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(54) **Fuel pump mounting structure of motorcycle**

(57) Disclosed is a fuel pump mounting structure of motorcycle. A motorcycle includes a fuel tank (7) in which a fuel pump (5) assembly is mounted. The fuel tank (7) has a bottom forming an inward recessed portion. The inward recessed portion (74) has an upper end portion (741) and a lower end portion (742). The upper end portion (741) of the inward recessed portion (74) forms a mounting hole (721). The fuel pump assembly is mounted

to the mounting hole. The fuel pump assembly includes a support arm (4) and the support arm supports a fuel pump in such a way to allow the fuel pump to extend into and locate close to the lower end portion of the inward recessed portion (74) of the fuel tank (7), so that the operation load of the fuel pump (5) is reduced and fuel drawing efficiency is increased, and further, the maintenance and assembling of the fuel pump (5) is simplified.

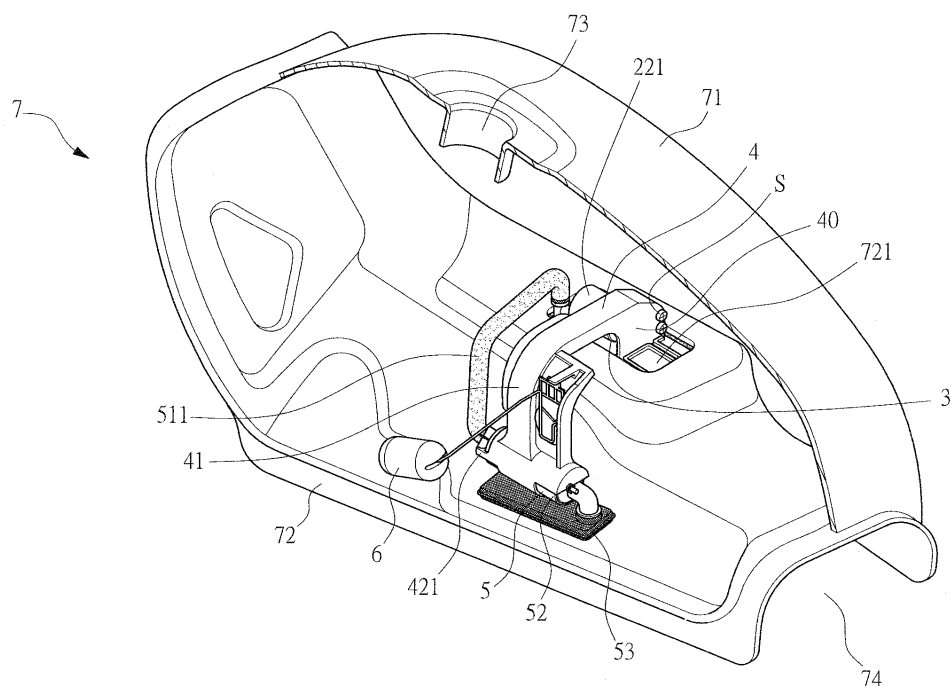


FIG.6

Description

(a) Technical Field of the Invention

[0001] The present invention generally relates to a mounting structure for a fuel pump of motorcycle, and more particularly to a fuel pump mounting structure that reduces the operation load of a fuel pump of a straddling injection engine motorcycle and increases fuel drawing efficient and simplifies the operation of maintenance and assembling.

(b) Description of the Prior Art

[0002] Motorcycles have been widely used by the public to serve as a short-distance transportation measure for the public. A great number of motorcycles are sold worldwide each year, making a great contribution to the development of economics. In respect of transportation, besides the public transportation devices, such as subways and public buses, there are a variety of private transportation devices, such as cars and motorcycles. Among all these known transportation devices, motorcycles have the advantages of convenience and efficiency and this is of no match by other transportation devices.

[0003] Motorcycles are generally classified as scooters and straddling type motorcycles.

[0004] As shown in FIG. 1, a conventional straddling type motorcycle 1 is composed of a number of constituent components, including a steering mechanism 11, a frame unit 12, a power unit 13, a fuel tank 14, and a driver's seat 15.

[0005] The steering mechanism 11 comprises a handlebar 112 arranged on a head tube seat 111. A head light FL is mounted at the front side of the head tube seat 111. A front shock absorber 113 is set below the head tube seat 111. The front shock absorber 113 supports a front wheel FW. A front fender 16 is arranged between the head tube seat 111 and the front wheel FW.

[0006] The frame unit 12 comprises a main tube 12a, which extends rearward from an upper portion of the head tube seat 111 in a downward inclined direction.

[0007] A pair of left and right lower tubes 12b extends from left and right sides of a middle portion of the head tube seat 111 in a downward direction to form a pair of horizontal connection sections 12b 1 of which rear ends extend upward to form rear inclined sections 12c.

[0008] The main tube 12a has a rear end portion to which a seat frame 12d is mounted. The seat frame 12d extends rearward to the rear side of the vehicle body. The seat frame 12d has a middle portion connected to upper ends of the rear inclined sections 12c of the lower tubes 12b to form a structure to support the seat frame 12d from the lower side.

[0009] Further, the main tube 12a, the lower tubes 12b, and the rear inclined sections 12c form a triangle when viewed sideways, in which the power unit 13 is suspended between the main tube 12a and the lower tubes 12b.

The seat frame 12d extends from a front end portion of the driver's seat 15 in a direction toward the rear side of the motorcycle 1 to the tail of the vehicle. The seat frame 12d is provided for supporting the driver's seat 15. The seat frame 12d has a rear section of which a suitable location coupled to a rear shock absorber 121 and the rear shock absorber 121 supports a rear wheel RW. The rear end portion of the seat frame 12d is coupled to a tail light RL. A rear fender 17 is arranged between the tail light RL and the rear wheel RW.

[0010] The power unit 13 comprises at least an engine section 131, a crankshaft transmission section 132, and an exhaust pipe 133. The engine section 131 comprises a piston and a combustion chamber (not shown). The crankshaft transmission section 132 comprises a crankshaft and a variable transmission system (not shown). The power unit 13 is suspended on the frame unit 12.

[0011] The fuel tank 14 is set between a rear end of the upper portion of the head tube seat 111 and the driver's seat 15. To allow the fuel tank 14 to straddle over the main tube 12a, the bottom of the fuel tank 14 forms an inverted U-shaped inward recessed portion 141 that is fit over the main tube 12a. The fuel tank 14 is composed of upper and lower shell members 14a, 14b (not shown) that are welded to each other so as to define a receiving space therein for receiving fuel for the motorcycle 1.

[0012] The driver's seat 15 comprises a cushion having a bottom forming a seat shell made of a rigid material and a top made of a soft material and enclosed by a decoration layer. With such an arrangement, a rider is allowed to sit on the motorcycle.

[0013] FIG. 2 shows the fuel tank 14 of the conventional straddling motorcycle 1. The fuel tank 14 is composed of an upper shell member 14a and a lower shell member 14b welded to each other. With the upper and lower shell members 14a, 14b welded to each other, together with the frame and outer configuration of the motorcycle, a receiving space for receiving fuel is formed in the fuel tank. The upper shell member 14a has a top forming a fuel filling opening 142, which serves to receive fuel filled into the fuel tank 14 when the fuel tank 14 runs short of fuel. Since the fuel tank 14 straddles over the main tube 12a of the frame unit 12, the lower shell member 14b forms an inverted U-shaped inward recessed portion 141 to allow the fuel tank 14 to straddle over the main tube 12a. Further, to allow fuel to be smoothly supplied from the fuel tank 14 to the power unit 13, a fuel pump 143 is provided on an upper portion of inward recessed portion 141 of the lower shell member 14b of the fuel tank 14. The fuel pump 143 comprises an inlet tube 1431 connected to a filter 1432 (serving as a fuel inlet port), so that the fuel pump 143 draws in fuel present in a lower portion of the fuel tank 14. The conventional fuel pump 143 is mounted inside the fuel tank 14 as described above. This allows the fuel pump 143 to supply fuel from the fuel tank 14 to the power unit 13.

However, although such a known mounting structure of the fuel pump 143 facilitates the performance of maintenance,

nance of the fuel pump 143, yet the filter 1432 (namely the fuel inlet port) is spaced from the body of the fuel pump 143 by quite a distance, so that the load of the operation of the fuel pump 143 is raised and the operation efficiency of the fuel pump 143 is reduced.

[0014] To solve such a problem associated with the fuel pump 143 set on the upper portion of the inward recessed portion 141 of the lower shell member 14b of the fuel tank 14 discussed above, a different arrangement of mounting fuel pump 143 is provided, as shown in FIG. 3. The different arrangement of mounting fuel pump 143 is to set the fuel pump 143 on one side of the lower portion of the inward recessed portion 141 of the lower shell member 14b of the fuel tank 14. This mounting structure of fuel pump 143 can effectively shorten the distance between the filter 1432 (namely the fuel inlet port) and the body of the fuel pump 143 to reduce the load of the operation of the fuel pump 143. However, since the fuel pump 143 is set on one side of the lower portion of the inward recessed portion 141 of the lower shell member 14b of the fuel tank, the performance of maintenance of the fuel pump 143 is subjected to constraint set by the width of the inward recessed portion 141, making the examination and maintenance of the very difficult. Thus, it is a challenge of the industry to provide a mounting structure of the fuel pump 143 that reduces the operation load of the fuel pump 143 and also simplifies the maintenance of the fuel pump 143 in order to overcome the drawbacks of the conventional mounting structure for fuel pump 143.

SUMMARY OF THE INVENTION

[0015] The primary object of the present invention is to provide a fuel pump mounting structure of motorcycle, wherein the motorcycle comprises a fuel tank in which a fuel pump assembly is mounted. The fuel tank has a bottom forming an inward recessed portion. The inward recessed portion has an upper end portion and a lower end portion. The upper end portion of the inward recessed portion forms a mounting hole. The fuel pump assembly is mounted to the mounting hole. The fuel pump assembly comprises a support arm and the support arm supports a fuel pump in such a way to allow the fuel pump to extend into and locate close to the lower end portion of the inward recessed portion of the fuel tank, so that the operation load of the fuel pump is reduced and fuel drawing efficiency is increased, and further, the maintenance and assembling of the fuel pump is simplified.

[0016] The foregoing objectives 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.

[0017] 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

[0018]

FIG. 1 is a side elevational view of a conventional motorcycle.

FIG. 2 is a schematic view illustrating a conventional mounting arrangement of motorcycle fuel pump.

FIG. 3 is a schematic view illustrating another conventional mounting arrangement of motorcycle fuel pump.

FIG. 4 is an exploded view of a fuel pump and associated components thereof according to the present invention.

FIG. 5 is an assembled view of FIG. 4.

FIG. 6 is a schematic perspective view showing a mounting structure according to the present invention that mounts a fuel pump inside a motorcycle fuel tank.

FIG. 7 is a schematic view showing the mounting structure of the present invention mounting the fuel pump.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] The following descriptions are 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.

[0020] Referring to FIGS. 4 and 5, the present invention provides a fuel pump mounting structure of motorcycle, comprising a base 2, a pressure regulation valve 3, a support arm 4, a fuel pump 5, and a fuel gauge 6.

[0021] The base 2 has a circumferential flange in which a plurality of mounting holes 21 is formed and comprises a gasket 27 mounted to the flange. The base 2 comprises a retention seat 22 mounted thereto. The retention seat 22 is bent to form an L-shape having an end forming receptacle 221 and an opposite end forming fastening holes 2221 to provide a fastening section 222.

The receptacle 221 receives and holds the pressure regulation valve 3 therein. The fastening section 222 is mounted to the support arm 4. The base 2 forms a plurality of ribs 231 at a portion close to the fastening section

222 to form a guide track section 23. The guide track section 23 receives the support arm 4 to fit therein. The base 2 forms a fuel output tube seat 24 at a front side of the receptacle 221 of the retention seat 2 and the fuel output tube seat 24 receives a fuel output tube 25 extending therethrough. Formed next to the fuel output tube seat 24 is an electrical connector 26 extending from a lower portion of the retention seat 22 so that an external power source is supplied through the electrical connector 26 into a fuel tank 7 to provide a working power to the fuel pump 5 and the fuel gauge 6.

[0022] The pressure regulation valve 3 is received and held inside the receptacle 221 of the retention seat 22 and has a front end communicating the fuel output tube 25 in order to regulate the output pressure of fuel.

[0023] The support arm 4 comprises a fixing section 40 and an extension section 41 extending from the fixing section 40 toward a lower end portion 742 of an inward recessed portion 74 of the fuel tank 7. The extension section 41 forms a fitting section 42 and a fuel gauge retention seat 43. The support arm 4 is made in the form of a substantially L-shaped cantilever arm, which forms reinforcement ribs 4a in an interior space thereof. The support arm 4 has an end forming the fixing section 40, which forms locking holes 411 and a receiving slot 412 therein. The locking holes 411 correspond respectively to the fastening holes 2221 of the fastening section 222 of the retention seat 22. The receiving slot 412 has a width substantially corresponding to the thickness of the fastening section 222 of the retention seat 22, whereby by fitting the receiving slot 412 over the fastening section 222 of the retention seat 22 and setting and tightening threaded fasteners S in the locking holes 411 and the fastening holes 2221, a lower end portion 413 of the fixing section 40 is fit into the guide track section 23 of the base 2 and the fixing section 40 of the support arm 4 is securely fixed to the base 2. The fitting section 42 and the fuel gauge retention seat 43 of the support arm 4 are provided on the extension section 41. The fitting section 42 has an end forming a plurality of barbed pawls 421 and an opposite end forming a stop plate 422. The stop plate 422 forms a notch 4221. The fuel gauge retention seat 43 is formed on the extension section 41 of the support arm 4 at a location above the fitting section 42.

[0024] The fuel pump 5 is received in the fitting section 42 of the support arm 4.

The fuel pump 5 has an output terminal 51 to which an output tube 511 is fit. The output tube 511 is connected to the fuel output tube 25. The fuel pump 5 has an intake terminal 52 that is provided with a fixing peg 521 and is fit to a filter 53. The filter 53 has an outlet tube 531 that forms a lug 532. By fitting the lug 532 over the fixing peg 521, the fixing peg 521 is allowed to extend through the notch 4221 of the stop plate 422 and a clip C is mounted to the fixing peg 521 outside the stop plate 422 so that the filter 53 is securely fixed to the fuel pump 5. The fuel pump 5 is securely held inside the fitting section 42 of the support arm 4 by having the output terminal 51 en-

gaging the barbed pawls 421 of the fitting section 42 and the intake terminal 52 retained by the stop plate 422 of the fitting section 42.

[0025] The fuel gauge 6 is fixed to the fuel gauge retention seat 43 of the support arm 4 and serves to detect the residual amount of fuel.

[0026] To practice the present invention, as shown in FIGS. 6 and 7, the base 2, the pressure regulation valve 3, the support arm 4, the fuel pump 5, and the fuel gauge 6 are assembled in a modularized form of a fuel pump assembly A in advance, as shown in FIG. 5. The fuel tank 7 is made up of upper and lower shell members 71, 72. The upper shell member 71 of the fuel tank 7 has a top forming a fuel filling opening 73. The fuel filling opening 73 provides an inlet for receiving fuel when the fuel tank 7 runs short of fuel therein. In a bottom of the fuel tank 7, namely a lower portion of the lower shell member 72, an inward recessed portion 74 is formed in the lower portion of the lower shell member 72 to allow the fuel tank 7 to straddle on a main tube 8 of a motorcycle frame. The inward recessed portion 74 has an upper end portion 741 and a lower end portion 742. The upper end portion 741 of the inward recessed portion 74 of the lower shell member 72 forms a mounting hole 721. The fuel pump assembly A composed of the base 2, the pressure regulation valve 3, the support arm 4, the fuel pump 5, the fuel gauge 6 is positioned into the fuel tank 7 through the mounting hole 721 formed in the inward recessed portion 74 of the lower shell member 72, as shown in FIG. 6. The base 2 is secured to the mounting hole 721 of the lower shell member 72 by fasteners S1. And, this completes the mounting operation of the fuel pump 5 according to the present invention. With such a mounting structure according to the present invention for the fuel pump 5, the base 2 is set at a location on the upper end portion 741 of the inward recessed portion 74 of the fuel tank 7 and the fuel pump 5 is supported by the support arm 4 to extend into and locate close to the lower end portion 742 of the inward recessed portion 74 of the fuel tank 7 for drawing in fuel that is present in a lower location of the fuel tank 7, as shown in FIG. 7.

[0027] The efficacy of the present invention is that with the above described mounting structure for the fuel pump 5, the base 2 is set at a location on the upper end portion 741 of the inward recessed portion 74 of the fuel tank 7 and the fuel pump 5 is supported by the support arm 4 to extend into and locate close to the lower end portion 742 of the inward recessed portion 74 of the fuel tank 7 for drawing in fuel that is present in a lower location of the fuel tank 7. Thus, on one hand, the fuel pump 5 is positioned into and close to the lower end portion 742 of the inward recessed portion 74 of the fuel tank 7 and the filter 53 (namely fuel suction port) is located close to the fuel pump 5, so that when fuel pump 5 is put into operation, the load thereof can be reduced and the efficiency of fuel suction is increased. On the other hand, the base 2 is located on the upper end portion 741 of the inward recessed portion 74 of the fuel tank 7 so that the fuel

pump assembly A can be directly removed from the mounting hole 721 of the lower shell member 72 of the fuel tank 7 to facilitate the maintenance of the fuel pump 5. This simplifies the maintenance and installation of the fuel pump 5.

[0028] 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 motorcycle fuel pump mounting structure, comprising a fuel pump assembly positioned inside a fuel tank of motorcycle, the fuel tank having a bottom forming an inward recessed portion, the inward recessed portion having an upper end portion and a lower end portion, the upper end portion of the inward recessed portion forming a mounting hole, the fuel pump assembly being mounted to the mounting hole, **characterized in that** the fuel pump assembly comprises a support arm and the support arm supports a fuel pump in such a way to allow the fuel pump to extend into and locate close to the lower end portion of the inward recessed portion of the fuel tank..
2. The motorcycle fuel pump mounting structure according to claim 1, wherein the fuel pump assembly comprises a base, a pressure regulation valve, the support arm, the fuel pump, and a fuel gauge.
3. The motorcycle fuel pump mounting structure according to claim 1, wherein the support arm comprises a fixing section and an extension section extending from the fixing section toward the lower end portion of the inward recessed portion of the fuel tank, the extension section forming a fitting section and a fuel gauge retention seat.
4. The motorcycle fuel pump mounting structure according to claim 3, wherein the fitting section of the support arm receives and holds therein the fuel pump, and the extension section of the support arm allows the fuel pump to extend into and locate close to the lower end portion of the inward recessed portion of the fuel tank.
5. The motorcycle fuel pump mounting structure according to claim 1, wherein the fuel tank comprises an upper shell member and a lower shell member and wherein bottom of the fuel tank forms a lower portion of the lower shell member.

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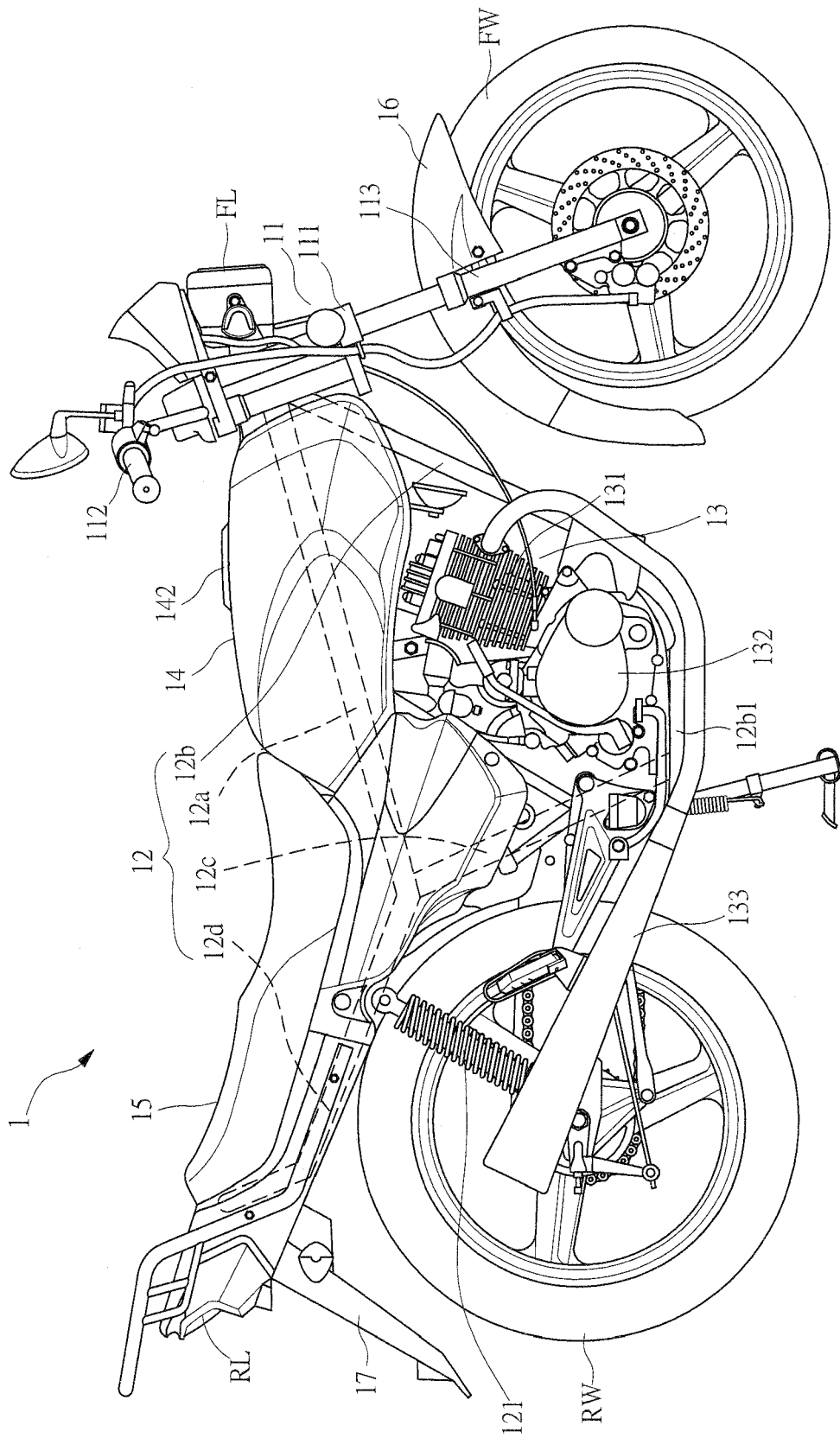
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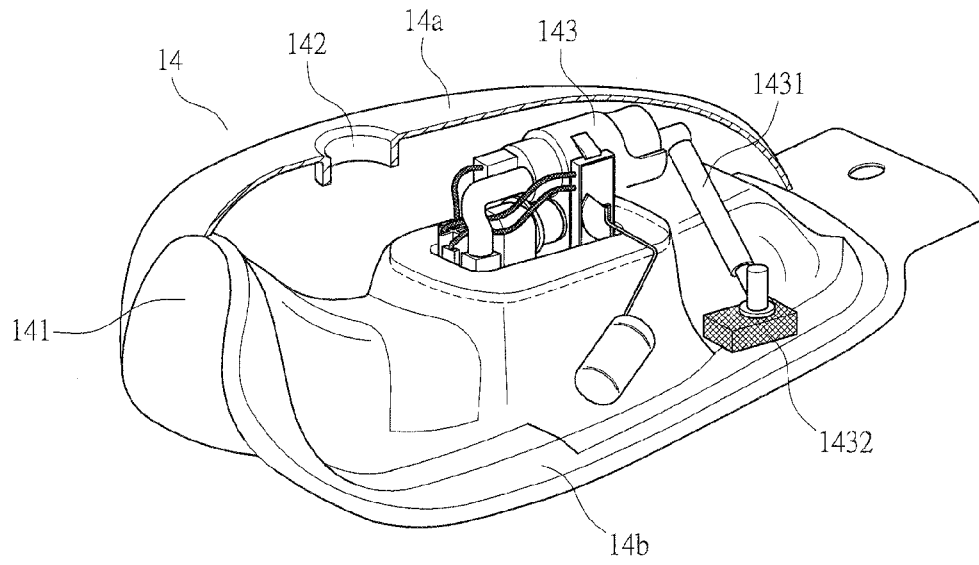
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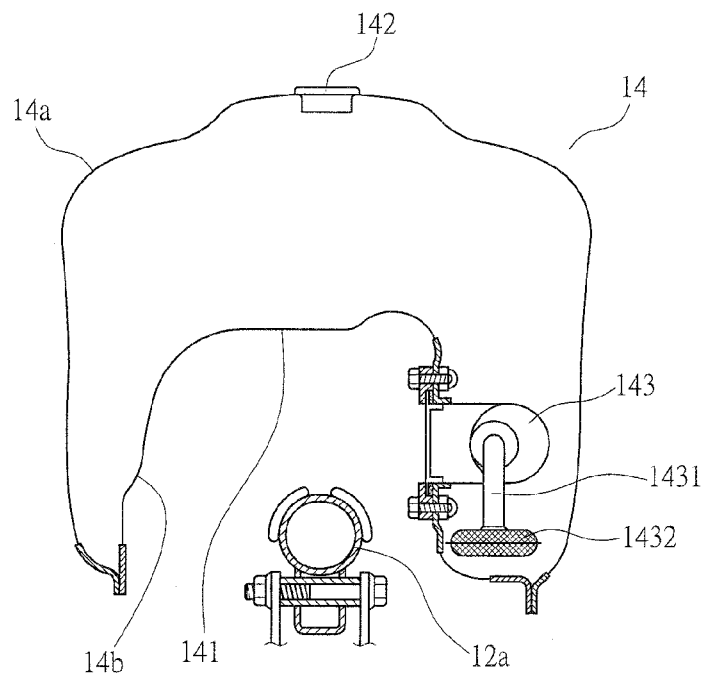
6. The motorcycle fuel pump mounting structure according to claim 2, wherein the base forms a retention seat, a fuel output tube seat, a guide track section, and an electrical connector.
7. The motorcycle fuel pump mounting structure according to claim 2, wherein the fuel pump has an output terminal to which an output tube is fit and an intake terminal that is provided with a fixing peg and is fit to a filter.
8. The motorcycle fuel pump mounting structure according to claim 1 or 3, wherein the support arm forms reinforcement ribs in an interior space thereof.
9. The motorcycle fuel pump mounting structure according to claim 3, wherein the fixing section of the support arm forms a locking hole and a receiving slot.
10. The motorcycle fuel pump mounting structure according to claim 3, wherein the fitting section of the support arm forms barbed pawls and a stop plate.
11. The motorcycle fuel pump mounting structure according to claim 7, wherein the filter forms a lug.
12. The motorcycle fuel pump mounting structure according to claim 1 or 3, wherein the support arm forms a guide track section close to a fastening section of the base.
13. The motorcycle fuel pump mounting structure according to claim 6, wherein the guide track section of the base is formed of ribs.
14. The motorcycle fuel pump mounting structure according to claim 6, wherein the base forms the fuel output tube seat at a front side of a receptacle of the retention seat and wherein the fuel output tube seat receives a fuel output tube extending therethrough.
15. The motorcycle fuel pump mounting structure according to claim 6, wherein the retention seat comprises a receptacle and a fastening section.



PRIOR ART
FIG.1



PRIOR ART
FIG.2



PRIOR ART
FIG.3

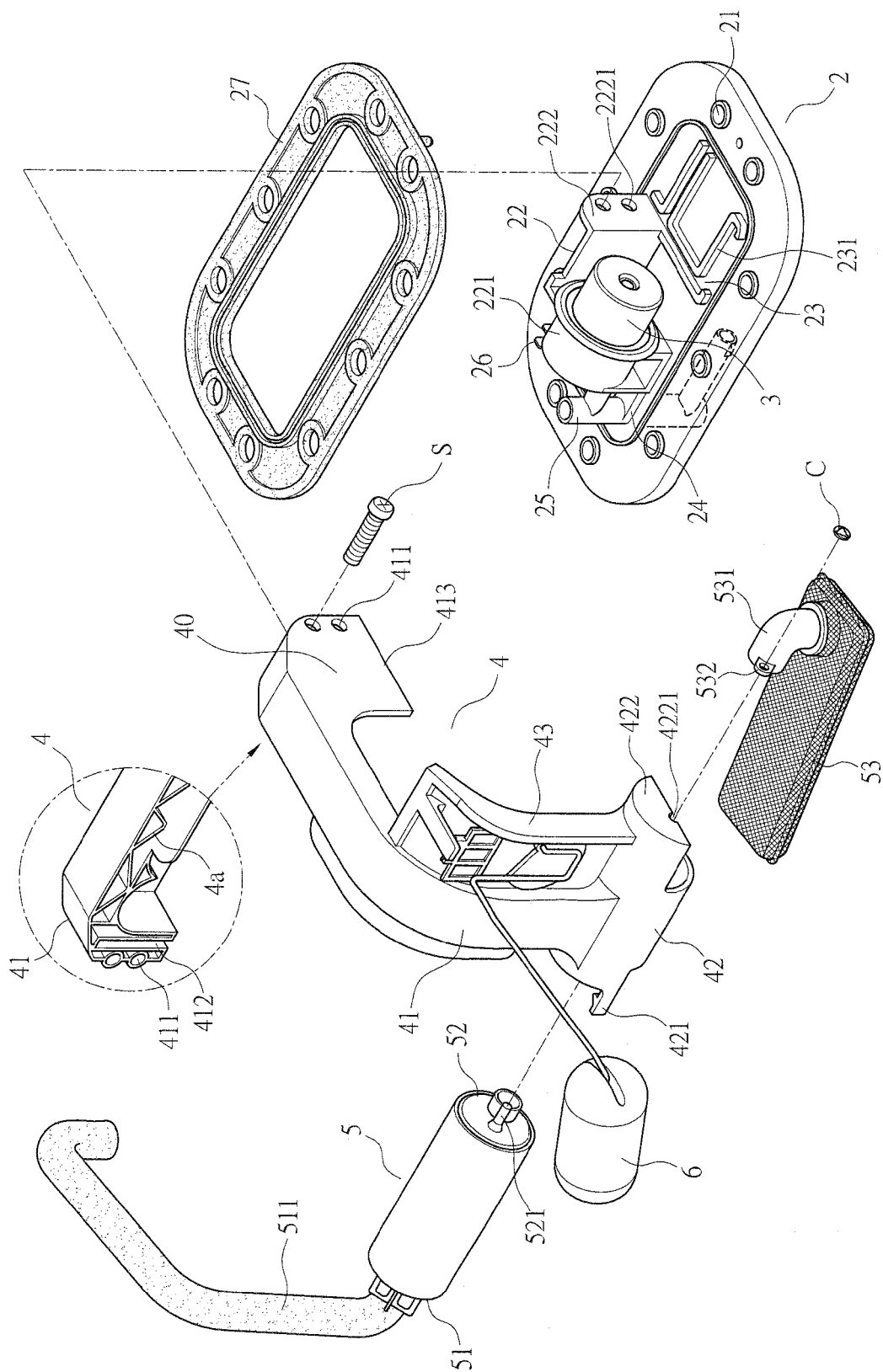


FIG.4

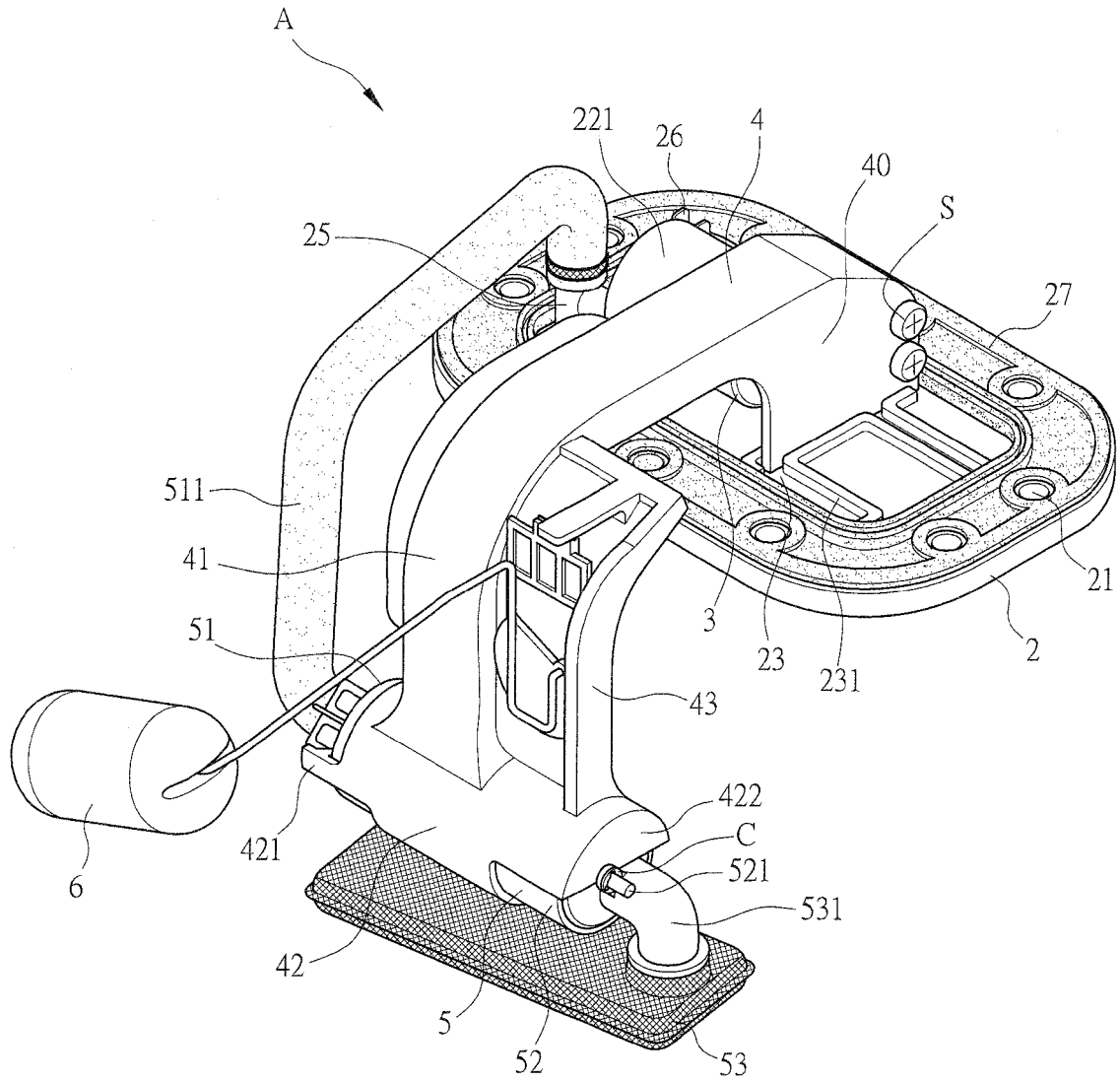


FIG.5

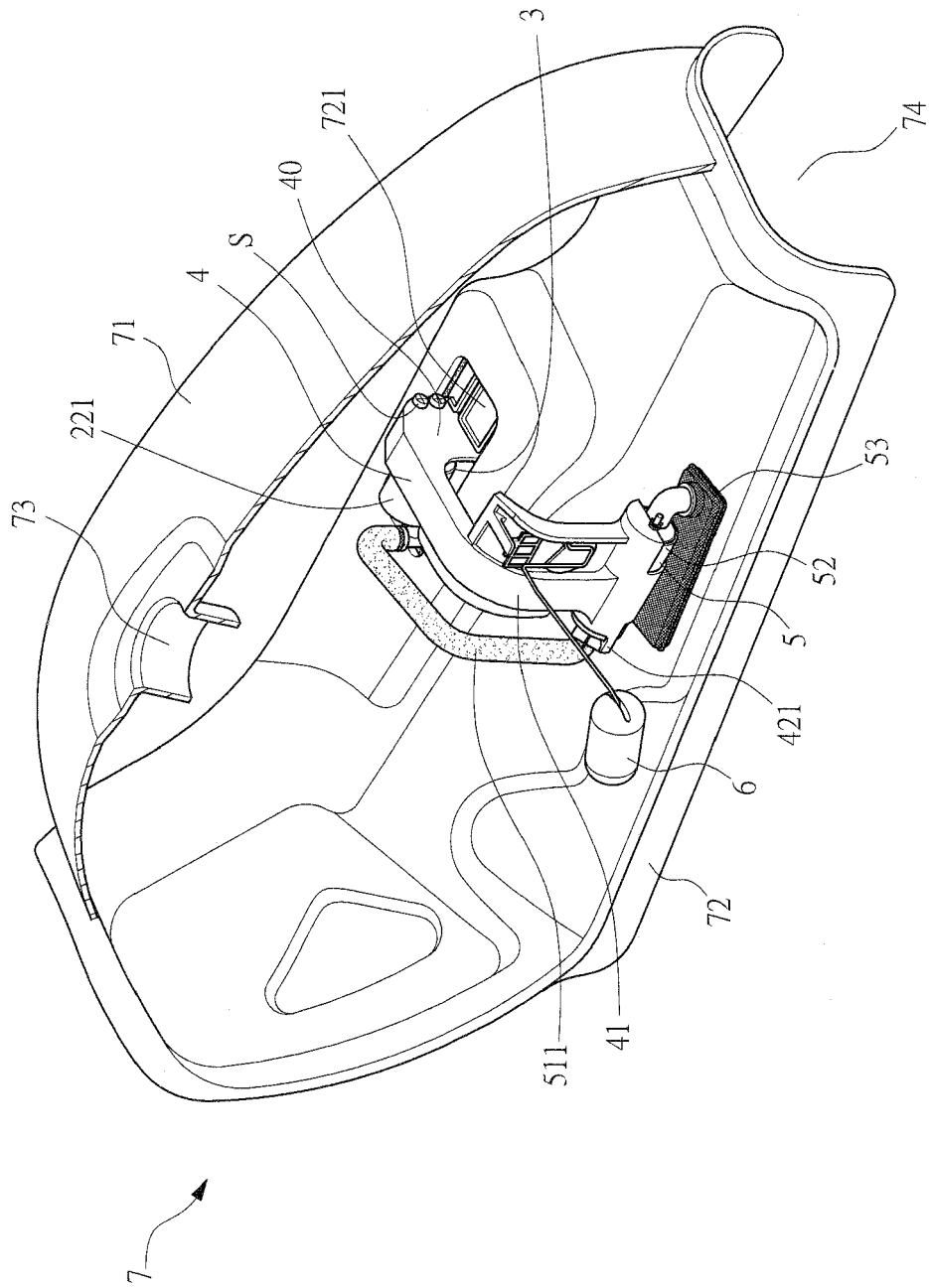


FIG. 6

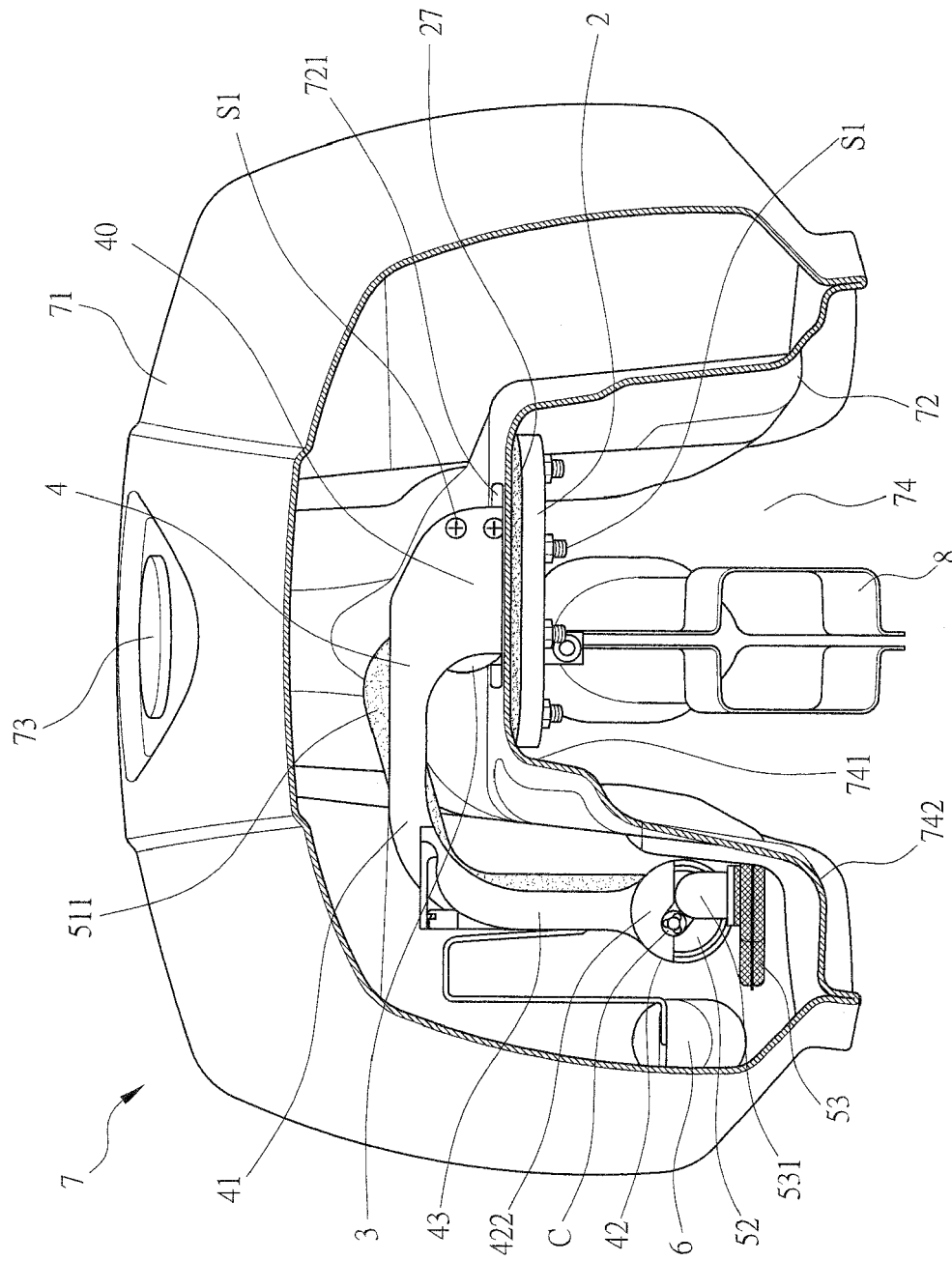


FIG. 7