the excessive fuel pressure is generated in the fuel chamber 9 of the oil reservoir 1, the excessive fuel pressure is fed back into the liquid fuel tank 21 via the fuel pressure feedback pipe 23, whereby it is possible to control smoothly the amount of the supply of the fuel in the oil reservoir 1.

INDUSTRIAL APPLICABILITY

According to the present invention, when the motor vehicle is driven at either lower speed or higher speed, there not happen irregular supply of the fuel due to shaking of the body of the motor vehicle and the liquid fuel load pressure and the liquid fuel flowing pressure in the liquid fuel tank 21, and a appropriate amount of the fuel is supplied under the stabilized condition. As a result, the amount of discharge of the exhaust fumes is little due to the prefect combustion in the combustion chamber 31 of the engine 30 of the motor vehicle, and the output of power is increased.
What is claimed is:

1. An apparatus for automatically controlling supply of fuel for a motor vehicle, comprising a plurality of fuel passages (5) in the form of multi-layers with small gaps, said fuel passages (5) being defined between a plurality of disks (3, 3', 3'') each of which has an oil hole (6) and a plurality of spacers (4, 4', 4'') such that the disks and the spacers are disposed alternately one on another in a fuel chamber (9) in an oil reservoir (1), by which a fuel pump (22) of a liquid fuel tank (21) and a combustion chamber (31) of an engine (30) are connected to each other, characterized in that ring-shaped fixing members (7, 7') are formed one on another at the lowest of the disks (3) to define an air buffering chamber (14) forming an air layer, a flange (10') of a fuel supply unit (10) is mounted at the circumferences thereof to said lower ring-shaped fixing member (7) by means of several threaded bars (11, 11') and nuts(12), that supporters (15, 15') of the same size as the ring-shaped fixing members (7, 7') are connected to the middle of the lower surface of the lowest disk (3) in the center of a fuel supply chamber (13) of the fuel supply unit (10) such that a fuel inlet pipe (16) is formed through said fuel passages (5) vertically, and combined by means of upper and lower nuts (12', 12''), that a bent pipe
(17) is connected to the upper end of the fuel inlet pipe (16), which is in turn connected to a fuel discharge pipe (18), and that at the wall of the upper fuel chamber (9) of the fuel reservoir (1) is arranged a fuel pressure feedback pipe (23), which is connected to the liquid fuel tank (21) via a fuel hose (19a) so that the excessive fuel pressure is fed back into the liquid fuel tank (21).
A. CLASSIFICATION OF SUBJECT MATTER

IPC7 F02M 37/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 F02M B60K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and applications for inventions since 1947
Korean Utility models and applications for Utility models since 1947
Japanese Utility models and applications for Utility models since 1974

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NPS
search terms: disk, buffering, fuel, ring shaped, supply, gap, spacer, hole, chamber

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>A</td>
<td>KR 99-083179A(PARK OK YOUNG) 25 November 1999 see entire document</td>
<td>1</td>
</tr>
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</table>

Further documents are listed in the continuation of Box C. See patent family annex.

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