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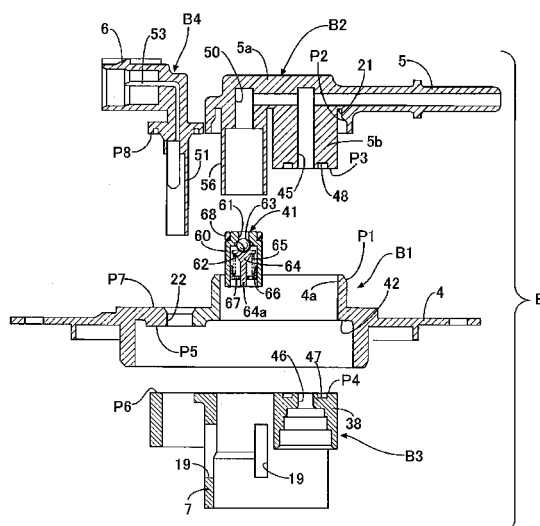
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(54) **FUEL SUPPLY MODULE**

(57) A fuel supply module is provided that includes a module body (B) formed from a mounting base (4), a fuel feed pipe (5), and a pump holding part (7) provided so as to be connected to a lower part of the mounting base (4), wherein the module body (B) is divided into a first block (B1) that includes the mounting base (4), a second block (B2) that includes the fuel feed pipe (5) and its boss (5a), and a fourth block (B4) that includes the pump holding part (7), a boss extension part (5b) extending downward from the boss (5a) is fitted into a support tube (4a) formed in the first block (B1), the support tube (4a) and the second block (B2) are welded, a third block (B3) is welded to an end face of the boss extension part (5b), the first and third blocks (B1, B3) are welded to each other, and the boss extension part (5b) and the third block (B3) are provided with first and second through holes (45, 46). It is thereby possible to provide at low cost a fuel supply module that includes a plurality of types of module bodies having, for example, different directions for a fuel feed pipe.

FIG.3



Description

TECHNICAL FIELD

[0001] The present invention relates to a fuel supply module that is primarily for supplying fuel to a fuel injection valve of an engine and, in particular, to an improvement of a fuel supply module that includes a module body formed from a mounting base mounted on an outer wall of a fuel tank, a fuel feed pipe projecting from an upper face of the mounting base, and a pump holding part provided so as to be connected to a lower part of the mounting base, an electric pump that pumps up fuel within the fuel tank and discharges the fuel to the fuel feed pipe via a fuel passage being held in the pump holding part.

BACKGROUND ART

[0002] Such a fuel supply module is already known, as disclosed in Patent Publication 1.
Patent Publication 1: Japanese Patent Application Laid-open No. 2007-291867

DISCLOSURE OF INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0003] In such a conventional fuel supply module, since the module body is molded as a unit, when a plurality of types of module bodies having, for example, different directions for a fuel feed pipe are molded, a plurality of types of molds are required so as to correspond to the types of module bodies. The total production cost for the plurality of types of molds is therefore high, this affects the cost of the fuel supply module, and it is thus very difficult to reduce the cost.

[0004] The present invention has been accomplished in the light of such circumstances, and it is an object thereof to provide at low cost a fuel supply module that includes a plurality of types of module bodies having, for example, different directions for a fuel feed pipe.

MEANS FOR SOLVING THE PROBLEMS

[0005] In order to attain the above object, according to a first aspect of the present invention, there is provided a fuel supply module comprising a module body formed from a mounting base mounted on an outer wall of a fuel tank, a fuel feed pipe projecting from an upper face of the mounting base, and a pump holding part provided so as to be connected to a lower part of the mounting base, an electric pump that pumps up fuel within the fuel tank and discharges the fuel to the fuel feed pipe via a fuel passage being held in the pump holding part, **characterized in that** the module body is divided into a first block comprising the mounting base, a second block comprising the fuel feed pipe and a boss supporting a base of the fuel feed pipe, and a third block comprising

the pump holding part, a support tube is formed on the first block, a boss extension part extending downward in the axial direction from the boss is fitted into an inner periphery of the support tube, the support tube and the second block are welded to each other, the third block is welded to an end face of the boss extension part, the first and third blocks are welded to each other, and the boss extension part and the third block are provided with first and second through holes respectively, the first and second through holes communicating directly with each other to form the fuel passage.

[0006] According to a second aspect of the present invention, in addition to the first aspect, welded bonding planes of the boss extension part and the third block are disposed closer to the interior of the fuel tank than the support tube.

[0007] According to a third aspect of the present invention, in addition to the second aspect, a clearance for opening the peripheral edge of the welded bonding planes of the boss extension part and the third block to the internal space of the fuel tank is provided in a lower face of the first block.

[0008] According to a fourth aspect of the present invention, in addition to any one of the first to third aspects, the welded bonding planes of the boss extension part and the third block and the welded bonding planes of the first and third blocks are disposed on the same plane.

[0009] The boss corresponds to a first boss 5a in an embodiment of the present invention, which is described later.

EFFECTS OF THE INVENTION

[0010] In accordance with the first aspect of the present invention, for some of the first to third blocks, a plurality of types having different shapes and dimensions are prepared, and the plurality of types of some of the blocks are combined with another block and welded to each other, thus giving a plurality of types of module bodies having different shapes and dimensions. When such a plurality of types of module bodies are produced, it is therefore only necessary to prepare molds corresponding to the plurality of types of some of the blocks, and compared with a case in which a plurality of types of entire molds are prepared so as to correspond to the types, the production cost of the molds can be greatly reduced. Moreover, since the module body is divided into first to third blocks, the shape of each block can be simplified, the shape of a mold corresponding to each block can therefore also be simplified, and this also contributes to a reduction of the production cost of the molds. In this way, fuel supply modules that include a plurality of types of module bodies can be provided at low cost.

[0011] Moreover, since the support tube is formed on the first block, the boss extension part extending downward in the axial direction from the boss is fitted into the inner periphery of the support tube, a first bonding plane at the upper end of the support tube and a second bond-

ing plane of the second block are welded, a third bonding plane at the lower end of the boss extension part and a fourth bonding plane of the third block are welded, and the boss extension part and the third block are respectively provided with the first and second through holes that communicate directly with each other to form the fuel passage, welded parts of the first and second bonding planes are disposed on the atmosphere side of welded parts of third and fourth bonding planes through which the fuel passage runs, and the pressure of the fuel passage does not act on the welded parts of the first and second bonding planes. There can therefore be expected an effect in preventing high pressure fuel discharged from the electric pump from leaking to the exterior by blocking it with the welded parts of the first and second bonding planes even if, due to weld failure, etc., it leaks past the welded parts of the third and fourth bonding planes, on which the pressure thereof acts.

[0012] In accordance with the second aspect of the present invention, since the welded third and fourth bonding planes are disposed closer to the interior of the fuel tank than the support tube, even if fuel leaks past the welded parts of the third and fourth bonding planes, it can be returned immediately to the fuel tank and this, coupled with the presence of the welded parts of the first and second bonding planes, enables the leakage of fuel to the exterior to be more reliably prevented.

[0013] In accordance with the third aspect of the present invention, since the clearance for opening the peripheral edge of the welded third and fourth bonding planes to the internal space of the fuel tank is provided in the lower face of the first block, if fuel leaks past the welded parts of the third and fourth bonding planes, it can immediately be returned smoothly to the fuel tank through the clearance, thereby enabling the leakage of fuel to the exterior to be more reliably prevented.

[0014] In accordance with the fourth aspect of the present invention, welding of the boss extension part, that is, the second block and the third block, and welding of the first and third block can be carried out at the same time by use of the same hot plate, thus contributing to an improvement in productivity.

BRIEF DESCRIPTION OF DRAWINGS

[0015]

[FIG. 1] FIG. 1 is a plan view showing a state in which a fuel supply module related to an embodiment of the present invention is mounted on a fuel tank (first embodiment).

[FIG. 2] FIG. 2 is a sectional view along line 2-2 in FIG. 1 (first embodiment).

[FIG. 3] FIG. 3 is an exploded view of a module body in FIG. 2 (first embodiment).

EXPLANATION OF REFERENCE NUMERALS AND SYMBOLS

[0016]

5	B	Module body
	B to B4	First to fourth blocks
	M	Fuel supply module
	P1 to P6	Bonding planes (first to sixth bonding planes)
10	T	Fuel tank
	2	Electric pump
	4	Mounting base
	4a	Support tube
15	5	Fuel feed pipe
	5a	Boss (first boss)
	7	Pump holding part
	10	Outer wall (ceiling wall)
	40	Fuel passage
20	42	Clearance
	45	First through hole
	46	Second through hole

BEST MODE FOR CARRYING OUT THE INVENTION

[0017] A mode for carrying out the present invention is explained below by reference to a preferred embodiment of the present invention shown in the attached drawings.

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EMBODIMENT 1

[0018] First, in FIG. 1 and FIG. 2, a fuel supply module M of the present invention is mounted on a ceiling wall 10 of a fuel tank T mounted in a vehicle such as a motorcycle, the fuel supply module M supplying fuel within the fuel tank T to a fuel injection valve I of an engine.

[0019] The fuel supply module M includes a module body B made of a synthetic resin, an electric pump 2 held on a lower part of the module body B, and a fuel strainer 3 mounted at the lower end of the electric pump 2. Furthermore, the module body B is formed from a mounting base 4, a fuel feed pipe 5 projecting from an upper face of the mounting base 4, a coupler 6 similarly projecting from the upper face of the mounting base 4, and a pump holding part 7 provided so as to be connected to a lower part of the mounting base 4.

[0020] On the other hand, the ceiling wall 10 of the fuel tank T is provided with an opening 11 through which the electric pump 2 is inserted into the interior of the fuel tank T, and is fixedly provided with a mounting ring 12 that surrounds the opening 11. This mounting ring 12 is fixedly provided with a plurality of mounting bolts 15 projecting from an upper face thereof.

[0021] The mounting base 4 is superimposed on the upper face of the mounting ring 12 so that its outer peripheral part blocks the opening 11. The outer peripheral part of the mounting base 4 is provided with a plurality

of bolt holes 14, and the mounting base 4 is fixed to the mounting ring 12 via the plurality of mounting bolts 15 inserted through these bolt holes 14 and a plurality of nuts 16 screwed and tightened onto the mounting bolts 15. In this arrangement, an annular seal 9 for sealing the opening 11 is disposed between the mounting base 4 and the ceiling wall 10 of the fuel tank T.

[0022] A circular first boss 5a supporting a base of the fuel feed pipe 5 is formed on a central part of the upper face of the mounting base 4. The fuel feed pipe 5 projects horizontally from an outer peripheral face of the first boss 5a, and an outer end part of the fuel feed pipe 5 is connected to a fuel supply pipe 18 communicating with the fuel injection valve I of the engine. A rectangular second boss 6a supporting the base of the coupler 6 is formed on the upper face of the mounting base 4 so as to be adjacent to the first boss 5a.

[0023] Furthermore, the pump holding part 7, which is cylindrical and is fitted around the outer periphery of an upper end part of the electric pump 2, is provided so as to be connected to a lower face of the mounting base 4. A plurality of latching holes 19 are provided in a peripheral wall of the pump holding part 7. A plurality of resilient latching tabs 20 are provided on the outer periphery of an upper end part of the electric pump 2, and these latching holes 19 and latching tabs 20 latch together when the upper end part of the electric pump 2 is fitted into the inner periphery of the pump holding part 7 so that the electric pump 2 is held by the pump holding part 7.

[0024] The electric pump 2 is formed from an electric motor 23 having a rotor 25 facing in the vertical direction, and a fuel pump 24 driven by the electric motor 23. The electric motor 23 is formed from a cylindrical stator 26 having a plurality of magnets 26a fixedly arranged on the inner periphery in the peripheral direction, an upper bearing bracket 27 joined to the upper end of the stator 26 by swaging, a lower bearing bracket 28 joined to a lower end part of the stator 26, and the rotor 25, which has a rotor shaft 25a supported by the upper and lower bearing brackets 27 and 28.

[0025] The fuel pump 24 is arranged as a Wesco type from a pump case 31 and a pump impeller 32, the pump case 31, together with the lower bearing bracket 28, being joined to the stator 26 by swaging so as to form a pump chamber 30 between itself and a lower face of the lower bearing bracket 28, and the pump impeller 32 being rotatably housed in the pump chamber 30 and connected to a lower end part of the rotor shaft 25a.

[0026] The pump case 31 is provided with a suction port 33 opening in the pump chamber 30, and the fuel strainer 3, which is disposed in a bottom part within the fuel tank T so as to communicate with the suction port 33, is mounted on the pump case 31. The lower bearing bracket 28 is provided with a discharge port 34 providing communication between the pump chamber 30 and the interior of the stator 26.

[0027] Formed integrally with the upper bearing bracket 27 is a fuel discharge pipe 36 projecting thereabove

and having a final discharge port 35 communicating with the interior of the stator 26, and provided in the interior of the fuel discharge pipe 36 is a check valve 37 for preventing backflow of fuel into the final discharge port 35.

A connection tube 38 joined to the inside of the pump holding part 7 is formed integrally with the mounting base 4, and the fuel discharge pipe 36 is fitted via a seal 39 into an inner peripheral face of the connection tube 38.

[0028] A fuel passage 40 is provided in the module body B, the fuel passage 40 providing communication between the fuel discharge pipe 36 and the fuel feed pipe 5 via the interior of the connecting tube 38, and a regulator valve 41 is mounted on the module body B, the regulator valve 41 regulating the pressure within the fuel passage 40 to a predetermined pressure that is suitable for the injection of fuel from the fuel injection valve I.

[0029] In FIG. 1 and FIG. 2, the module body B is divided into a first block B1 that includes the mounting base 4, a second block B2 that includes the fuel feed pipe 5 and the first boss 5a supporting the base thereof, a third block B3 that includes the pump holding part 7 and the connection tube 38, and a fourth block B4 that includes the coupler 6 and the second boss 6a supporting the base thereof, and they are all molded individually using a synthetic resin as a material.

[0030] A cylindrical support tube 4a is formed integrally with the first block B1 so as to project from the upper face thereof. Furthermore, a tapered first bonding plane P1 is formed at the upper end of the support tube 4a. On the other hand, formed on the second block B2 are a boss extension part 5b extending coaxially downward from the first boss 5a and fitted into an inner periphery of the support tube 4a, and a tapered second bonding plane P2 surrounding an upper part of the boss extension part 5b with an annular groove 21 interposed therebetween. This second bonding plane P2 and the first bonding plane P1 are welded to each other by ultrasonic welding, etc. Burrs formed during welding are received by the annular groove 21.

[0031] The boss extension part 5b runs through the support tube 4a, a lower end face thereof is formed as a third bonding plane P3 perpendicular to the axis of the first boss 5a, and a longitudinal first through hole 45 is provided in the second block B2, the first through hole 45 opening on the third bonding plane P3 while communicating with the fuel feed pipe 5. Furthermore, formed on the second block B2 is a semi-cylindrical connection tube 56 extending below the third bonding plane P3, and provided therein is a return hole 50 providing communication between the fuel feed pipe 5 and the upper end of the interior of the connection tube 56.

[0032] The connection tube 56 is equipped with the regulator valve 41. This regulator valve 41 includes a bottomed cylindrical valve housing 60 molded separately from the mounting base 4 and press-fitted into the connection tube 56 via a seal 68, and this valve housing 60 has formed in an upper end wall a valve hole 61 and a conical valve seat 62, the valve hole 61 running through

the upper end wall and communicating with the return hole 50, and the valve seat 62 being connected to the inner end of the valve hole 61. Housed within the valve housing 60 are a ball-shaped valve body 63, a poppet-type valve retainer 64, and a valve spring 65, the valve body 63 being capable of being seated on the valve seat 62, the valve retainer 64 rotatably supporting the valve body 63 on the opposite side to the valve seat 62, the valve spring 65 urging the valve body 63 via the valve retainer 64 with a predetermined set load in the direction in which the valve seat 62 is seated, and a guide member 66 supporting a fixed end part of the valve spring 65 and slidably supporting a stem portion 64a of the valve retainer 64 in an open-and-close direction of the valve body 63 being press-fitted into and fixed to an inner peripheral face of the valve housing 60. The set load, on the valve body 63, of the valve spring 65 is regulated by adjusting the press-fit depth of the guide member 66 into the inner peripheral face of the valve housing 60. The guide member 66 is provided with an open hole 67 providing communication between the interior and the exterior thereof. After the connection tube 56 is equipped with the regulator valve 41, a lower end part of the connection tube 56 is hot-swaged to stop the regulator valve 41 from falling out.

[0033] A fourth bonding plane P4 facing the third bonding plane P3 of the second block B2 is formed on an upper face of the third block B3. Formed on a lower face of the first block B1 is a bonding plane P5 arranged on the same plane as the lower end face of the boss extension part 5b fitted into the support tube 4a, that is, the third bonding plane P3, and formed on an upper face of the third block B3 is a sixth bonding plane P6 facing the fifth bonding plane P5 so as to be arranged on the same plane as the fourth bonding plane P4. Provided in the third block B3 are a second through hole 46 and the connection tube 38, the second through hole 46 opening on the fourth bonding plane P4 and being capable of communicating with the first through hole 45, and the interior of the connection tube 38 communicating with the second through hole 46. Formed in the third and fourth bonding planes P3 and P4 are annular grooves 47 and 48 surrounding openings of the first and second through holes 45 and 46 respectively.

[0034] The third bonding plane P3 and the fourth bonding plane P4, and the fifth bonding plane P5 and the sixth bonding plane P6 are welded to each other, and since the third bonding plane P3 and the fifth bonding plane P5, and the fourth bonding plane P4 and the sixth bonding plane P6 are each arranged on the same plane, these bonding planes can be welded to each other at the same time using the same hot plate. Welding the third and fourth bonding planes P3 and P4 to each other allows the first through hole 45 and the second through hole 46 to communicate directly with each other, thus forming the fuel passage 40, which provides communication between the fuel discharge pipe 36 of the electric pump 2 and the fuel feed pipe 5. In this arrangement, since burrs

formed during welding of the third and fourth bonding planes P3 and P4 to each other are received by the annular grooves 47 and 48, it is possible to prevent the burrs from projecting toward the first and second through holes 45 and 46.

[0035] A recess-shaped clearance 42 is provided in a lower face of the first block B1, the clearance 42 opening peripheral edge parts of the welded third and fourth bonding planes P3 and P4 to the interior of the fuel tank T.

[0036] Furthermore, provided on an upper face of the first block B1 are a seventh bonding plane P7 and a through hole 22, the seventh bonding plane P7 being adjacent to the support tube 4a, and the through hole 22 running through a central part of the seventh bonding plane P7. On the other hand, formed integrally with a lower face of the second boss 6a of the fourth block B4 are an eighth bonding plane P8 and a semi-cylindrical protection tube 51, the eighth bonding plane P8 facing the seventh bonding plane P7, and the protection tube 51 projecting downward from a central part of the eighth bonding plane P8 and running through the through hole 22. Embedded in the fourth block B4 is a power supply terminal 53 having opposite end parts extending to the coupler 6 and the interior of the protection tube 51. The power supply terminal 53 within the protection tube 51 is connected to a current-carrying terminal 54 projecting from an upper face of the electric motor 23, via a lead 57 passing through the latching hole 19 of the pump holding part 7.

[0037] The seventh and eighth bonding planes P7 and P8 are thus welded to each other, thereby integrally joining the first and fourth blocks B1 and B4 to each other.

[0038] The operation of this embodiment is now explained.

[0039] In the electric pump 2, when the electric motor 23 operates, the pump impeller 32 is rotated by means of the rotor shaft 25a. Accompanying this, fuel within the fuel tank T is sucked into the pump chamber 30 via the suction port 33 while being filtered through the fuel strainer 3, pressurized by means of the pump impeller 32, then pumped to the interior of the stator 26 via the discharge port 34, supplied from the final discharge port 35 to the fuel injection valve I via the fuel discharge pipe 36, the fuel passage 40, that is, the first and second through holes 45 and 46, the fuel feed pipe 5, and the fuel supply pipe 18, and is injected into the engine, which is not illustrated.

[0040] In this process, since the pressure of the fuel passage 40, that is, the discharge pressure of the electric pump 2, acts on the valve body 63 of the regulator valve 41 via the return hole 50 and the valve hole 61, when the discharge pressure of the electric pump 2 exceeds a predetermined value, the valve body 63 opens against the set load of the pressure-regulating spring 65, and part of the fuel within the fuel passage 40 is discharged to the interior of the valve housing 60; when the pressure of the fuel passage 40 returns to the predetermined value, the valve body 63 is closed again by the set load of the pres-

sure-regulating spring 65. Since the pressure of the fuel passage 40 is thus automatically regulated at a predetermined value, the fuel injection pressure from the fuel injection valve 1 is controlled appropriately.

[0041] Furthermore, fuel discharged from the regulator valve 41 falls onto an upper face of the upper bearing bracket 27, and is returned to the fuel tank T via the latching hole 19 of the pump holding part 7, etc.

[0042] When assembling the module body B, the connection tube 56 of the second block B2 is firstly equipped with the regulator valve 41, subsequently the boss extension part 5b of the second block B2 is fitted into the support tube 4a of the first block B1, and the first and second bonding planes P1 and P2 are welded as described above. Furthermore, the seventh bonding plane P7 of the first block B1 and the eighth bonding plane P8 of the fourth block B4 are welded as described above. In this way, an assembly of the mounting base 4, the fuel feed pipe 5, and the coupler 6 is first produced.

[0043] Subsequently, the fourth bonding plane P4 and the sixth bonding plane P6 of the third block B3 are welded to the third bonding plane P3 of the second block B2 and the fifth bonding plane P5 of the first block B1 respectively as described above, thus completing the module body B.

[0044] In such a fuel supply module M, since the module body B is formed as described above by dividing it into the first block B1, which includes the mounting base 4, the second block B2, which includes the fuel feed pipe 5 and the first boss 5a supporting the base thereof, the third block B3, which includes the pump holding part 7, and the fourth block B4, which includes the coupler 6 and the second boss 6a supporting the base thereof, individually molding them, and welding them, it is possible to obtain a plurality of types of module bodies B having different shapes and dimensions by preparing a plurality of types of some of the first to fourth blocks B1 to B4 having different shapes and dimensions and combining and welding the plurality of types of some of the blocks with another block. Therefore, when such a plurality of types of module bodies B are produced, since it is only necessary to prepare molds corresponding to the plurality of types of some of the blocks, compared with a case in which a plurality of types of an entire mold are prepared according to the types, it is possible to greatly reduce the production cost of the molds. Moreover, dividing the module body B into the first to fourth blocks B1 to B4 enables the shape of each block to be simplified, the shape of the mold corresponding to each block is therefore also simplified, and this also contributes to a reduction in the production cost of the mold. In this way, fuel supply modules that include a plurality of types of module bodies can be provided at low cost.

[0045] In this arrangement, since in particular the support tube 4a is formed on the first block B1, the boss extension part 5b extending downward in the axial direction from the first boss 5a is fitted into the inner periphery of the support tube 4a, the first bonding plane P1 at the

upper end of the support tube 4a and the second bonding plane P2 of the second block B2 are welded, the third bonding plane P3 at the lower end of the boss extension part 5b and the fourth bonding plane P4 of the third block B3 are welded, the fifth bonding plane P5 on the lower face of the first block B1 and the sixth bonding plane P6 on the upper face of the third block B3 are welded, and the boss extension part 5b and the third block B3 are respectively provided with the first and second through holes 45 and 46, which communicate directly with each other to form the fuel passage 40, the welded parts of the first and second bonding planes P1 and P2 are disposed on the atmosphere side of the welded parts of the third and fourth bonding planes P3 and P4, through which the fuel passage 40 runs, and the pressure of the fuel passage 40 therefore does not act on the welded parts of the first and second bonding planes P1 and P2. There can therefore be expected an effect in preventing high pressure fuel discharged from the electric pump 2 from leaking to the exterior by blocking it with the first and second bonding planes P1 and P2 even if, due to weld failure, etc, it leaks past the welded parts of the third and fourth bonding planes P3 and P4, on which the pressure thereof acts.

[0046] Moreover, since in particular the welded third and fourth bonding planes P3 and P4 are disposed closer to the interior of the fuel tank T than the support tube 4a, even if fuel leaks past the welded parts of the third and fourth bonding planes P3 and P4, it can be returned to the fuel tank T, and this, coupled with the presence of the welded parts of the first and second bonding planes P1 and P2, enables the leakage of fuel to the exterior to be more reliably prevented.

[0047] Moreover, since the clearance 42 for opening the periphery of the welded third and fourth bonding planes P3 and P4 to the internal space of the fuel tank T is provided in the first block B1, if fuel leaks past the welded parts of the third and fourth bonding planes P3 and P4, it can be returned to the fuel tank T smoothly through the clearance 42, thereby enabling the leakage of fuel to the exterior to be more reliably prevented.

[0048] The present invention is not limited to the above-mentioned embodiment, and may be modified in a variety of ways as long as the modifications do not depart from the spirit and scope thereof.

Claims

1. A fuel supply module comprising a module body (B) formed from a mounting base (4) mounted on an outer wall (10) of a fuel tank (T), a fuel feed pipe (5) projecting from an upper face of the mounting base (4), and a pump holding part (7) provided so as to be connected to a lower part of the mounting base (4), an electric pump (2) that pumps up fuel within the fuel tank (T) and discharges the fuel to the fuel feed pipe (5) via a fuel passage (40) being held in

the pump holding part (7),

characterized in that the module body (B) is divided into a first block (B1) comprising the mounting base (4), a second block (B2) comprising the fuel feed pipe (5) and a boss (5a) supporting a base of the fuel feed pipe (5), and a third block (B3) comprising the pump holding part (7), a support tube (4a) is formed on the first block (B1), a boss extension part (5b) extending downward in the axial direction from the boss (5a) is fitted into an inner periphery of the support tube (4a), the support tube (4a) and the second block (B2) are welded to each other, the third block (B3) is welded to an end face of the boss extension part (5b), the first and third blocks (B1, B3) are welded to each other, and the boss extension part (5b) and the third block (B3) are provided with first and second through holes (45, 46) respectively, the first and second through holes (45, 46) communicating directly with each other to form the fuel passage (40).

2. The fuel supply module according to Claim 1, wherein welded bonding planes (P3, P4) of the boss extension part (5b) and the third block (B3) are disposed closer to the interior of the fuel tank (T) than the support tube (4a).
3. The fuel supply module according to Claim 2, wherein a clearance (42) for opening the peripheral edge of the welded bonding planes (P3, P4) of the boss extension part (5b) and the third block (B3) to the internal space of the fuel tank (T) is provided in a lower face of the first block (B1).
4. The fuel supply module according to any one of Claims 1 to 3, wherein the welded bonding planes (P3, P4) of the boss extension part (5b) and the third block (B3) and the welded bonding planes (P5, P6) of the first and third blocks (B1, B3) are disposed on the same plane.

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FIG.1

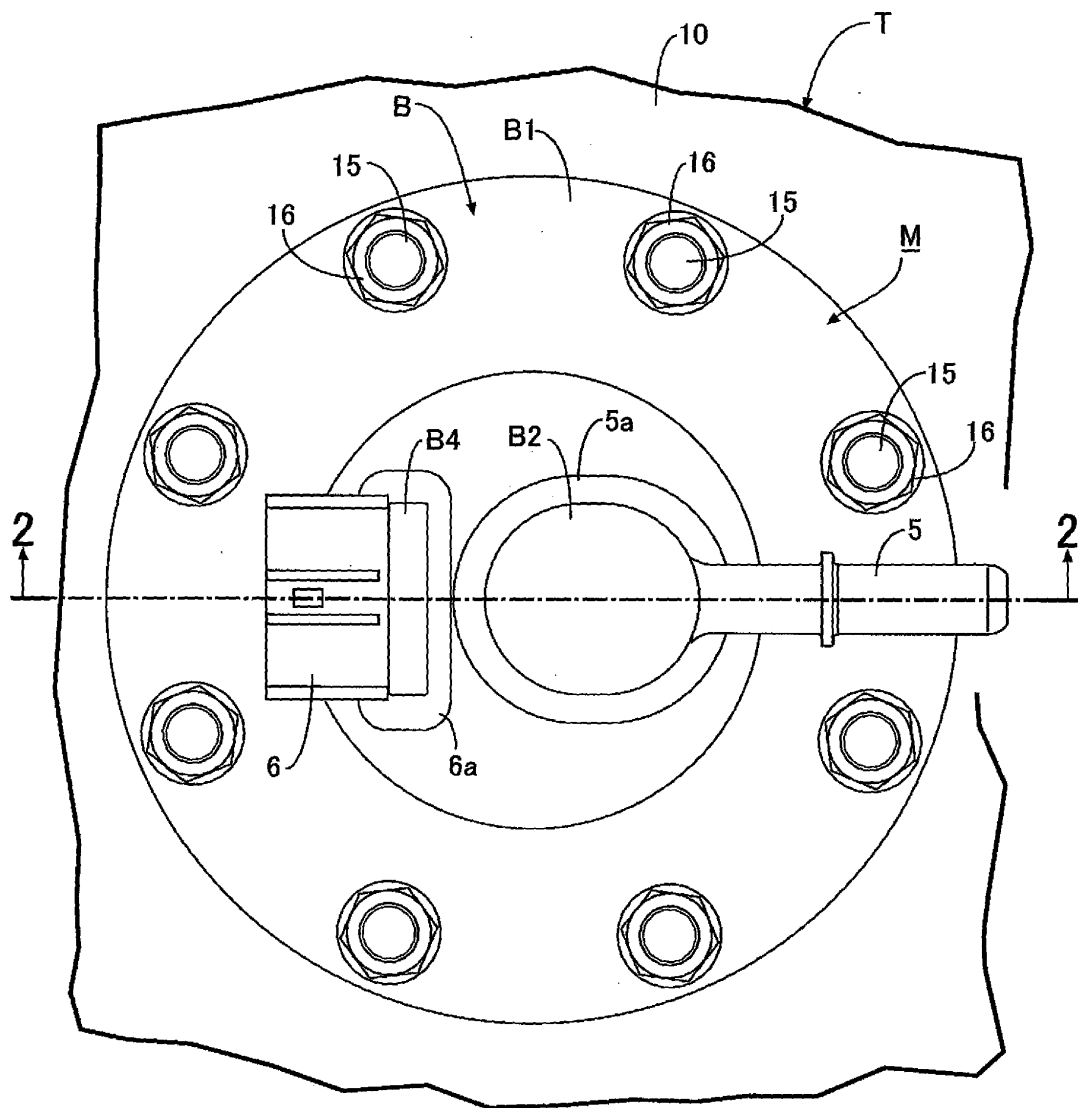


FIG.2

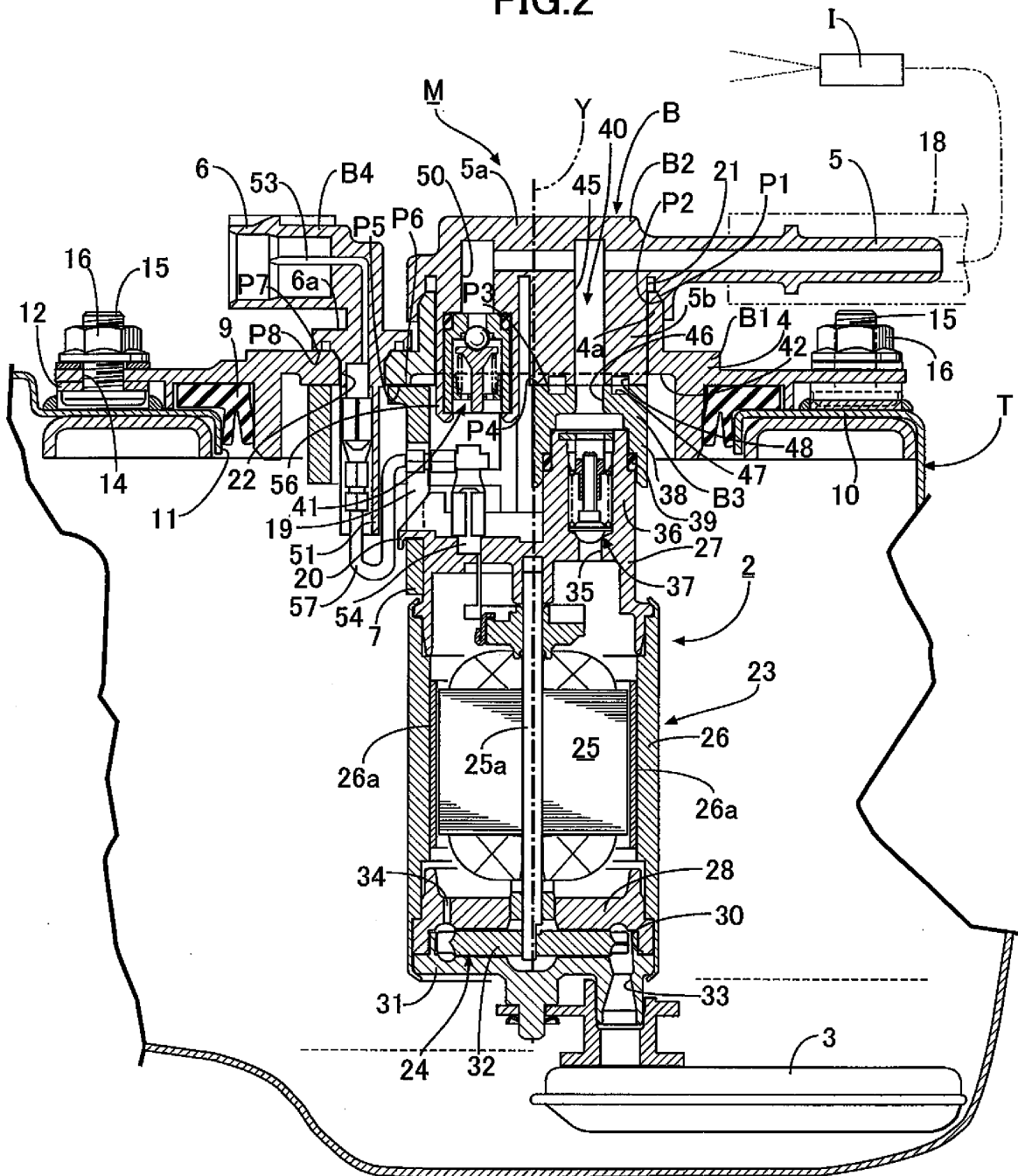
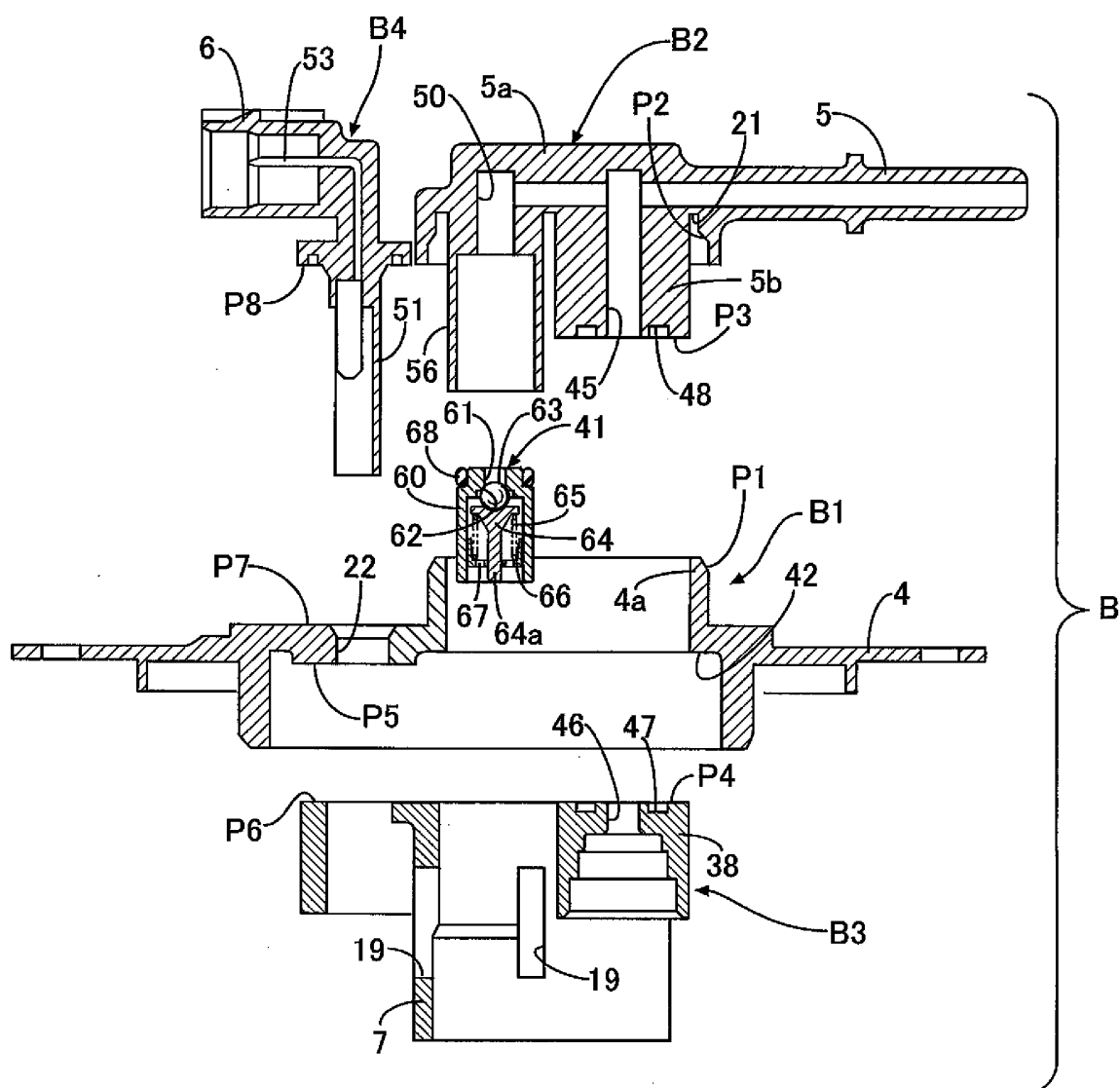


FIG.3



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2008/072481

A. CLASSIFICATION OF SUBJECT MATTER F02M37/00(2006.01) i, F02M37/10(2006.01) i		
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) F02M37/00, F02M37/10		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2009 Kokai Jitsuyo Shinan Koho 1971-2009 Toroku Jitsuyo Shinan Koho 1994-2009		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2002-371938 A (Toyota Motor Corp.), 26 December, 2002 (26.12.02), Par. Nos. [0023] to [0045]; Fig. 1 (Family: none)	1-4
Y	WO 02/016752 A1 (Mitsubishi Electric Corp.), 28 February, 2002 (28.02.02), Page 3, line 7 to page 7, line 3; Figs. 1 to 3 & EP 1310663 A1 Par. Nos. [0002] to [0027]; Figs. 1 to 3 & CN 1379844 A	1-4
Y	JP 2007-291866 A (Kehin Corp.), 08 November, 2007 (08.11.07), Par. Nos. [0019] to [0058]; Figs. 1 to 4 (Family: none)	3
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
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Date of the actual completion of the international search 05 January, 2009 (05.01.09)		Date of mailing of the international search report 20 January, 2009 (20.01.09)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2007291867 A [0002]