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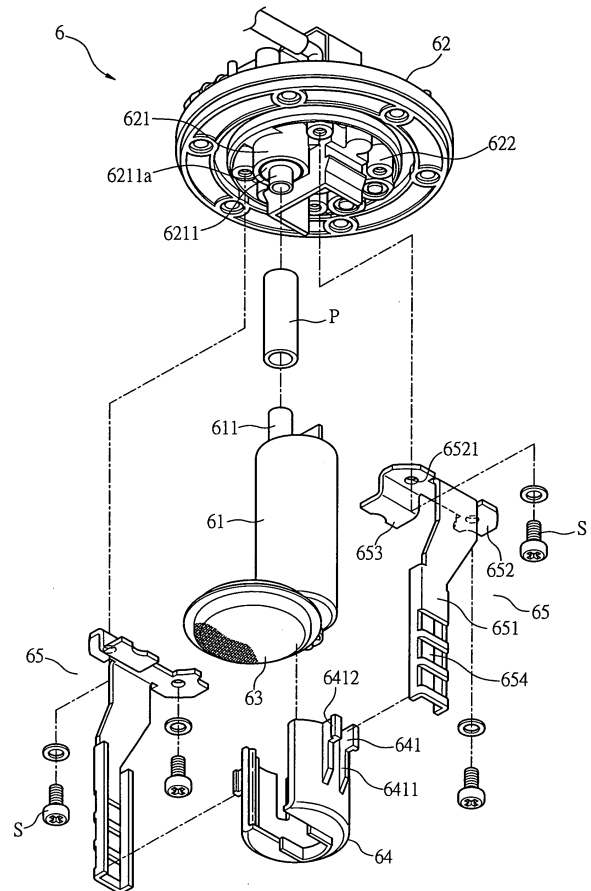
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(54) **Structure of motorcycle fuel pump**

(57) A motorcycle fuel pump (6) includes a main body (61) and a cover (62). The main body (61) forms a fuel discharge outlet, which is connected by a high pressure fuel hose to a connection tube of the cover (62). A filter (63) is mounted to a lower end of the main body (61). A lower portion of the main body (61) is fit to a fuel pump support (64). The fuel pump support (64) has an outer surface on which locking sets (641) are formed. An adjustment mechanism (65) is mounted to the cover (62) and forms a plurality of adjustment openings (654) to selectively and releasably engage the respective locking sets (641) to thereby set the fuel pump (6) at different depths inside a fuel tank in order to ensure that the filter (63) is always located close to the bottom of the fuel tank.



**FIG.5**

## Description

### BACKGROUND OF THE INVENTION

#### (a) Technical Field of the Invention

**[0001]** The present invention relates to a motorcycle fuel pump, and in particular to a fuel pump structure that allows adjustment of the distance between the fuel pump and the bottom of a fuel tank in which the fuel pump is installed.

#### (b) Description of the Prior Art

**[0002]** A motorcycle incorporating a fuel injection engine requires a fuel pump. As shown in Figure 1 of the attached drawings, a conventional fuel tank 1 is provided with a fuel pump mount 11. Out-feeding of fuel from the tank 1 is generally performed by a fuel pump 12 mounted to the tank 1 by the fuel pump mount 11. The fuel pump 12 is generally located inside the tank 1 and has an inlet 121 to which a filter net 13 is mounted for filtering the fuel drawn in to the fuel pump 12 in order to ensure the supply of clean fuel to a fuel injection device of the engine. However, to satisfy the general consumers, the design of motorcycle must be innovated frequently, which leads to change and modification of outside look and internal parts of the motorcycle. Once the design of the fuel tank 1 is changed, the fuel pump 12 must be modified accordingly, in order to ensure the filter net 13 of the fuel pump 12 is always located in proximity to the bottom of the fuel tank 1 to carry out filtering of the fuel drawn into the fuel pump 12.

**[0003]** To cope with such a problem, a fuel pump as shown in Figure 2 is available in the market, which is generally designated at 20. The fuel pump 20 comprises a cover 21 forming a flange 211 and an insertion cylindrical portion 212 extending therefrom. The insertion cylindrical portion 212 defines in a wall thereof retention holes 213. The flange 211 serves to fix the fuel pump 20 to a fuel tank 2. The fuel pump 20 comprises a pump shade 22, from which a frame 221 extends. The frame 221 is further extended and terminates at a support barrel 222 that forms pawls 223 for engaging the retention holes 213 of the insertion cylindrical portion 212 of the cover 21. The pump shade 22 also forms retention holes 224 which engage the pawls 225 formed on the frame 221 to couple the pump shade 22 to the frame 221. The fuel pump 20 is connected to a fuel discharge pipe 25 by a connection tube 24 for out-feeding of fuel from the tank 2.

**[0004]** When the fuel tank 2 is modified in accordance with design change of the motorcycle to thereby change the depth of the tank 2, only the connection tube 24 and the pump shade 22 need to be modified to change the lengths thereof in order to maintain the filter net 23 of the fuel pump 20 close to the bottom of the tank 2. In this way, the fuel pump 2 is applicable to various types of tanks 2. The fuel pump 2 of this type, although applicable

to different designs of fuel tank, still need to change or modify two of the components thereof, namely the connection tube 24 and the pump shade 22. Since the pump shade 22 is often made by plastic injection molding, once the shade 22 must be changed for increased length, the mold used in the injection molding for the shade 22 must be completely replaced. This increases the costs of molds and eventually adds to the overall manufacturing costs.

**[0005]** Thus, it is desired to provide a motorcycle fuel pump that overcomes the drawbacks of the conventional fuel pumps.

### SUMMARY OF THE INVENTION

**[0006]** The primary purpose of the present invention is to provide a motorcycle fuel pump, which comprises a main body and a cover, which is fixed to a top of a fuel tank. The main body forms a fuel discharge outlet, which is connected by a high pressure fuel hose to a connection tube of the cover. A filter is mounted to a lower end of the main body. A lower portion of the main body is fit to a fuel pump support. The fuel pump support has an outer surface on which locking sets are formed. An adjustment mechanism is mounted to the cover and forms a plurality of adjustment openings to selectively and releasably engage the respective locking sets to thereby set the fuel pump at different depth inside a fuel tank. By selectively engaging the locking sets of the fuel pump supports that carries the main body of the fuel pump with properly selected ones of the adjustment openings of the adjustment mechanism that is fixed to the top of the fuel tank, the filter that is mounted to the lower end of the main body can always be set at a location close to the bottom of the fuel tank for drawing fuel into the pump. Further, the location adjustability of the main body of the fuel pump also helps to reduce the costs for making new molds that are used to mold parts of the fuel pump in case that a new design of fuel tank is adopted.

**[0007]** The foregoing object and summary provide only a brief introduction to the present invention. To fully appreciate these and other objects of the present invention as well as the invention itself, all of which will become apparent to those skilled in the art, the following detailed description of the invention and the claims should be read in conjunction with the accompanying drawings. Throughout the specification and drawings identical reference numerals refer to identical or similar parts.

**[0008]** Many other advantages and features of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0009]**

Figure 1 is a cross-sectional view of a fuel tank which a conventional fuel pump is installed;

Figure 2 is a cross-sectional view of another known fuel pump;

Figure 3 is a side elevational view of a motorcycle comprising a fuel tank that incorporates a fuel pump constructed in accordance with the present invention;

Figure 4 is a plan view of a fuel tank that incorporates a fuel pump in accordance with the present invention;

Figure 5 is an exploded view of a fuel pump constructed in accordance with the present invention;

Figure 6 is a perspective view, in an assembled form, of the fuel pump of the present invention; and

Figure 7 is a perspective view illustrating the adjustment of the fuel pump in accordance with the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0010]** The following descriptions are of exemplary embodiments only, and are not intended to limit the scope, applicability or configuration of the invention in any way. Rather, the following description provides a convenient illustration for implementing exemplary embodiments of the invention. Various changes to the described embodiments may be made in the function and arrangement of the elements described without departing from the scope of the invention as set forth in the appended claims.

**[0011]** With reference to the drawings, and in particular to Figure 3, a motorcycle, generally designated at 3, comprises a seat 31 under which a storage box 32 is formed. A power unit 4 is further arranged below the storage box 32. The motorcycle 3 further comprises a footstep 33 below which a fuel tank 5 for containing therein fuel for the motorcycle 3. The operation of the motorcycle 3 is that fresh air is drawn through an air filter 34 to remove dirt and foreign objects therefrom for supply of clean air to mix the fuel supplied from the fuel tank in a carburetor for forming an air-fuel mixture. The air-fuel mixture is fed into a combustion chamber of an engine 41 of the power unit for combustion, which generates mechanical power to drive the rotation of a crankshaft. The crankshaft in turns rotates, via a gear-based transmission system, a rear wheel RW, which in turn causes the rotation of a front wheel FW to move the motorcycle 3 forward.

**[0012]** Also referring to Figures 4 and 5, in accordance with the present invention, the fuel tank 5 is provided with a fuel in-feeding pipe 51, a level gauge mount 52, and a fuel pump 6. The fuel in-feeding pipe 51 functions to receive filling of fuel for replenishment of the tank 5. The level gauge mount 51 functions to retain a level gauge,

which detects the residual amount of fuel inside the tank 5 and displays the result of detection on for example a dashboard or on a fuel meter. For out-feeding of fuel from the fuel tank 5, the fuel pump 6 is provided, comprising a main body 61, a cover 62, a filter net 63, a fuel pump support 64, and an adjustment mechanism 65.

**[0013]** The main body 61 forms, on a top thereof, a fuel discharge outlet 611 and is provided, at a bottom thereof, with the filter net 63. A lower portion of the main body 61 is set on the fuel pump support 64.

**[0014]** The cover 62 is fixed to a top surface of the fuel tank 5 and comprises a connection tube seat 621 extending from an underside thereof. The connection tube seat 621 is coupled to a connection tube 6211, which has an upper end forming a flange 6211 a. A high-pressure fuel hose P is fit onto the connection tube 6211 and is also connected to the fuel discharge outlet 611 of the main body 61. The underside of the cover 62 also forms a plurality of threaded members 622, preferably in the form of internally-threaded projections, for engaging threaded fasteners S of the adjustment mechanism 65.

**[0015]** The filter net 63, which is arranged on the bottom of the main body 61 of the fuel pump 6, is located close to the bottom of the fuel tank 5 to allow the filter net 63 to filter out impurities entraining fuel flowing into the fuel pump 6 thereby ensuring supply of clean fuel to the engine 41.

**[0016]** The fuel pump support 64 comprises a cylindrical body fit over a lower portion of the main body 61 of the fuel pump 6. The fuel pump support 64 can be made of plastics by injection molding and forms, on an outer surface thereof, two locking sets 641 on opposite sides of the fuel pump support 64. Each locking set 641 comprises two vertical tabs 6411 extending sideways from the side surface of the fuel pump support 64. Each tab 6411 forms, on an upper portion thereof, a further sideways extending barb 6412. The barbs 6412 are arranged to face opposite directions.

**[0017]** The adjustment mechanism 65 comprises two boards made of for example plastics or metals and arranged to be opposite to each other. Each board of the adjustment mechanism 65 forms a frame 651 in which a plurality of adjustment openings 654 lined up vertically. The openings 654 are preferably rectangular in shape and engageable with the barbs 6412 of the corresponding locking set 641 of the fuel pump support 64. Each board of the adjustment mechanism 65 forms on an upper end thereof a fixing section 652 in which holes 6521 corresponding to the threaded members 622 of the cover 62 are defined. The fixing section 652 forms an extension in which an engaging portion 653 is formed. The engaging portion 653 is arranged to engage and abut against the flange 6211 a of the connection tube 6211.

**[0018]** Also referring to Figure 6, to install the fuel pump 6 of the present invention, the fuel pump support 64 is first fit over the lower portion of the main body 61 of the fuel pump 6 and the adjustment openings 654 of the frames 651 of the adjustment mechanism 65 are

pressed to fit over the barbs 6412 of the locking sets 641 of the fuel pump support 64, whereby the barbs 641 of each locking set 641 respectively engage opposite sides of a selected one of the openings 654 of the corresponding frame 651. Thus, the adjustment mechanism 65 is attached to the fuel pump support 64. The high pressure fuel hose P is then fit, with opposite ends thereof, over the connection tube 6211 and the fuel discharge outlet 611, respectively. The threaded fasteners S are set through the holes 6521 of the fixing sections 651 of the adjustment mechanism 65 and engage the corresponding threaded members 622 on the underside of the cover 62, with the engaging portions 653 of the adjustment mechanism 65 clamping onto the connection tube 6211 extending from the connection tube seat 621. By means of the engagement between the locking sets 641 of the fuel pump support 64 and the respective adjustment openings 654 and threading fixation of the fixing sections 652 to the underside of the cover 62, the main body 61 of the fuel pump 6 can be securely and firmly fixed, and undesired shaking or vibration of the main body 61 of the fuel pump 6 inside the fuel tank 5 can be eliminated.

**[0019]** Also referring to Figure 7, when modification of the fuel tank 5 by changing the depth of the fuel tank 5 is desired to accord with the design change of the motorcycle, the frames 651 of the adjustment mechanism 65 are separated from the fuel pump support 64 by disengaging the barbs 6412 from the opposite sides of the adjustment opening 654. In this respect, it is preferable that the tabs 6411 that support the barbs 6412 or the barbs 6421 themselves are made resilient and elastically deformable. By separating the frames 651 from the fuel pump support 64, the frames 651 are allowed to move relative to the fuel pump support 64 to have the barbs 6412 engaging another one of the adjustment openings 654 thereby setting the main body 61 of the fuel pump 6 that is carried by the fuel pump support 64 at a different position with respect to the frames 651 that are secured to the underside of the cover 62, which is in turn fixed to the top surface of the fuel tank 5. In this way, the main body 61 of the fuel pump 6 can be set at a location accommodating the depth change of the fuel tank 5 and the filter net 63 is again positioned close to the bottom of the fuel tank 5. The high pressure fuel hose P is then replaced with one of a suitable length sufficiently extending from the connection tube 6211 to the fuel discharge outlet 611 of the main body 61 of the fuel pump 6.

**[0020]** The effectiveness of the present invention resides in that the location of the main body 61 of the fuel pump 6 in the depth direction of the fuel tank 5 can be easily adjusted by means of the adjustment mechanism 65, which comprises two frames 651, preferably arranged in a symmetric or opposite manner, and a fuel pump support 64 arranged on the lower portion of the main body 61 of the fuel pump 6, wherein the fuel pump support 64 has, on opposite sides thereof, two locking sets 641 forming barbs 6412 to selectively engage vertically arranged openings 654 formed in the respective

frames 651. Therefore, in change of design of the fuel tank, there is no need to remold the components of the fuel pump and associated parts thereof, thereby saving costs. Further, the main body 61 of the fuel pump 6 can be securely fixed inside the fuel tank with the filter net 63 of the fuel pump 6 surely located close to the bottom of the fuel tank 5 to realize filtering of fuel drawn into the fuel pump.

**[0021]** It will be understood that each of the elements described above, or two or more together may also find a useful application in other types of methods differing from the type described above.

**[0022]** While certain novel features of this invention have been shown and described and are pointed out in the annexed claim, it is not intended to be limited to the details above, since it will be understood that various omissions, modifications, substitutions and changes in the forms and details of the device illustrated and in its operation can be made by those skilled in the art without departing in any way from the spirit of the present invention.

## Claims

### 1. A fuel pump comprising:

a main body having an upper end forming a fuel discharge outlet;  
 a cover having an underside forming a connection tube corresponding to the fuel discharge outlet, the underside also forming a plurality of threaded members;  
 a filter mounted to a lower end of the main body;  
 a fuel pump support having an outer surface on which two locking sets are formed on opposite sides of the fuel pump support; and  
 an adjustment mechanism secured to the threaded members of the cover and comprising frames each defining a plurality of adjustment openings;  
 wherein each locking set is releasably and selectively engageable with a selected one of the adjustment openings of the respective frame of the adjustment mechanism to set the main body of the fuel pump to a corresponding location with respect to the cover.

2. The fuel pump as claimed in Claim 1, wherein each frame of the adjustment mechanism comprises a fixing section.

3. The fuel pump as claimed in Claim 2, wherein the fixing section forms an engaging portion.

4. The fuel pump as claimed in Claim 3, wherein the engaging portion engages and abuts against a flange of the connection tube.

5. The fuel pump as claim in Claim 1, wherein the adjustment mechanism comprises two frames, which are symmetrically arranged.
6. The fuel pump as claimed in Claim 1, wherein the adjustment openings are rectangular in shape. 5
7. The fuel pump as claimed in Claim 1, wherein the locking set comprises two plates extending sideways from the outer surface of the fuel pump support, each plate having an upper portion forming a barb. 10
8. The fuel pump as claimed in Claim 1, wherein the adjustment mechanism comprises boards made of plastics or metal. 15

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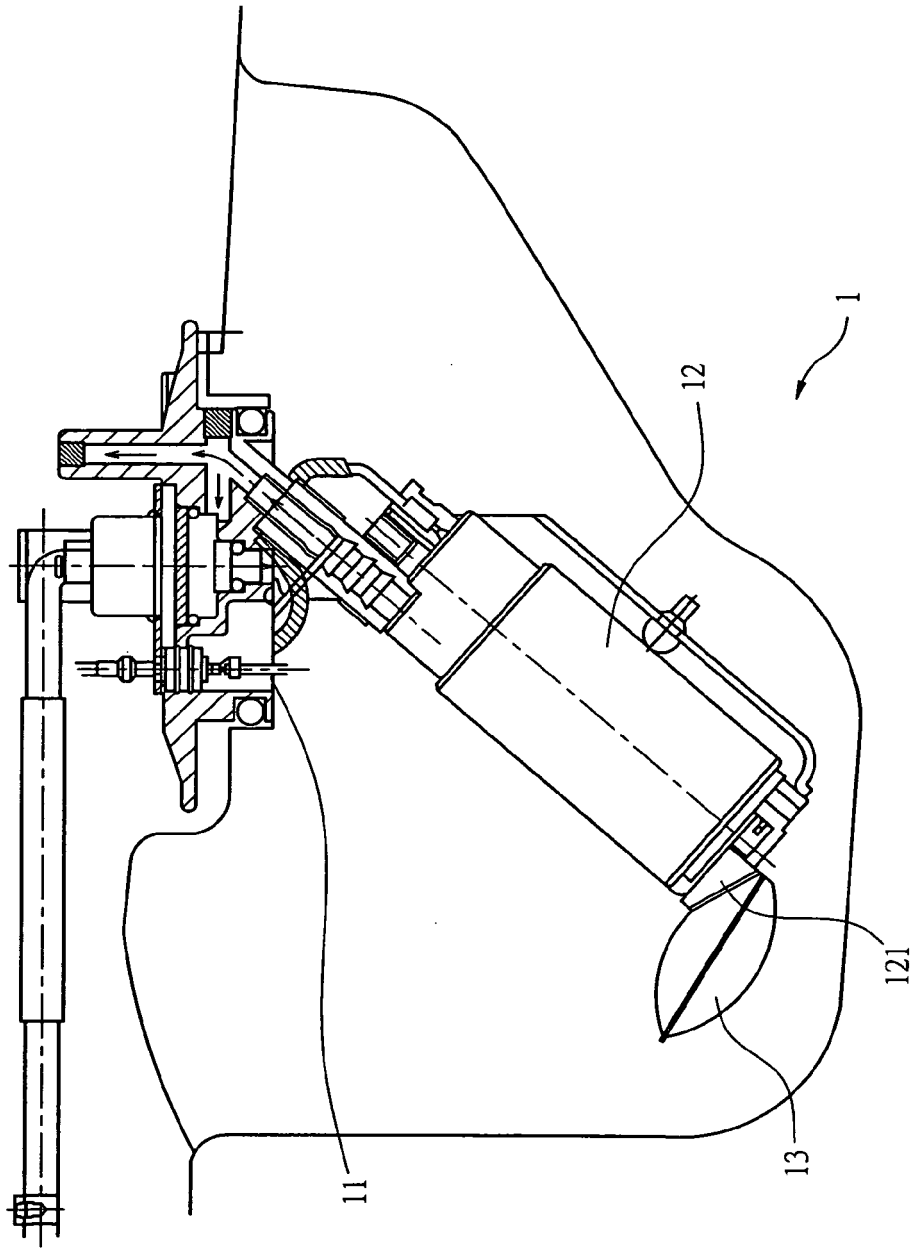
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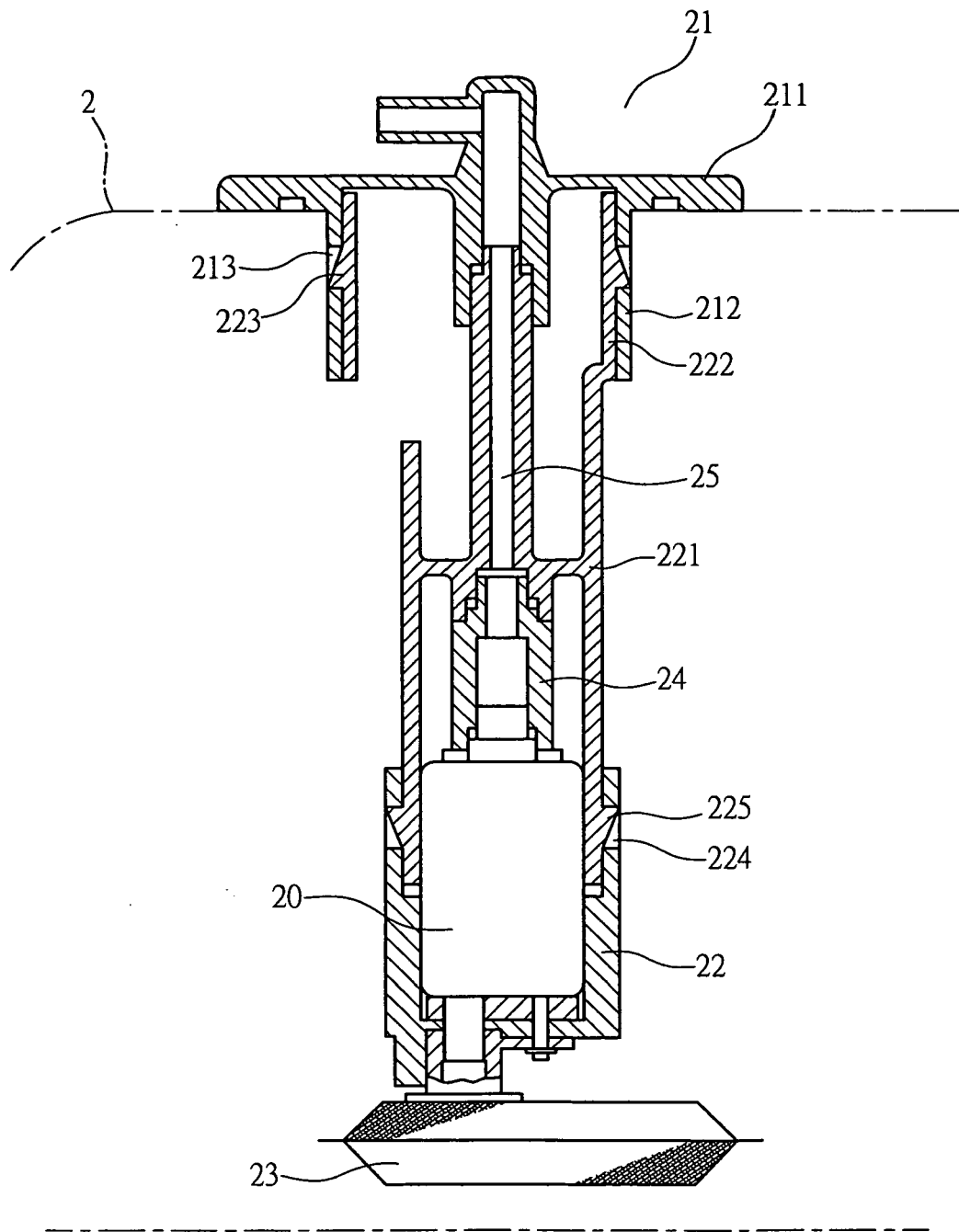
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*PRIOR ART*

FIG.1



*PRIOR ART*

FIG. 2

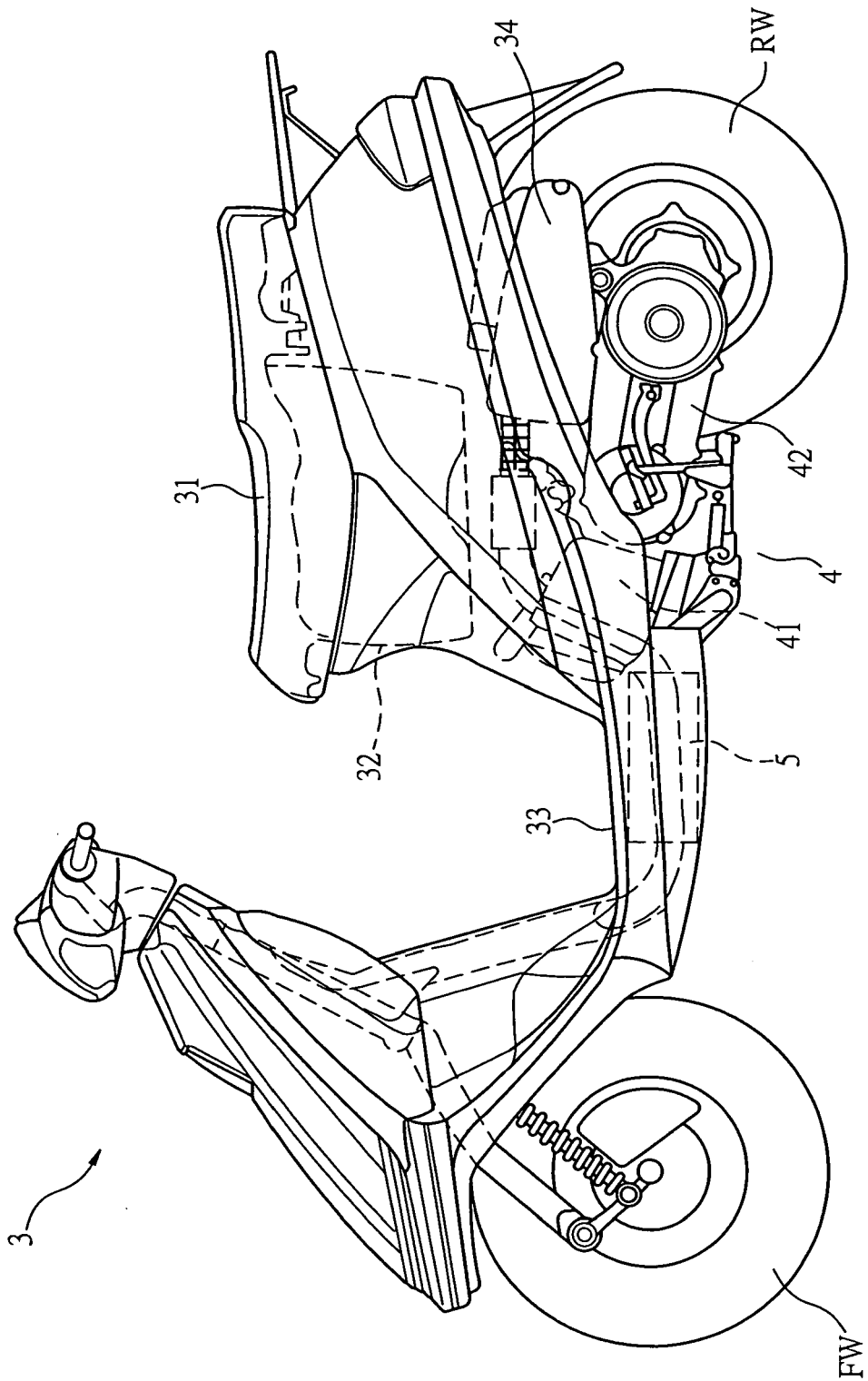


FIG.3

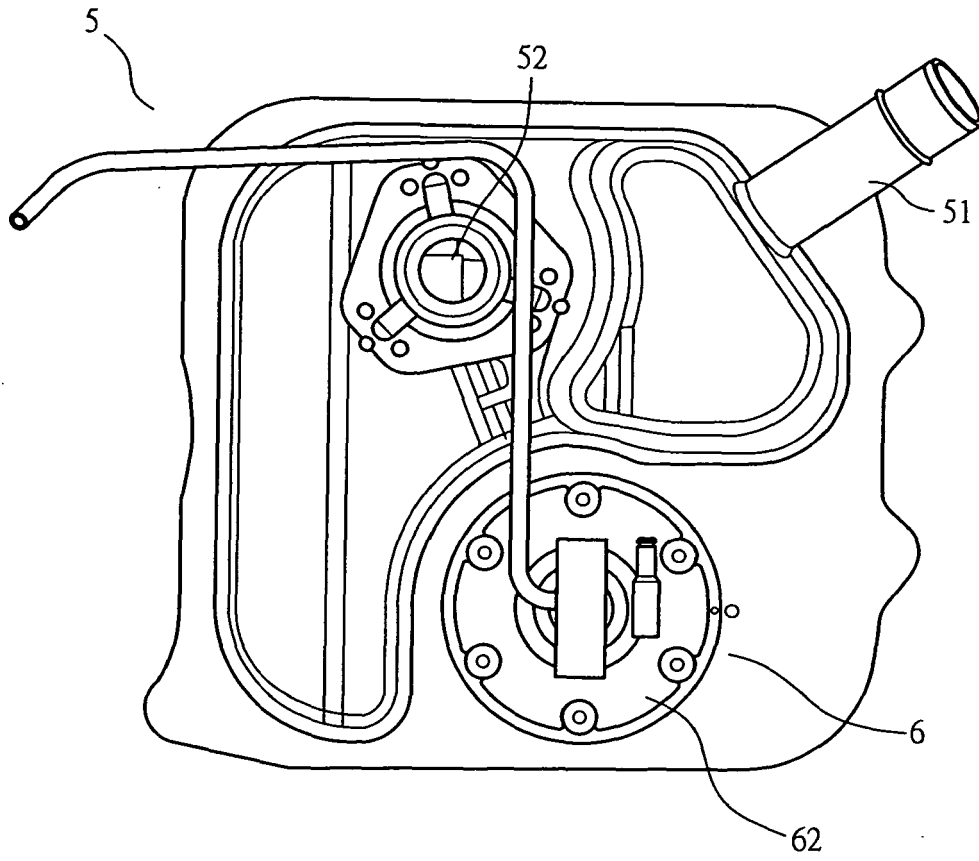


FIG.4

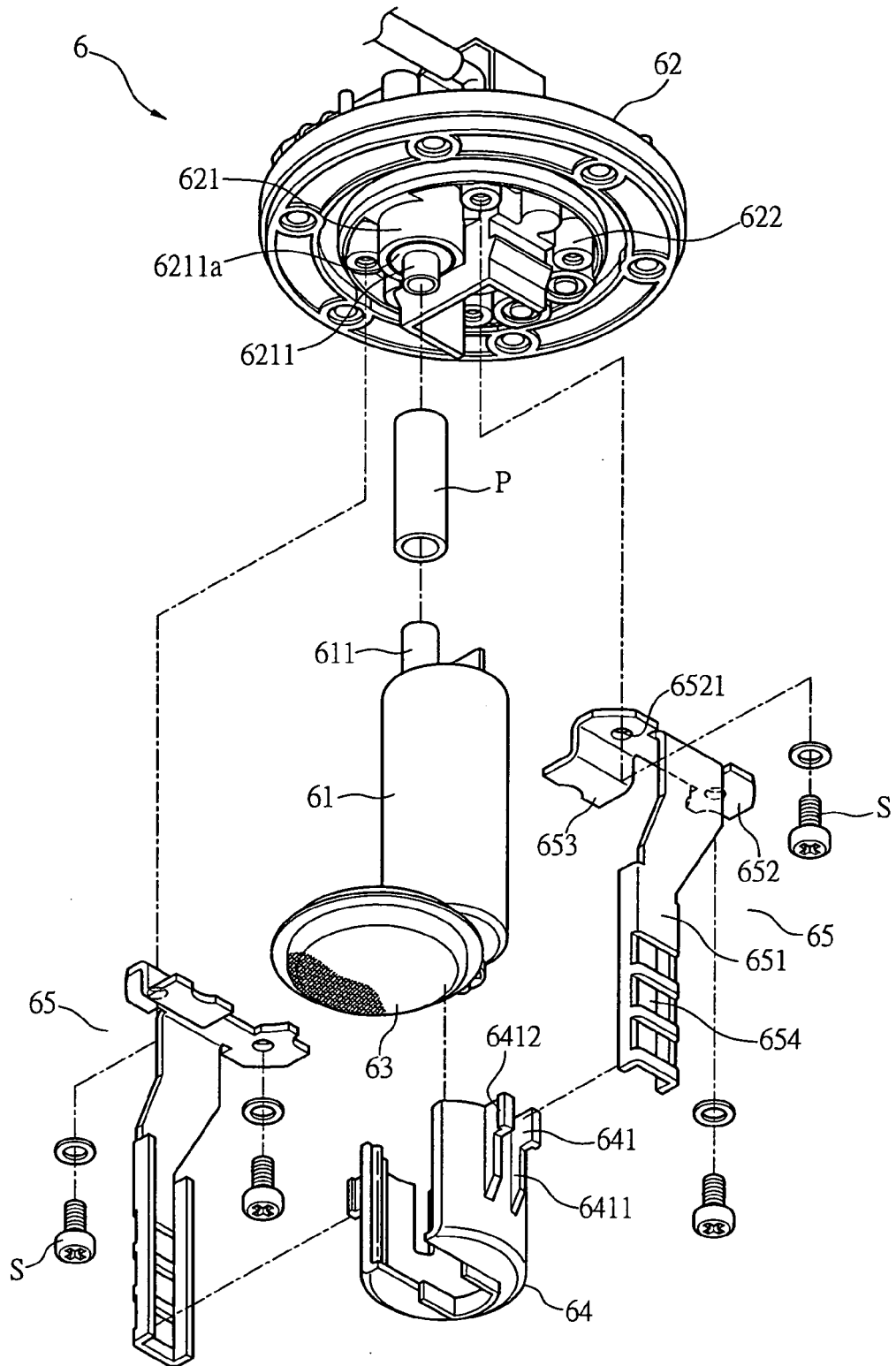


FIG.5

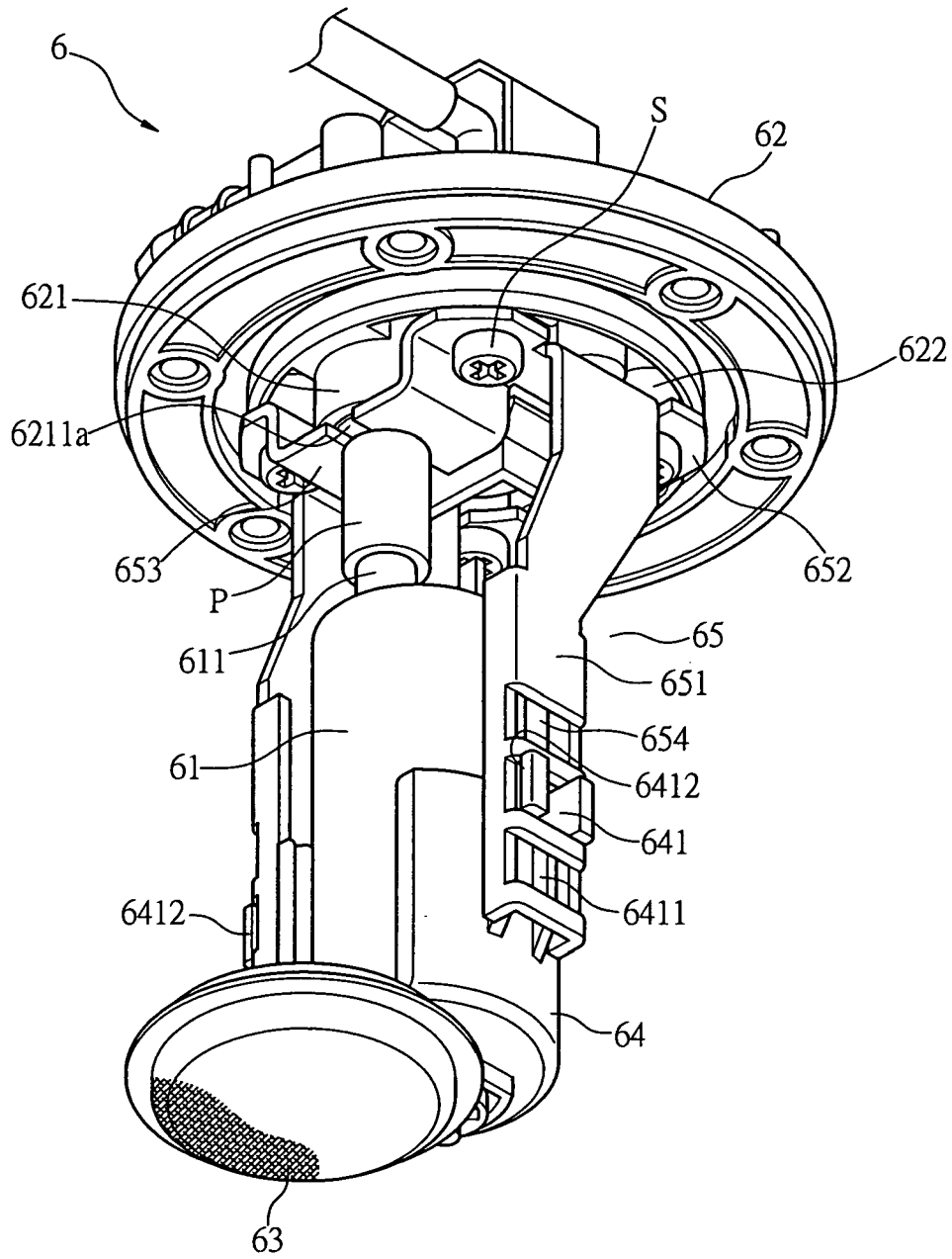


FIG.6

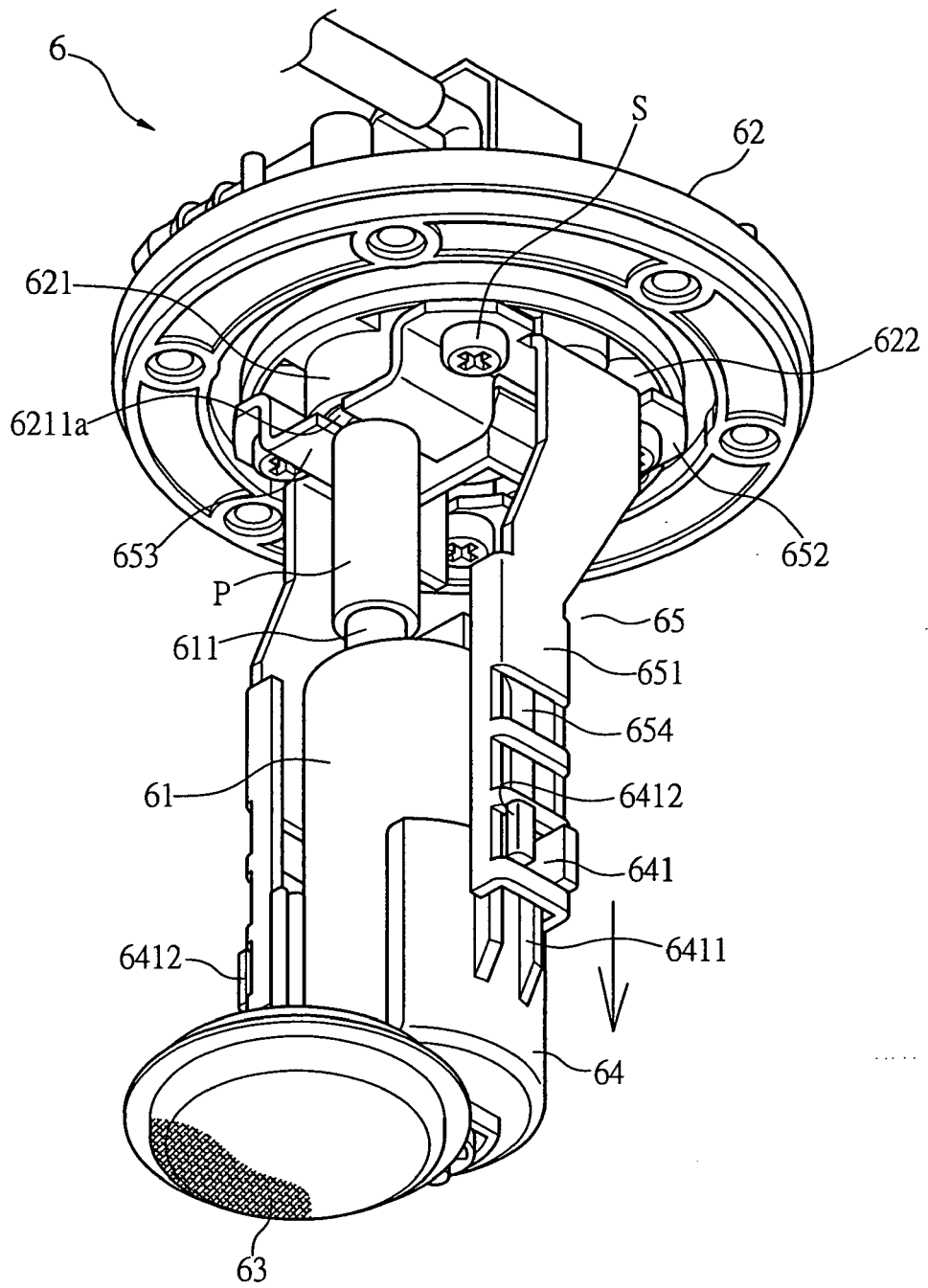


FIG.7



## EUROPEAN SEARCH REPORT

Application Number  
EP 07 02 4696

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2 963 203 A (HOELLE JAMES C) 6 December 1960 (1960-12-06) * column 2, line 34 - column 3, line 46; figures 1-3 *	1-6,8	INV. F02M37/10
A	US 3 193 151 A (JEEP JR CHARLES W ET AL) 6 July 1965 (1965-07-06) * column 2, line 11 - column 2, line 65; figure 2 *	1	
A	US 2 370 590 A (TAYLOR EUGENE C) 27 February 1945 (1945-02-27) * page 1, column 2, line 14 - page 1, column 2, line 55; figure 1 *	1	
A	JP 2007 291867 A (KEIHIN CORP) 8 November 2007 (2007-11-08) * abstract; figures 1,2 *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			F02M
Place of search		Date of completion of the search	Examiner
Munich		1 October 2008	Marsano, Flavio
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 02 4696

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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01-10-2008

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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US 3193151	A	06-07-1965	NONE	
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82