We claim:

[Claim 1]

A carburetor air vent tube piping structure for a saddle riding type vehicle, wherein the saddle riding type vehicle (1) has an internal combustion engine (3) and an air cleaner case (7) arranged forwardly and rearwardly below a fuel tank (16), and wherein an intake air passage is formed by an upstream side intake pipe (62) and a downstream side intake pipe (61) with a carburetor (5) interposed between the upstream side intake pipe (62) and the downstream side intake pipe (61), and wherein an air vent tube (8) is connected to one of left and right side portions of the carburetor (5) and extends to the other side portion of the carburetor (5), characterized in:

that the air vent tube (8) has a detouring portion top portion (80) detouring above the upstream side intake pipe (62), and the detouring portion top portion (80) is supported at a higher position than an upper portion of the upstream side intake pipe (62) by a supporting rib (71) provided on the air cleaner case (7) upstream of the carburetor (5); and

that the air vent tube (8) includes a first air vent tube (8A) extending downward from the detouring portion top portion (80), and a second air vent tube (8B) communicating with the first air vent tube (8A) at a lower portion of the first air vent tube (8A), the second air vent tube (8B) extending upward to terminate at a second air vent tube end portion having an upper outside air inlet opening (83), which second air vent tube end portion is supported by the air cleaner case (7).

[Claim 2]

The carburetor air vent tube piping structure for the saddle riding type vehicle as claimed in claim 1, wherein on the other side of the carburetor (5), the air vent tube (8) is inserted through and retained by an insertion hole (63a) formed in an upward-downward direction in a side portion of the upstream side intake pipe (62).

[Claim 3]

The carburetor air vent tube piping structure or the saddle riding type vehicle as claimed in claim 2, wherein both the first and second air vent tubes (8A and 8B) are vertically inserted side by side through and retained by the insertion hole (63a).

[Claim 4]

The carburetor air vent tube piping structure for the saddle riding type vehicle as claimed in claim 3, wherein the air cleaner case (7) includes a lower case (7A), an air cleaner element holder (7B) covering an upward opening (7Aa) of the lower case (7A) and forming a clean chamber (73) with a flange surface (7Bb) left outside a periphery of the opening (7Aa) of the lower case (7A), and an air cleaner cover (7C) covering an upper portion of an air cleaner element (74) held on the air cleaner element holder (7B); and an upper part of the second air vent tube (SB), adjoining the upper outside air inlet opening (83), is retained by the flange surface (7Bb).

[Claim 5]

The carburetor air vent tube piping structure for the saddle riding type vehicle as claimed in claim 4, wherein the air vent tube (8) has a lower outside air inlet opening (81) below a coupling portion (82) of the first and second air vent tubes (8A, 8B), on an undersurface side of the vehicle.

[Claim 6]

The carburetor air vent tube piping structure for the saddle riding type vehicle as claimed in claim 5, wherein a drain tube (56) connected to a drain passage (55) of the carburetor (5) is further coupled to an upperpart of the coupling portion (82) of the first air vent tube (8A).

Dated: 02/01/2015

[NEHA MALHOTRA]
IN/PA No.: 2687
OF REMFRY & SAGAR
ATTORNEY OF THE APPLICANT[S]

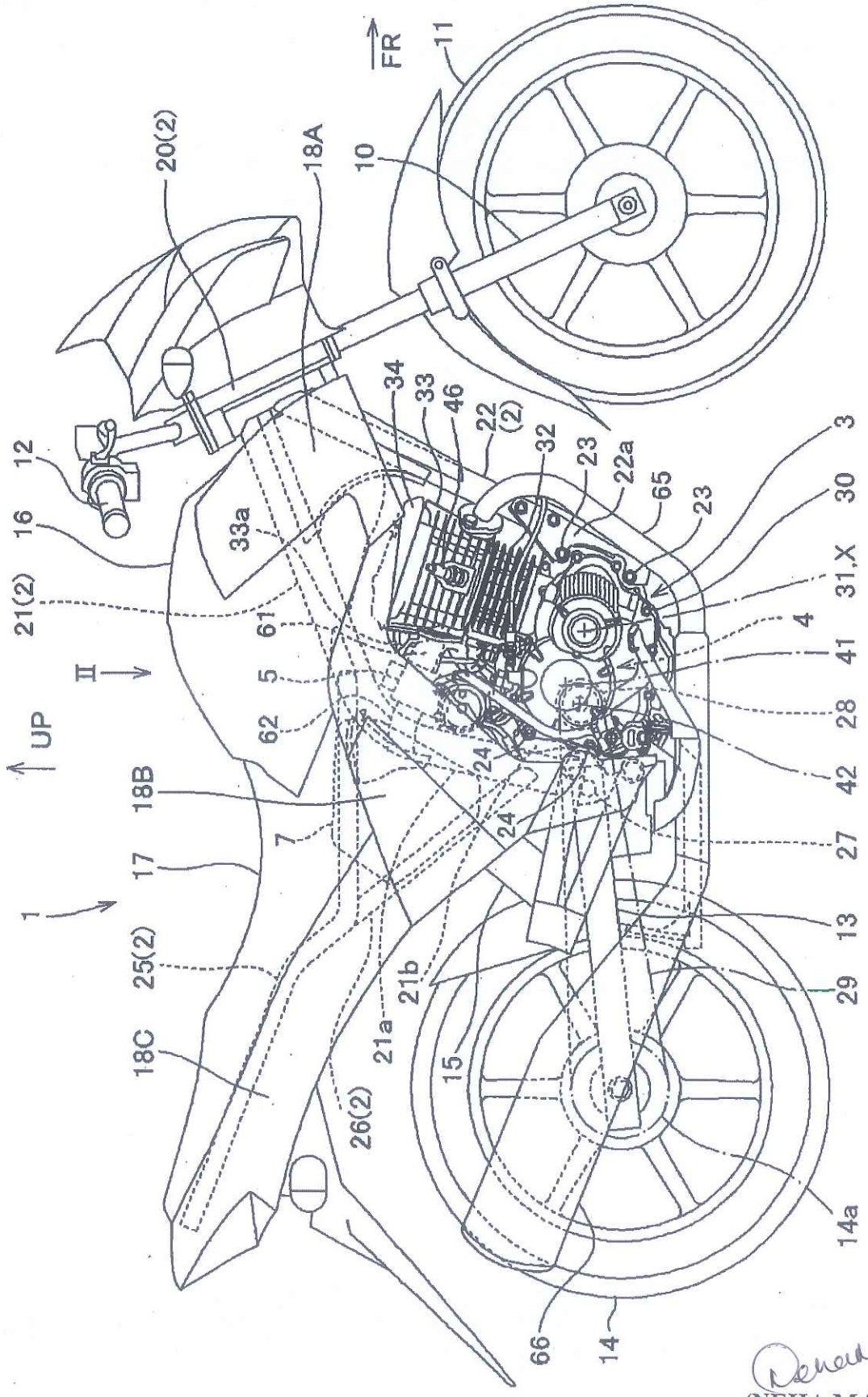
ABSTRACT

"CARBURETOR AIR VENT TUBE PIPING STRUCTURE FOR SADDLE RIDING TYPE VEHICLE"

A carburetor air vent tube piping structure for a saddle riding type vehicle which structure can prevent an air vent function from being hindered by reducing the entry of a fuel from a carburetor into an air vent tube, and can improve air vent performance without increasing the number of parts. A carburetor air vent tube piping structure for a saddle riding type vehicle, the saddle riding type vehicle 1 having an internal combustion engine 3 and an air cleaner case 7 arranged longitudinally below a fuel tank 16, and having an intake air passage formed by an upstream side intake pipe 62 and a downstream side intake pipe 61 with a carburetor 5 interposed between the upstream side intake pipe 62 and the downstream side intake pipe 61, wherein a detouring portion top portion 80 of an air vent tube 8 connected to a side portion of one of a left and a right of the carburetor, the air vent tube 8 detouring above the upstream side intake pipe 62 and extending to a side of the other of the left and the right of the carburetor 5, is supported at a higher position than an upper portion of the upstream side intake pipe by a supporting rib 71 provided to the air cleaner case upstream of the carburetor.

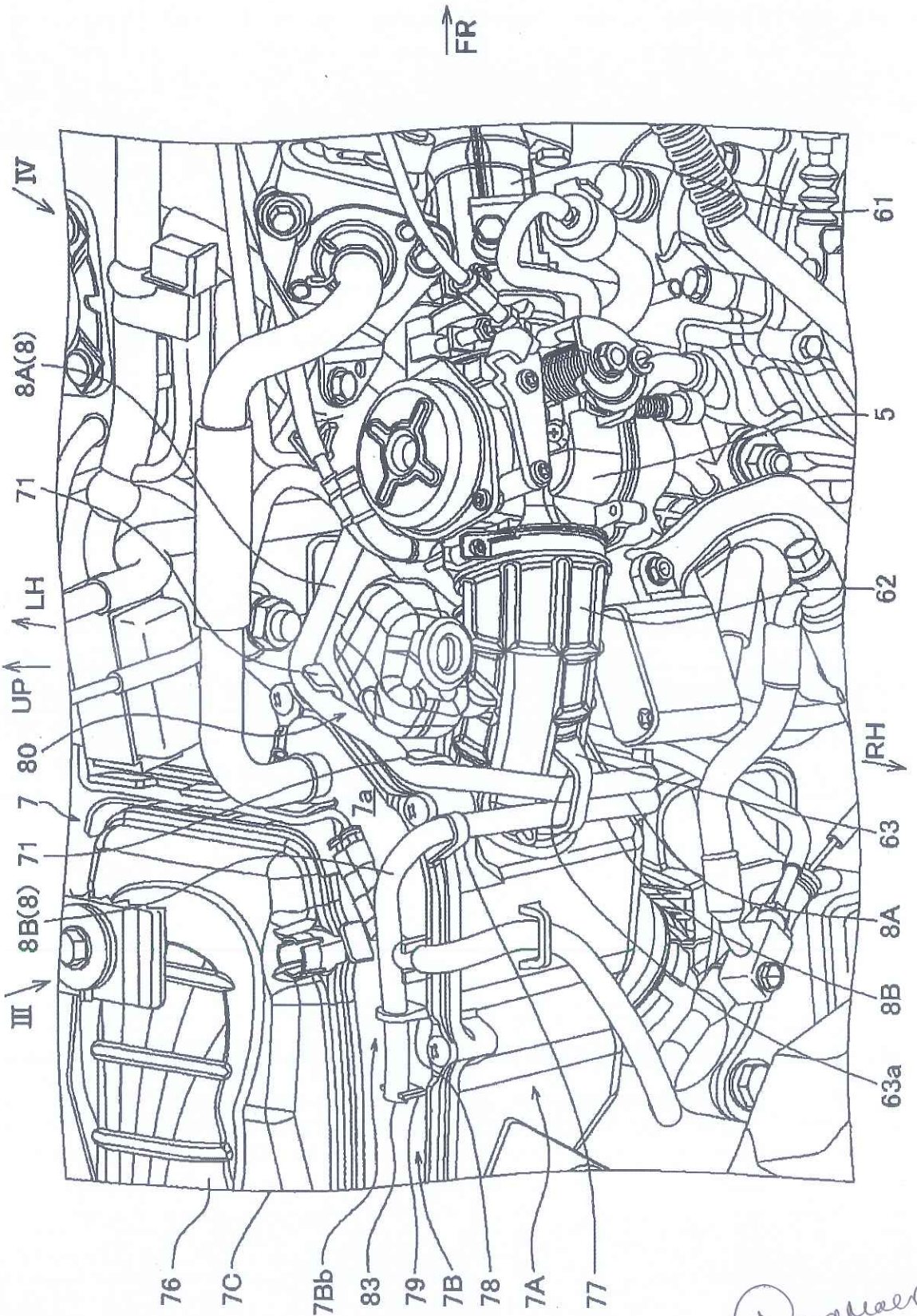
Fig. 3

FIG.1



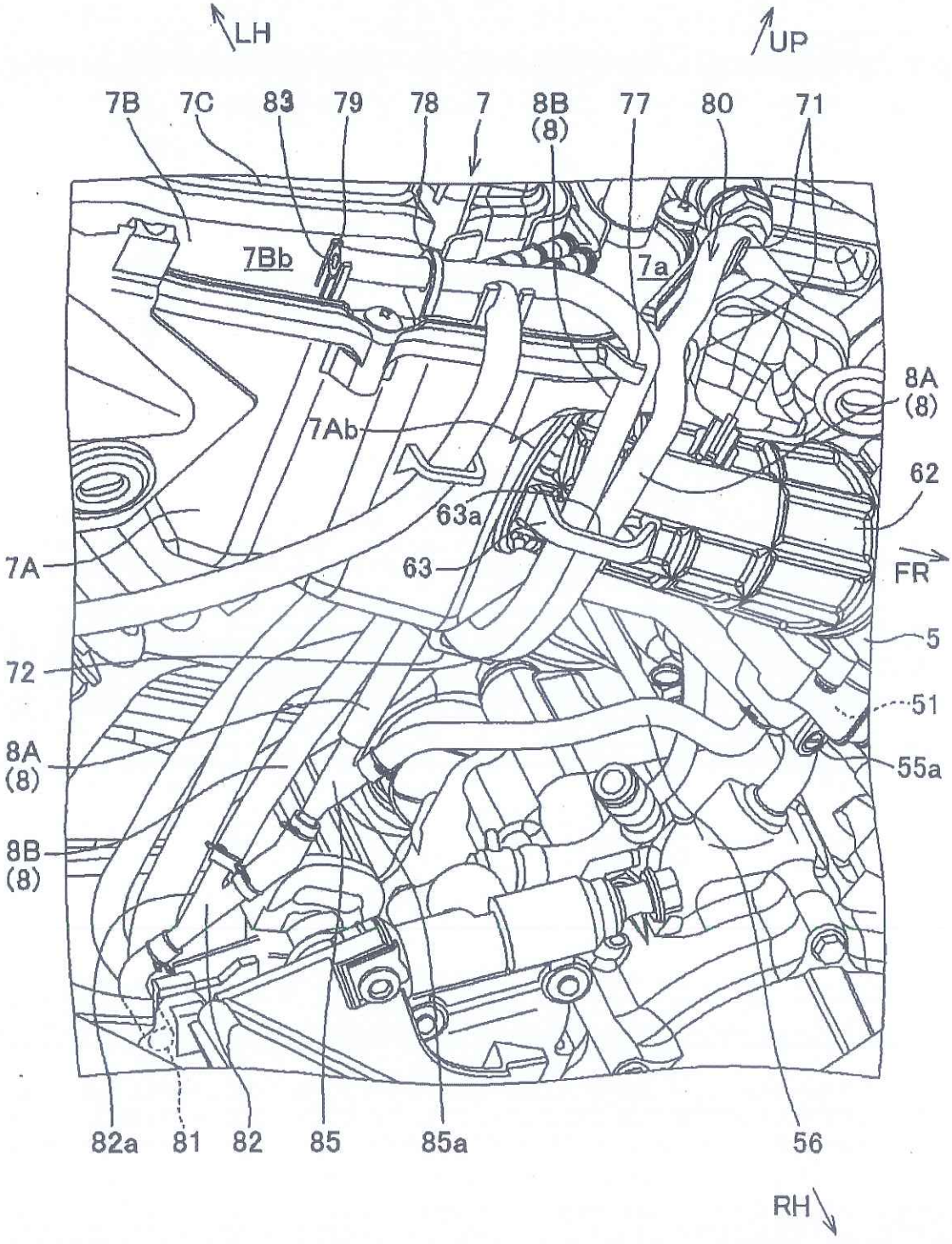
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.2



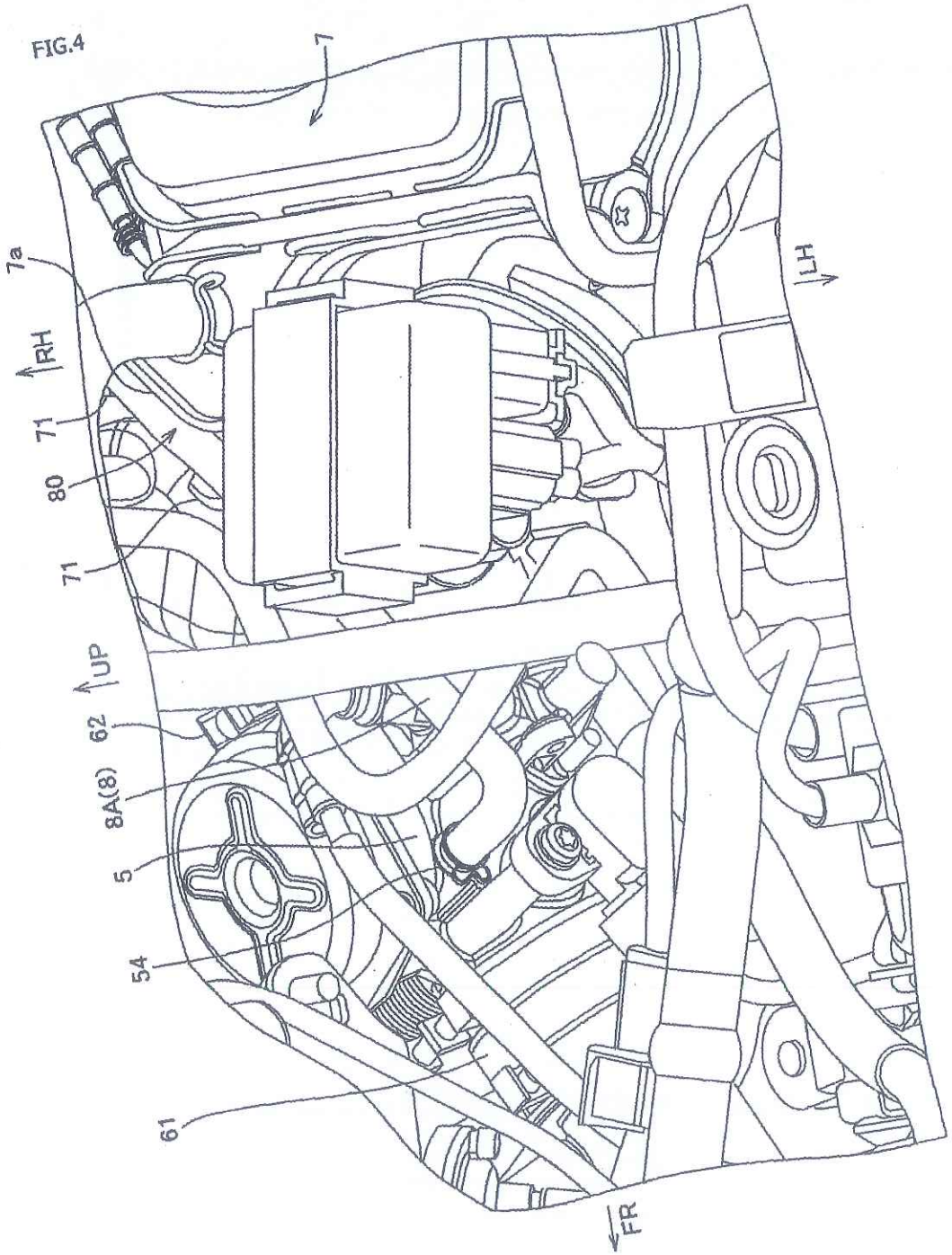
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.3



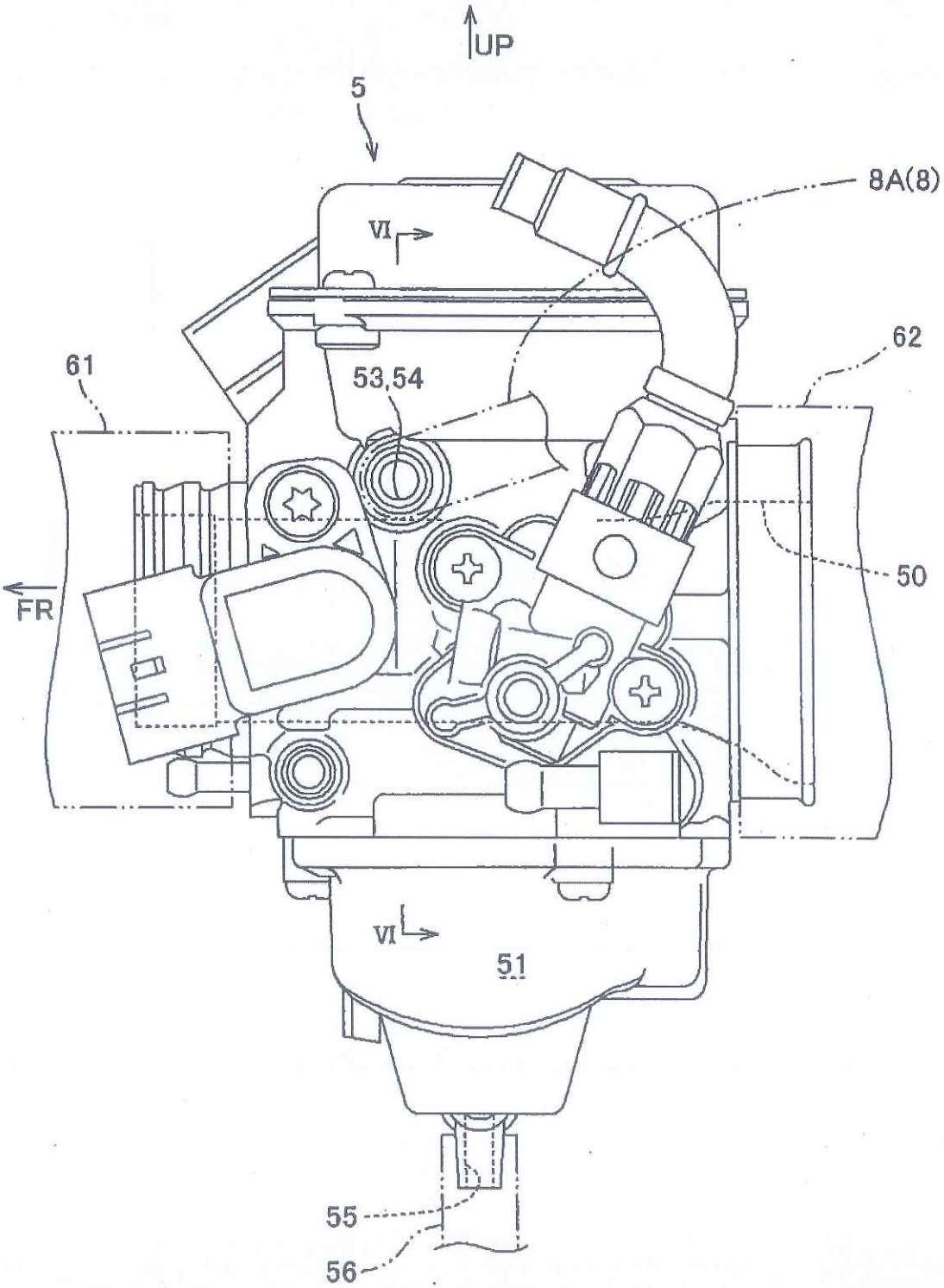
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.4



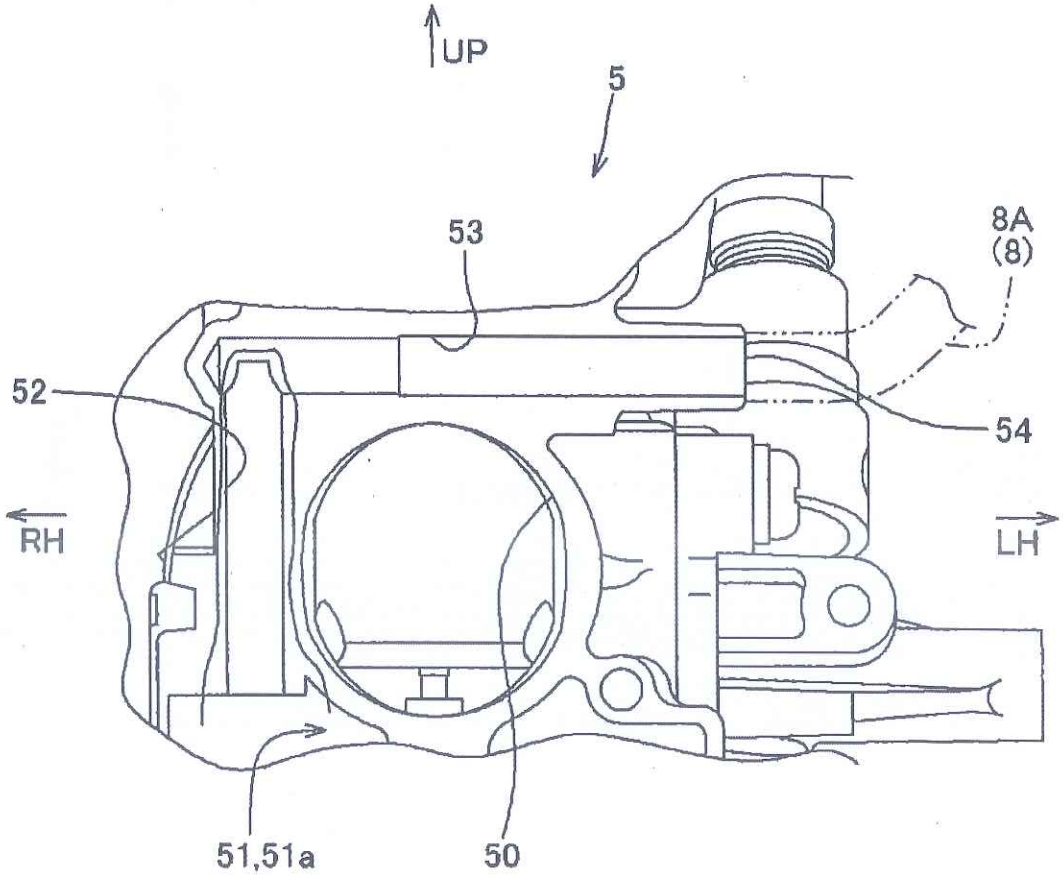
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.5



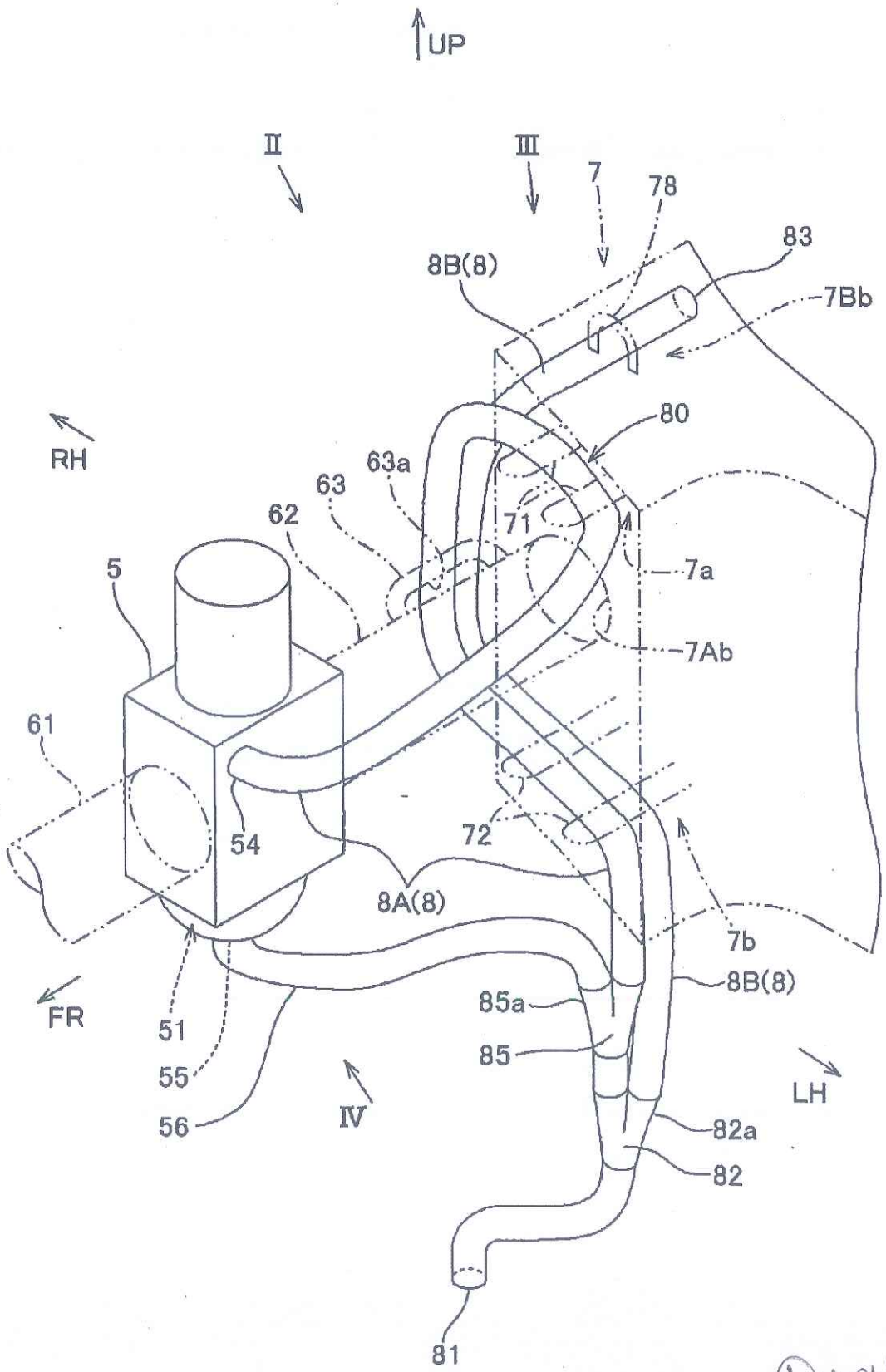
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.6



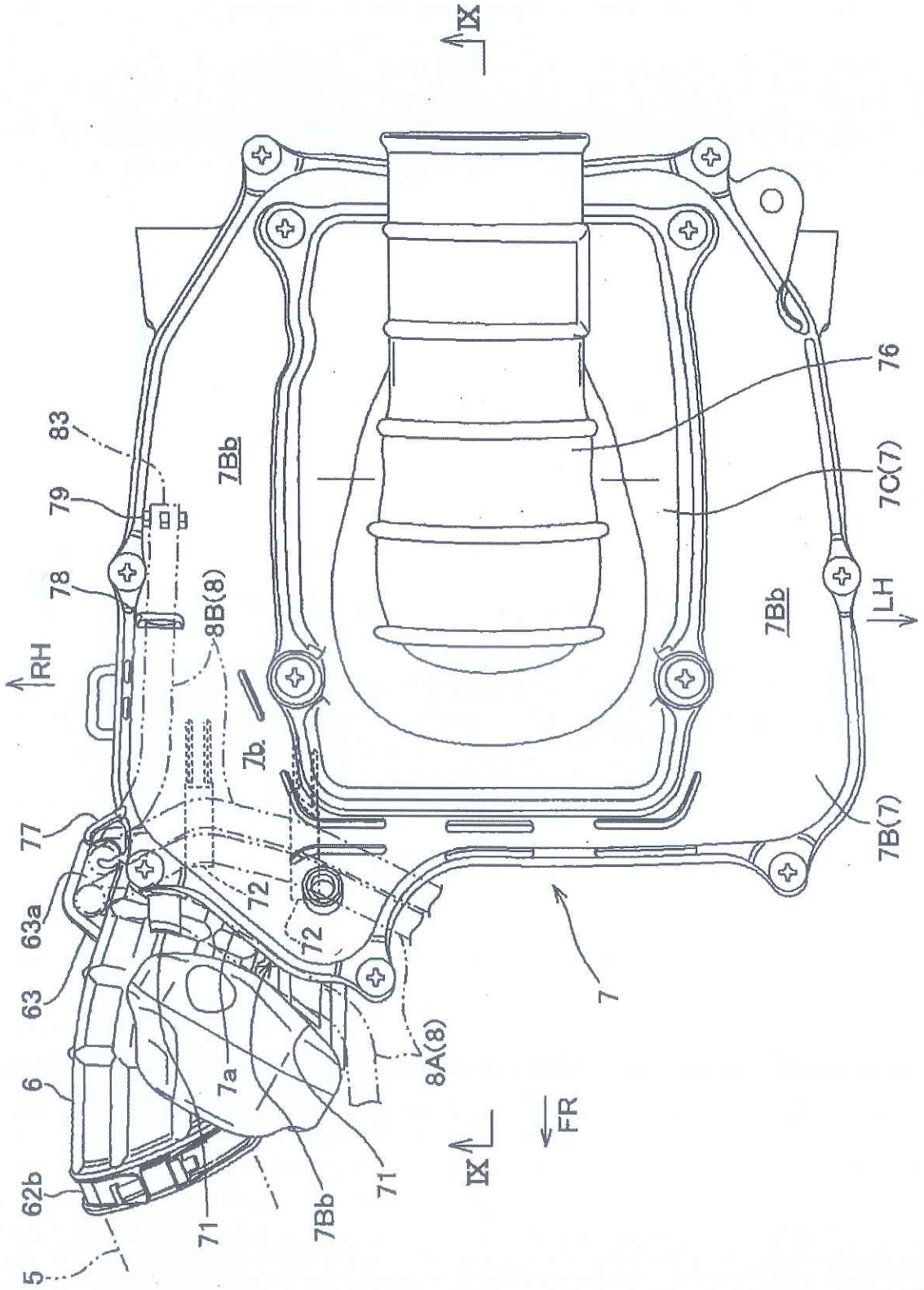
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.7



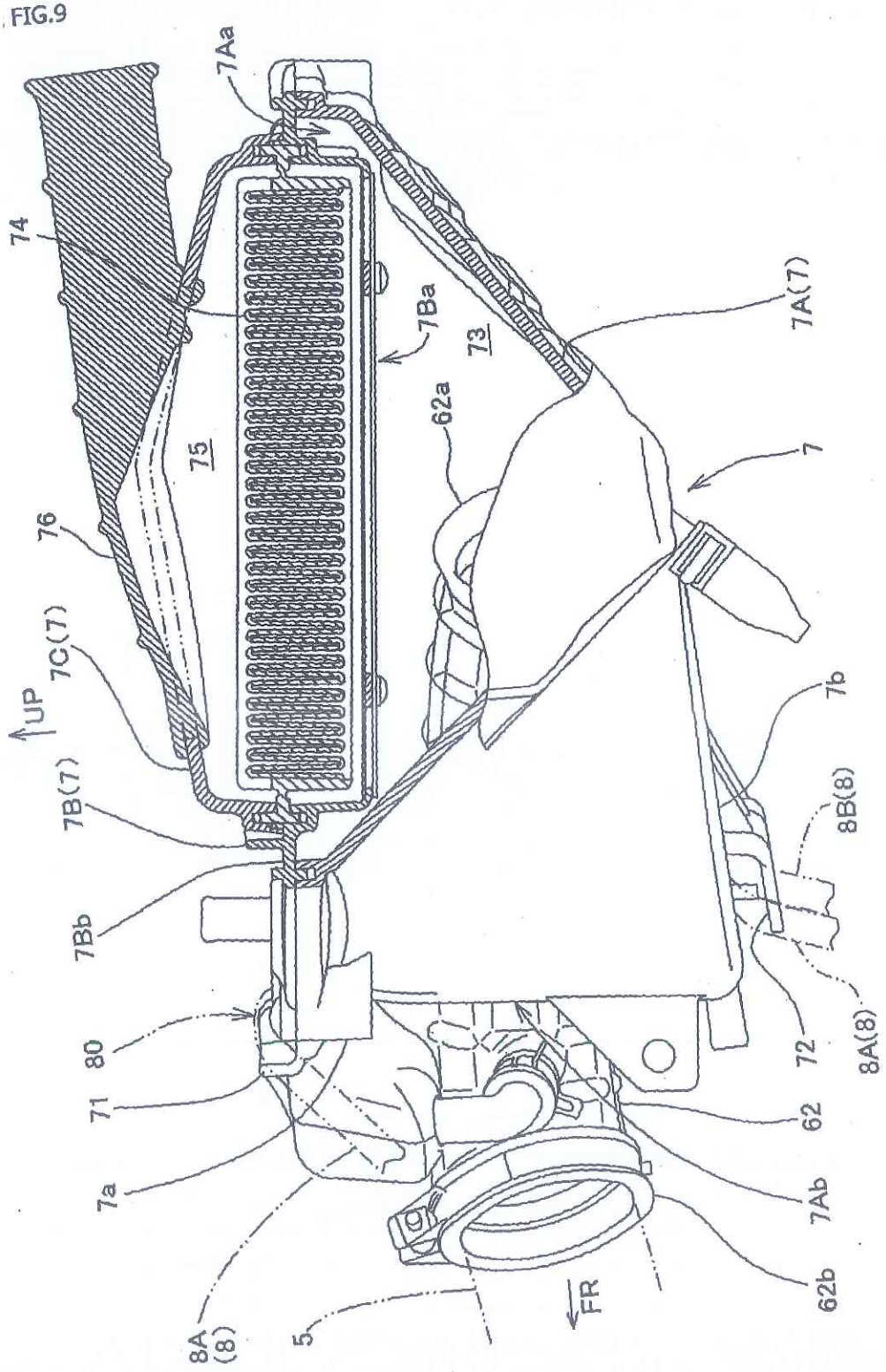
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.8



(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.9



(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FORM 2
THE PATENTS ACT 1970
[39 OF 1970]
&
THE PATENTS (AMENDMENT) RULES, 2006
COMPLETE SPECIFICATION

[See Section 10; rule 13]

"CARBURETOR AIR VENT TUBE PIPING STRUCTURE FOR SADDLE RIDING TYPE VEHICLE"

HONDA MOTOR CO., LTD., a corporation of Japan, of 1-1, Minami-Aoyama 2-chome, Minato-ku, Tokyo 107-8556, Japan,

The following specification particularly describes the invention and the manner in which it is to be performed:

Carburetor Air Vent Tube Piping Structure for Saddle Riding Type Vehicle

[Technical Field]

[0001]

The present invention relates to a piping structure of an air vent tube attached to a carburetor in a saddle riding type vehicle.

[Background Art]

[0002]

In a conventional saddle riding type vehicle having an internal combustion engine and an air cleaner case arranged longitudinally below a fuel tank, and having an intake air passage formed by a front intake pipe and a rear intake pipe with a carburetor interposed between the intake pipes, the outside air inlet opening of an air vent tube of the carburetor is disposed at a position in the vicinity of the rear intake pipe, as shown in Patent Document 1 below, for example.

[0003]

However, in the saddle riding type vehicle shown in Patent Document 1, while the outside air inlet opening is located at a position higher than a road surface and thus

provision is made for suppressing the effect of a traveling wind, there are a problem of the air vent tube being clogged by dust in the outside air inlet opening which dust occurs due to a moisture or a liquid within the air vent tube, and a problem of external appearance quality being degraded by dirt on members surrounding the outside air inlet opening.

[Prior Art Document]

[Patent Document]

[0004]

[Patent Document 1]

Japanese Patent No. 4000188 (FIGS. 1 to 5)

[Summary of the Invention]

[Problem to be Solved by the Invention]

[0005]

The present invention has been made in view of such related art. It is an object of the present invention to provide a carburetor air vent tube piping structure for a saddle riding type vehicle which structure can prevent an air vent function from being hindered by reducing the entry of a fuel from a carburetor into an air vent tube, and can improve air vent performance without increasing the number of parts.

[Means for Solving the Problem]

[0006]

In order to solve the above problems, according to an invention of claim 1, there is provided a carburetor air vent tube piping structure for a saddle riding type vehicle, the saddle riding type vehicle having an internal combustion engine and an air cleaner case arranged longitudinally below a fuel tank, and having an intake air passage formed by an upstream side intake pipe and a downstream side intake pipe with a carburetor interposed between the upstream side intake pipe and the downstream side intake pipe, wherein a detouring portion top portion of an air vent tube connected to a side portion of one of a left and a right of the carburetor, the air vent tube detouring above the upstream side intake pipe and extending to a side of the other of the left and the right of the carburetor, is supported at a higher position than an upper portion of the upstream side intake pipe by a supporting rib provided to the air cleaner case upstream of the carburetor.

[0007]

According to an invention of claim 2, in the carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 1, on the side of the other of the left and the right of the carburetor,

the air vent tube is inserted into and retained by an insertion hole formed by die cutting in an upward-downward direction in a side portion of the upstream side intake pipe.

[0008]

According to an invention of claim 3, in the carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 2, the air vent tube includes: a first air vent tube passing from the detouring portion top portion through the insertion hole and extending downward; and a second air vent tube communicating with the first air vent tube in a coupling portion of a lower portion of the first air vent tube, the second air vent tube passing through the insertion hole and extending upward, a side of an upper outside air inlet opening of an end portion of the second air vent tube being supported by the air cleaner case again; and wherein the first and second air vent tubes are vertically inserted into and retained by the insertion hole side by side.

[0009]

According to an invention of claim 4, in the carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 3, the air cleaner

case includes: a lower case; an air cleaner element holder covering an upward opening of the lower case and forming a clean chamber with a flange surface left on a periphery of the opening of the lower case; and an air cleaner cover covering an upper portion of an air cleaner element on the air cleaner element holder; and the side of the upper outside air inlet opening of an upper part of the second air vent tube is retained by the flange surface.

[0010]

According to an invention of claim 5, in the carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 4, the air vent tube also has a lower outside air inlet opening below the coupling portion on an undersurface side of the vehicle.

[0011]

According to an invention of claim 6, in the carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 5, a drain tube connected to a drain passage of the carburetor is further coupled to an upper part of the coupling portion of the first air vent tube.

[Effect of the Invention]

[0012]

According to the carburetor air vent tube piping structure for the saddle riding type vehicle according to the invention of claim 1, because the detouring portion top portion of the air vent tube is supported at a position higher than the upper portion of the upstream side intake pipe by the supporting rib of the air cleaner case, the entry of a fuel from the carburetor into the air vent tube is reduced. Thus, an air vent function is performed more reliably, and air vent performance can be improved without an increase in the number of parts.

[0013]

According to the invention of claim 2, in addition to the effect of the invention of claim 1, it is possible to retain the air vent tube by the upstream side intake pipe without complicating a process of manufacturing the upstream side intake pipe, and assemble the air vent tube without increasing the number of parts.

[0014]

According to the invention of claim 3, in addition to the effect of the invention of claim 2, while the retaining structure is simplified by retaining the first and second air vent tubes by the upstream side intake pipe at a common retaining position, variations in internal pressure are suppressed with the air vent tube

formed long, and the effect of a traveling wind is further reduced by the upper outside air inlet opening, so that air vent performance is improved.

[0015]

According to the invention of claim 4, in addition to the effect of the invention of claim 3, in work of replacement of the air cleaner element, the air cleaner element can be replaced without the second air vent tube being removed. Maintainability is therefore improved.

[0016]

According to the invention of claim 5, in addition to the effect of the invention of claim 4, the upper and lower outside air inlet openings of the air vent tube are arranged so as to be distributed vertically in the vehicle. Dirt in the upper outside air inlet opening is prevented by guiding a moisture and a liquid component to the lower outside air inlet opening, and the effect of a traveling wind is prevented by the upper outside air inlet opening located on the flange surface of the air cleaner case and below the fuel tank. Therefore high air vent performance can be ensured over a long period of time.

[0017]

According to the invention of claim 6, in addition

to the effect of the invention of claim 5, also for a moisture or a liquid from the drain passage, the lower outside air inlet opening of the air vent tube is shared as an outlet for the moisture or the liquid. Thereby parts affecting peripheries thereof can be reduced while assemblability is maintained. Thus a degradation in external appearance quality can be prevented.

[Brief Description of the Drawings]

[0018]

[FIG. 1]

FIG. 1 is a right side view of a motorcycle according to a present embodiment.

[FIG. 2]

FIG. 2 is a right side top perspective view of the central portion of the motorcycle shown with covers removed, the right side top perspective view corresponding substantially to the direction of an arrow II in FIG. 1.

[FIG. 3]

FIG. 3 is a right side perspective view looking down on the undersurface side of the vehicle from the side of a connecting tube and an air cleaner case, the right side perspective view corresponding substantially to the direction of an arrow III in FIG. 2.

[FIG. 4]

FIG. 4 is a left side top perspective view of a carburetor of the motorcycle and peripheries thereof, the left side top perspective view corresponding substantially to the direction of an arrow IV in FIG. 2.

[FIG. 5]

FIG. 5 is a left side view of the carburetor according to the present embodiment.

[FIG. 6]

FIG. 6 is a sectional view of the front of the carburetor as viewed in the direction of arrows from a line VI-VI in FIG. 5.

[FIG. 7]

FIG. 7 is a schematic perspective view of the arrangement of an air vent tube formed by a first and a second air vent tube and a drain tube, the schematic perspective view corresponding substantially to the direction of an arrow VII in FIG. 4. Incidentally, an arrow II, an arrow III, and an arrow IV in FIG. 7 indicate approximate perspective directions of FIG. 2, FIG. 3, and FIG. 4, respectively.

[FIG. 8]

FIG. 8 is a top view of the air cleaner case and the connecting tube, the top view corresponding to the

direction of an arrow VIII in FIG. 7.

[FIG. 9]

FIG. 9 is a left sectional view of the air cleaner case, the left sectional view being taken in the direction of arrows from a line IX-IX in FIG. 8.

[Mode for Carrying Out the Invention]

[0019]

A carburetor air vent tube piping structure for a saddle riding type vehicle according to one embodiment of the present invention will be described with reference to FIGS. 1 to 9.

In the present embodiment, the saddle riding type vehicle is a motorcycle 1 having an internal combustion engine 3. Directions such as a forward direction, a rearward direction, a left direction, a right direction, an upward direction, a downward direction, and the like in the description of claims and the present specification are in accordance with the direction of the vehicle (motorcycle) provided with the carburetor air vent tube piping structure according to the present embodiment.

In the drawings, an arrow FR indicates the forward direction of the vehicle, an arrow LH indicates the left direction of the vehicle, an arrow RH indicates the right

direction of the vehicle, and an arrow UP indicates the upward direction of the vehicle.

[0020]

As shown in FIG. 1, which shows the right side of the motorcycle ("saddle riding type vehicle" in the present invention) 1 according to the present embodiment, a main frame 21 of a vehicle body frame 2 of the motorcycle 1 according to the present embodiment extends rearward from a head pipe 20 through a center in a vehicle width direction while tilting slightly downward, and then bends downward to form a main steeply inclined portion 21a, and further a down frame 22 extends obliquely rearward and downward from the head pipe 20 through the center in the vehicle width direction.

[0021]

The front portion of a crankcase 30 in the internal combustion engine 3 is attached to a supporting bracket 22a on the lower portion of the down frame 22 by bolts 23 at two upper and lower positions. The rear portion of the crankcase 30 is attached to a supporting bracket 21b on the lower portion of the main steeply inclined portion 21a of the main frame 21 by bolts 24 at two upper and lower positions. The internal combustion engine 3 is thereby supported by the vehicle body frame 2.

A pair of left and right seat rails 25 extends rearward from the bent portion of the main frame 21 while forming a bent portion midway. A back stay 26 coupling the bent portion of the seat rail 25 to the central portion of the main steeply inclined portion 21a supports the seat rail 25.

[0022]

In the vehicle body frame 2 as described above, the head pipe 20 pivotally supports a front fork 10. The lower end of the front fork 10 rotatably supports a front wheel 11. Steering handlebars 12 are provided at an upper end of a pivot of the front fork 10. A rear fork 13 whose front end is rotatably supported by a pivot shaft 27 provided to the lower portion of the main frame 21 extends rearward. The rear end of the rear fork 13 rotatably supports a rear wheel 14. A rear cushion 15 is interposed between the central portion of the rear fork 13 and the back stay 26.

[0023]

A fuel tank 16 is installed so as to straddle both of the left side and the right side of the main frame 21. A seat 17 is provided in the rear of the fuel tank 16 so as to be supported by the seat rails 25.

A front cover 18A covers the upper portion of the

down frame 22 of the vehicle body frame 2 from both of the left side and the right side. A side cover 18B covers both of the left side and the right side between the internal combustion engine 3 and the seat 17. A rear cover 18C covers the rear half of the seat rails 25.

[0024]

The internal combustion engine 3 and an air cleaner case 7 in the rear of the internal combustion engine 3 are arranged longitudinally below the fuel tank 16.

The internal combustion engine 3 in the present embodiment is integrally provided with a transmission 4 in a rear portion within the crankcase 30 to form a so-called power unit. The internal combustion engine 3 in the present embodiment is an SOHC type four-stroke-cycle internal combustion engine having an air-cooled single cylinder which internal combustion engine is mounted in the motorcycle 1 with a crankshaft 31 of the internal combustion engine 3 orientated in the vehicle width direction, that is, the left-right direction of the motorcycle 1, and with the cylinder rising in a state of slightly leaning forward.

[0025]

A cylinder block 32 and a cylinder head 33 are stacked in order obliquely above the crankcase 30 that

rotatably supports the crankshaft 31 of the internal combustion engine 3, and are fastened integrally with each other. A cylinder head cover 34 is put on the cylinder head 33. The cylinder block 32, the cylinder head 33, and the cylinder head cover 34 are projected from the crankcase 30 in a state of slightly leaning forward.

[0026]

In addition, a main shaft 41 and a counter shaft 42 are disposed in the rear portion of the crankcase 30 so as to be parallel with the crankshaft 31. A plurality of sets of speed change gears of the main shaft 41 and the counter shaft 42, which speed change gears are not shown in the figures, are in mesh with each other at all times to form the transmission 4.

The counter shaft 42 penetrates the crankcase 30 in the left direction and projects to the outside. The counter shaft 42 forms a final output shaft of the internal combustion engine 3. An output sprocket 28 is spline-fitted to the projecting part of the counter shaft 42.

A drive chain 29 wound around the output sprocket 28 is stretched over a driven sprocket 14a on the side of the rear wheel 14 to form a chain transmission mechanism.

Thus power is transmitted to the rear wheel 14.

[0027]

A metallic intake pipe ("downstream side intake pipe" in the present invention) 61 that is connected to an intake port 33a of the cylinder head 33 and which extends rearward is connected to a carburetor 5. The carburetor 5 is coupled to the air cleaner case 7 on an upstream side which air cleaner case is located in the rear of the carburetor 5 via a connecting tube ("upstream side intake pipe" in the present invention) 62 made of a hard rubber.

That is, the connecting tube 62 and the intake pipe 61 arranged longitudinally with the carburetor 5 interposed therebetween form an intake air passage from the air cleaner case 7 to the intake port 33a of the cylinder head 33.

[0028]

An exhaust pipe 65 extending frontward from the cylinder head 33 bends downward, further bends rearward, extends rearward and on the right side along the undersurface of the crankcase 30, and is coupled to a muffler 66 disposed to the right of the rear wheel 14.

[0029]

FIG. 2 is a right side top perspective view of the

central portion of the motorcycle 1 shown with the covers 18A to 18C removed, the right side top perspective view corresponding substantially to the direction of an arrow II in FIG. 1. As shown in FIG. 2, the intake pipe 61 connected to the intake port (see FIG. 1) 33a opening in the rear of the cylinder head 33 of the internal combustion engine 3 extends rearward and is connected to the carburetor 5.

[0030]

As shown in FIG. 5, which shows the left side of the carburetor 5 according to the present embodiment, and FIG. 6, which shows a cross section of the front of the carburetor 5 as viewed in the direction of arrows from a line VI-VI in FIG. 5, the carburetor 5 is a publicly known negative pressure actuation type carburetor including a venturi portion formed by a negative pressure actuation type venturi piston and a throttle valve, which are not shown in the figures, in an airflow passage 50 disposed in a forward-rearward direction. A float chamber 51 that temporarily stores a fuel until the fuel is supplied to the airflow passage 50 is provided below the venturi portion.

A float not shown in the figures is included in the float chamber 51. A float valve opened or closed

according to vertical movement of the float that follows the liquid level of the fuel acts to supply the float chamber 51 with the fuel supplied under pressure at all times due to a gravity fall thereof from the fuel tank 16 so as to maintain a constant height of the liquid level. The fuel is thus stored without overflowing.

[0031]

Therefore, the inside of the float chamber 51 needs to be maintained at atmospheric pressure at all times to maintain the buoyancy of the float properly and supply the fuel to the venturi portion properly. As shown in FIG. 2 and FIG. 4, an air vent tube 8 that makes a space 51a above the liquid level of the fuel in the float chamber 51 (see FIG. 6) communicate with an external atmospheric space is provided to secure ventilation to the outside.

As shown in FIG. 6, a vertical through hole 52 communicating with the space 51a above the liquid level of the fuel in the float chamber 51 and extending upward and a horizontal through hole 53 communicating with the vertical through hole 52 and extending in the left direction are provided in the wall of the carburetor 5. As shown in FIG. 5 and FIG. 6, the horizontal through hole 53 opens in the left side portion of the carburetor 5. The air vent tube 8 is connected to an opening portion

54. A publicly known connecting structure may be used as appropriate.

[0032]

However, when the fuel within the float chamber 51 flows into the air vent tube 8 and clogs the air vent tube 8 due to violent jolting of the motorcycle 1 or the like, or when the ventilation of the air vent tube 8 is hindered by the adhesion of a dust or the like from the outside to the air vent tube 8 which adhesion is caused by a moisture such as a fuel vapor, a condensate, or the like, the air pressure of the float chamber 51 cannot be maintained at atmospheric pressure. Abnormalities in the actuation of the float valve and the supply of the fuel to the venturi portion may thus occur. A piping structure for the air vent tube 8 for avoiding the abnormalities is desired.

In addition, it is necessary to avoid subjecting the air vent tube 8 to a negative pressure due to an effect of a traveling wind of the motorcycle 1.

[0033]

In the present embodiment, the air vent tube 8 includes a first air vent tube ("first air vent tube" in the present invention) 8A connected to the carburetor 5 and a second air vent tube ("second air vent tube" in the

present invention) 8B connected to the first air vent tube 8A.

[0034]

FIG. 4 is a left side top perspective view of the carburetor 5 of the motorcycle 1 and peripheries thereof that are shown with the covers 18A to 18C removed, the left side top perspective view corresponding substantially to the direction of an arrow IV in FIG. 2. FIG. 4 shows the first air vent tube 8A connected to the opening portion 54 in the left side portion of the carburetor 5 and extended obliquely rearward and upward.

[0035]

The first air vent tube 8A connected to the opening portion 54 in the left side portion of the carburetor 5 extends obliquely rearward and upward, and then detours around the upper part of the connecting tube 62 from the left to the right, as shown in FIG. 2. A detouring portion top portion 80 of the first air vent tube 8A extends to the right with respect to the carburetor 5. The first air vent tube 8A then bends downward, and extends to a lower outside air inlet opening 81 opening in the undersurface of the vehicle (see FIG. 3).

[0036]

Supporting ribs 71 provided at an upper front end

edge 7a of the air cleaner case 7 on the upstream side which air cleaner case 7 is located in the rear of the carburetor 5' support the detouring portion top portion 80 of the first air vent tube 8A at a higher position than the upper portion of the connecting tube 62. Thus, even when the motorcycle 1 is shaken greatly or inclined, the entry of the fuel from the float chamber 51 of the carburetor 5 into the first air vent tube 8A is reduced. In addition, a fuel that has entered flows down and returns to the float chamber 51 easily. Even if there is a fuel that goes over the detouring portion top portion 80, the fuel flows down to the lower outside air inlet opening 81 and is discharged from the lower outside air inlet opening 81. An air vent function is therefore prevented from being hindered. Thus, the air vent function is performed more reliably, and air vent performance can be improved without an increase in the number of parts of the air vent tube 8.

[0037]

When the first air vent tube 8A extends downward on the right side with respect to the carburetor 5 and on the right of the connecting tube 62, the first air vent tube 8A is inserted into and retained by an insertion hole 63a formed by die cutting in the upward-downward

direction in the right side portion of the connecting tube 62.

The connecting tube 62 is made of a molded hard rubber. Even with a simple constitution formed by a molding die divided into two upper and lower parts, a retaining portion 63 having the insertion hole 63a in the die cutting direction, that is, the upward-downward direction can be formed on the side surface of the connecting tube 62.

It is therefore possible to retain the first air vent tube 8A by the connecting tube 62 without complicating a process of manufacturing the connecting tube 62, and assemble the first air vent tube 8A without increasing the number of parts.

[0038]

FIG. 3 is a right side perspective view looking down on the undersurface side of the vehicle from the side of the connecting tube 62 and the air cleaner case 7, in substantially the direction of an arrow III in FIG. 2, which is shown with the covers 18A to 18C removed. As shown in FIG. 3, the first air vent tube 8A passing through the insertion hole 63a of the connecting tube 62 and extending downward extends to the central side of the vehicle in the left direction while supported by

supporting hooks 72 provided on a front end side bottom surface 7b of the air cleaner case 7, then extends downward again, and opens downward in the undersurface of the vehicle, thereby forming the lower outside air inlet opening 81.

[0039]

A first Y-shaped tube ("coupling portion" in the present invention) 82 branching upward is interposed in the lower portion of the first air vent tube 8A, that is, slightly above the lower outside air inlet opening 81. The second air vent tube 8B is connected to the side of a branch tube 82a of the first Y-shaped tube 82. The second air vent tube 8B extends upward alongside of the first air vent tube 8A and in an opposite direction from the first air vent tube 8A, then extends to the right while supported by the supporting hooks 72 on the front end side bottom surface 7b of the air cleaner case 7, then bends upward, passes through the insertion hole 63a of the connecting tube 62 and extends upward, then diverges from the first air vent tube 8A, and extends rearward and is supported by the top surface of the air cleaner case 7. The end portion of the second air vent tube 8B forms an upper outside air inlet opening 83.

[0040]

Therefore, the first air vent tube 8A and the second air vent tube 8B are vertically inserted into and retained by the insertion hole 63a of the connecting tube 62 side by side. The retaining portion 63 formed by the connecting tube 62 is thus made common to the first and second air vent tubes 8A and 8B, so that a retaining structure is simplified.

In addition, the first and second air vent tubes 8A and 8B form a long air vent tube 8. Thus, variations in internal pressure are suppressed. The effect of a traveling wind on the air vent tube 8 is thereby further reduced. Therefore air vent performance is improved.

[0041]

As described above, in addition to the upper outside air inlet opening 83, the air vent tube 8 is provided with the lower outside air inlet opening 81 on the undersurface side of the vehicle below the first Y-shaped tube 82 serving as a coupling portion coupling the first air vent tube 8A and the second air vent tube 8B to each other. The upper and lower outside air inlet openings 83 and 81 of the air vent tube 8 are thus arranged so as to be distributed vertically in the vehicle. Dirt in the upper outside air inlet opening 83 in the upper part is prevented by guiding a moisture such

as a fuel vapor or the like and a liquid component such as a fuel or the like to the lower outside air inlet opening 81 in the lower part and discharging the moisture and the liquid component from the lower outside air inlet opening 81, and the effect of a traveling wind is prevented by the upper outside air inlet opening 83 located at a higher position than a road surface and below the fuel tank. Therefore high air vent performance is ensured over a long period of time.

[0042]

In addition, as shown in FIG. 3, a drain tube 56 is connected to a drain passage 55 in a bottom portion communicating with the float chamber 51 of the carburetor 5 (see FIG. 5). The drain tube 56 extends obliquely downward, and is coupled to the side of a branch tube 85a of a second Y-shaped tube 85 that is interposed above the first Y-shaped tube 82 in the first air vent tube and which branches upward. The drain tube 56 communicates with the branch tube 85a of the second Y-shaped tube 85. Incidentally, a connecting structure for connecting the drain tube 56 to the drain passage 55 is a publicly known appropriate structure.

[0043]

Therefore, a moisture such as a fuel vapor or the

like or a liquid such as a fuel or the like from the drain passage 55 flows into the first air vent tube 8A via the drain tube 56, and can be discharged from the lower outside air inlet opening 81. By sharing the lower outside air inlet opening 81 as an outlet for the moisture or the liquid, assemblability is maintained, and parts affecting peripheries thereof due to the moisture or the liquid can be reduced. Thus, a degradation in external appearance quality can be prevented.

Incidentally, the drain passage 55 is normally closed by a stopper bolt 55a (see FIG. 3), and is opened when a fuel within the float chamber 51 is discharged and replaced, for example.

[0044]

The arrangement of the air vent tube 8 formed by the first and second air vent tubes 8A and 8B and the drain tube 56 described above is shown in FIG. 7 as a schematic perspective view corresponding substantially to the direction of an arrow VII in FIG. 4.

An arrow II, an arrow III, and an arrow IV in FIG. 7 indicate approximate perspective directions of FIG. 2, FIG. 3, and FIG. 4, respectively.

[0045]

As shown in FIG. 7, the detouring portion top

portion 80 of the first air vent tube 8A is supported by the supporting ribs 71 of the air cleaner case 7 above the connecting tube 62. The first air vent tube 8A is passed downward through the insertion hole 63a of the connecting tube 62, is then supported by the supporting hooks 72 of the air cleaner case 7, extends in the left direction to the central side of the vehicle, and thereafter extends downward.

On the other hand, the second air vent tube 8B coupled to the first air vent tube 8A and communicating with the first air vent tube 8A in the lower part extends upward, is then supported by the supporting hooks 72 of the air cleaner case 7, extends to the right side of the vehicle, further turns upward, passes upward through the insertion hole 63a of the connecting tube 62, and is thereafter supported by the top surface of the air cleaner case 7. A supporting structure by which the air vent tube 8 is supported on the air cleaner case 7 will be described in the following with reference to FIG. 8 and FIG. 9.

[0046]

FIG. 8 is a top view of the air cleaner case 7 and the connecting tube 62, the top view corresponding to the direction of an arrow VIII in FIG. 7. FIG. 9 is a left

sectional view of the air cleaner case 7, the left sectional view being taken in the direction of arrows from a line IX-IX in FIG. 8.

As shown in FIG. 9, the air cleaner case 7 includes: a lower case 7A made of a resin, the lower case 7A widely opening upward; an air cleaner element holder 7B made of a resin, the air cleaner element holder 7B having an air cleaner element retaining portion 7Ba in the center of an upward opening 7Aa of the lower case 7A, covering the opening 7Aa with a flange surface 7Bb left on a periphery, and defining a clean chamber 73; and an air cleaner cover 7C made of a resin, the air cleaner cover 7C covering the upper portion of an air cleaner element 74 retained by the air cleaner element retaining portion 7Ba, and defining a dirty chamber 75.

[0047]

An upstream end 62a of the connecting tube 62 is inserted into and fixed to the front end side of the lower case 7A. A downstream end 62b of the connecting tube 62 is connected to the carburetor 5.

The air cleaner element holder 7B includes the central air cleaner element retaining portion 7Ba and the flange surface 7Bb on the periphery of the air cleaner element retaining portion 7Ba. The periphery of the

flange surface 7Bb is airtightly fastened to the periphery of the upward opening 7Aa of the lower case 7A. Thus, the opening 7Aa is closed, and the clean chamber 73 is defined. The air cleaner element retaining portion 7Ba has a retaining structure that allows an airflow from the dirty chamber 75 to the clean chamber 73 through the cleaner element 74 retained by the air cleaner element retaining portion 7Ba.

An intake air duct 76 is attached to the upper portion of the air cleaner cover 7C. An outside air flowing from the intake air duct 76 into the dirty chamber 75, is cleaned through the cleaner element 74, enters the clean chamber 73, passes through the connecting tube 62, the carburetor 5, and the intake pipe 61, and is sucked into the intake port 33a of the internal combustion engine 3.

[0048]

The above-described supporting ribs 71 for supporting the detouring portion top portion 80 of the first air vent tube 8A are provided at two positions of the upper portion of a connecting tube inserting portion 7Ab of the lower case 7A, which upper portion forms the upper front end edge 7a of the air cleaner case 7 (see FIG. 2).

On the other hand, the retaining portion 63 having the above-described insertion hole 63a which retaining portion retains the first and second air vent tubes 8A and 8B such that the first and second air vent tubes 8A and 8B are vertically inserted in the insertion hole 63a side by side is positioned on the right side portion of the inserted and fixed connecting tube 62 (see FIG. 2 and FIG. 3).

In addition, the above-described supporting hooks 72 by which the first and second air vent tubes 8A and 8B are supported side by side are provided at two positions of the front end side bottom surface 7b of the lower case 7A (see FIG. 3).

[0049]

Further, as shown in FIG. 8, a guide hook 77 for guiding the second air vent tube 8B that passes through the insertion hole 63a and which extends upward is projected from both of the lower case 7A located above the insertion hole 63a and the flange surface 7Bb of the air cleaner element holder 7B (see FIG. 2 and FIG. 3). Locking hooks 78 and 79 for holding the second air vent tube 8B that passes through the guide hook 77 and which extends rearward on the air cleaner case 7 are further provided on the flange surface 7Bb of the air cleaner

case 7 (see FIG. 2 and FIG. 3). The side of the upper outside air inlet opening 83 of the upper part of the second air vent tube 8B is retained on the flange surface 7Bb by these locking hooks 78 and 79.

[0050]

As described above, in the air vent tube piping structure according to the present embodiment, the air vent tube 8 is retained by the supporting ribs 71, the supporting hooks 72, the guide hook 77, and the locking hooks 78 and 79 formed integrally with the air cleaner case 7, the insertion hole 63a of the retaining portion 63 molded integrally with the connecting tube 62, and the like. Therefore the air vent tube 8 can be assembled easily with the number of parts for piping reduced.

[0051]

Features of the carburetor air vent tube piping structure for the motorcycle 1 according to the present embodiment described above will be summarized in the following.

[0052]

In the motorcycle 1 having the internal combustion engine 3 and the air cleaner case 7 arranged longitudinally below the fuel tank 16, and having an intake air passage formed by the connecting tube 62 and

the intake pipe 61 with the carburetor 5 interposed between the connecting tube 62 and the intake pipe 61, the detouring portion top portion 80 of the air vent tube 8 connected to the left side portion of the carburetor 5, the air vent tube 8 detouring above the connecting tube 62 and extending to the right of the carburetor 5, is supported at a higher position than the upper portion of the upstream side intake pipe 62 by the supporting ribs 71 provided on the air cleaner case 7 upstream of the carburetor 5.

[0053]

Therefore, because the detouring portion top portion 80 of the air vent tube 8 is supported at a position higher than the upper portion of the connecting tube 62 by the supporting ribs 71 of the air cleaner case 7, the entry of a fuel from the carburetor 5 into the air vent tube 8 is reduced. Thus, an air vent function is performed more reliably, and air vent performance can be improved without an increase in the number of parts.

[0054]

In addition, on the right side of the carburetor 5, the air vent tube 8 is inserted into and retained by the insertion hole 63a formed by die cutting in the upward-downward direction in the side portion of the connecting

tube 62. It is therefore possible to retain the air vent tube 8 by the connecting tube 62 without complicating a process of manufacturing the connecting tube 62, and assemble the air vent tube 8 without increasing the number of parts.

[0055]

In addition, the air vent tube 8 includes: the first air vent tube 8A passing from the detouring portion top portion 80 through the insertion hole 63a and extending downward; and the second air vent tube 8B communicating with the first air vent tube 8A at the first Y-shaped tube 82 of the lower portion of the first air vent tube 8A, the second air vent tube 8B passing through the insertion hole 63a and extending upward, the side of the upper outside air inlet opening 83 of an end portion of the second air vent tube 8B being supported by the air cleaner case 7 again. The first and second air vent tubes 8A and 8B are vertically inserted into and retained by the insertion hole 63a side by side. Thus, while the retaining structure is simplified by retaining the first and second air vent tubes 8A and 8B by the connecting tube 62 at a common retaining position, variations in internal pressure are suppressed with the air vent tube 8 formed long, and the effect of a

traveling wind is further reduced by the upper outside air inlet opening 83, so that air vent performance is improved.

[0056]

In addition, the air cleaner case 7 includes: the lower case 7A; the air cleaner element holder 7B covering the upward opening 7Aa of the lower case 7A and forming the clean chamber 73 with the flange surface 7Bb left on the periphery of the opening 7Aa of the lower case 7A; and the air cleaner cover 7C covering the upper portion of the air cleaner element 74 on the air cleaner element holder 7B. The side of the upper outside air inlet opening 83 of the upper part of the second air vent tube 8B is retained by the flange surface 7Bb. Thus, in work of replacement of the air cleaner element 74, the air cleaner element 74 can be replaced without the second air vent tube 8B being removed. Maintainability is therefore improved.

[0057]

In addition, the air vent tube 8 also has the lower outside air inlet opening 81 below the first Y-shaped tube 82 on the undersurface side of the vehicle. Thus, the upper and lower outside air inlet openings 83 and 81 of the air vent tube 8 are arranged so as to be

distributed vertically in the motorcycle 1. Dirt in the upper outside air inlet opening 83 is prevented by guiding a moisture and a liquid component to the lower outside air inlet opening 81, and the effect of a traveling wind is prevented by the upper outside air inlet opening 83 located on the flange surface 7Bb of the air cleaner case 7 and below the fuel tank 16. Therefore high air vent performance can be ensured over a long period of time.

[0058]

The drain tube 56 connected to the drain passage 55 of the carburetor 5 is further coupled to an upper part of the first Y-shaped tube 82 of the first air vent tube 8A. Therefore, also for a moisture or a liquid from the drain passage 55, the lower outside air inlet opening 81 of the air vent tube 8 is shared as an outlet for the moisture or the liquid. Thereby parts affecting peripheries thereof can be reduced while assemblability is maintained. Thus a degradation in external appearance quality can be prevented.

[0059]

A carburetor air vent tube piping structure for a saddle riding type vehicle according to one embodiment of the present invention has been described above. However,

of course, the mode of the present invention is not limited to the embodiment, and includes various modes carried out within the scope of the spirit of the present invention.

For example, the saddle riding type vehicle according to the present invention is not limited to the motorcycle according to the embodiment, but may be for example three-wheeled and four-wheeled buggies and various other saddle riding type vehicles. It suffices for the saddle riding type vehicle according to the present invention to be a saddle riding type vehicle provided with requirements of claim 1.

In addition, the arrangements in the left-right direction of respective devices have been described as specific arrangements shown in the figures for the convenience of description. However, the arrangements may be opposite in the left-right direction from those shown in the foregoing embodiment, and such arrangements are included in the present invention.

[Description of Reference Symbols]

[0060]

1...Motorcycle ("saddle riding type vehicle" in the present invention), 3...Internal combustion engine, 5...Carburetor, 7...Air cleaner case, 7a...Upper front

end edge, 7b...Front end side bottom surface, 7A...Lower case, 7Aa...Opening, 7B...Air cleaner element holder, 7Bb...Flange surface, 7C...Air cleaner cover, 8...Air vent tube, 8A...First air vent tube ("first air vent tube" in the present invention), 8B...Second air vent tube ("second air vent tube" in the present invention), 16...Fuel tank, 18A...Front cover, 18B...Side cover, 18C...Rear cover, 30...Crankcase, 31...Crankshaft, 32...Cylinder block, 33...Cylinder head, 33a...Intake port, 50...Airflow passage, 51...Float chamber, 51a...Space above a fuel liquid level, 52...Vertical through hole, 53...Horizontal through hole, 54...Opening portion, 55...Drain passage, 56...Drain tube, 61...Intake pipe ("downstream side intake pipe" in the present invention), 62...Connecting tube ("upstream side intake pipe" in the present invention), 63...Retaining section, 63a...Inserting hole, 71...Supporting rib, 72...Supporting hook, 73...Clean chamber, 74...Air cleaner element, 75...Dirty chamber, 76...Intake air duct, 77...Guide hook, 78...Locking hook, 79...Locking hook, 80...Detouring portion top portion, 81...Lower outside air inlet opening, 82...First Y-shaped tube ("coupling portion" in the present invention), 83...Upper outside air inlet opening, 85...Second Y-shaped tube

[Name of Document] Claims

[Claim 1]

A carburetor air vent tube piping structure for a saddle riding type vehicle, the saddle riding type vehicle (1) having an internal combustion engine (3) and an air cleaner case (7) arranged longitudinally below a fuel tank (16), and having an intake air passage formed by an upstream side intake pipe (62) and a downstream side intake pipe (61) with a carburetor (5) interposed between the upstream side intake pipe (62) and the downstream side intake pipe (61),

wherein a detouring portion top portion (80) of an air vent tube (8) connected to a side portion of one of a left and a right of the carburetor (5), the air vent tube (8) detouring above the upstream side intake pipe (62) and extending to a side of the other of the left and the right of the carburetor (5), is supported at a higher position than an upper portion of the upstream side intake pipe (62) by a supporting rib (71) provided to the air cleaner case (7) upstream of the carburetor (5).

[Claim 2]

The carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 1,

wherein on the side of the other of the left and

the right of the carburetor (5), the air vent tube (8) is inserted into and retained by an insertion hole (63a) formed by die cutting in an upward-downward direction in a side portion of the upstream side intake pipe (62).

[Claim 3]

The carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 2,

wherein the air vent tube (8) includes

a first air vent tube (8A) passing from the detouring portion top portion (80) through the insertion hole (63a) and extending downward, and

a second air vent tube (8B) communicating with the first air vent tube (8A) in a coupling portion (82) of a lower portion of the first air vent tube (8A), the second air vent tube (8B) passing through the insertion hole (63a) and extending upward, a side of an upper outside air inlet opening (83) of an end portion of the second air vent tube (8B) being supported by the air cleaner case (7) again; and

the first and second air vent tubes (8A and 8B) are vertically inserted into and retained by the insertion hole (63a) side by side.

[Claim 4]

The carburetor air vent tube piping structure for

the saddle riding type vehicle according to claim 3,

wherein the air cleaner case (7) includes

a lower case (7A),

an air cleaner element holder (7B) covering an upward opening (7Aa) of the lower case (7A) and forming a clean chamber (73) with a flange surface (7Bb) left on a periphery of the opening (7Aa) of the lower case (7A), and

an air cleaner cover (7C) covering an upper portion of an air cleaner element (74) on the air cleaner element holder (7B); and

the side of the upper outside air inlet opening (83) of an upper part of the second air vent tube (8B) is retained by the flange surface (7Bb).

[Claim 5]

The carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 4,

wherein the air vent tube (8) also has a lower outside air inlet opening (81) below the coupling portion (82) on an undersurface side of the vehicle.

[Claim 6]

The carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 5,

wherein a drain tube (56) connected to a drain

passage (55) of the carburetor (5) is further coupled to an upper part of the coupling portion (82) of the first air vent tube (8A).

Dated this 02.01.2015

[RANJNA MEHTA-DUTT]
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANT[S]

[Abstract]

[Object]

A carburetor air vent tube piping structure for a saddle riding type vehicle which structure can prevent an air vent function from being hindered by reducing the entry of a fuel from a carburetor into an air vent tube, and can improve air vent performance without increasing the number of parts.

[Solving Means]

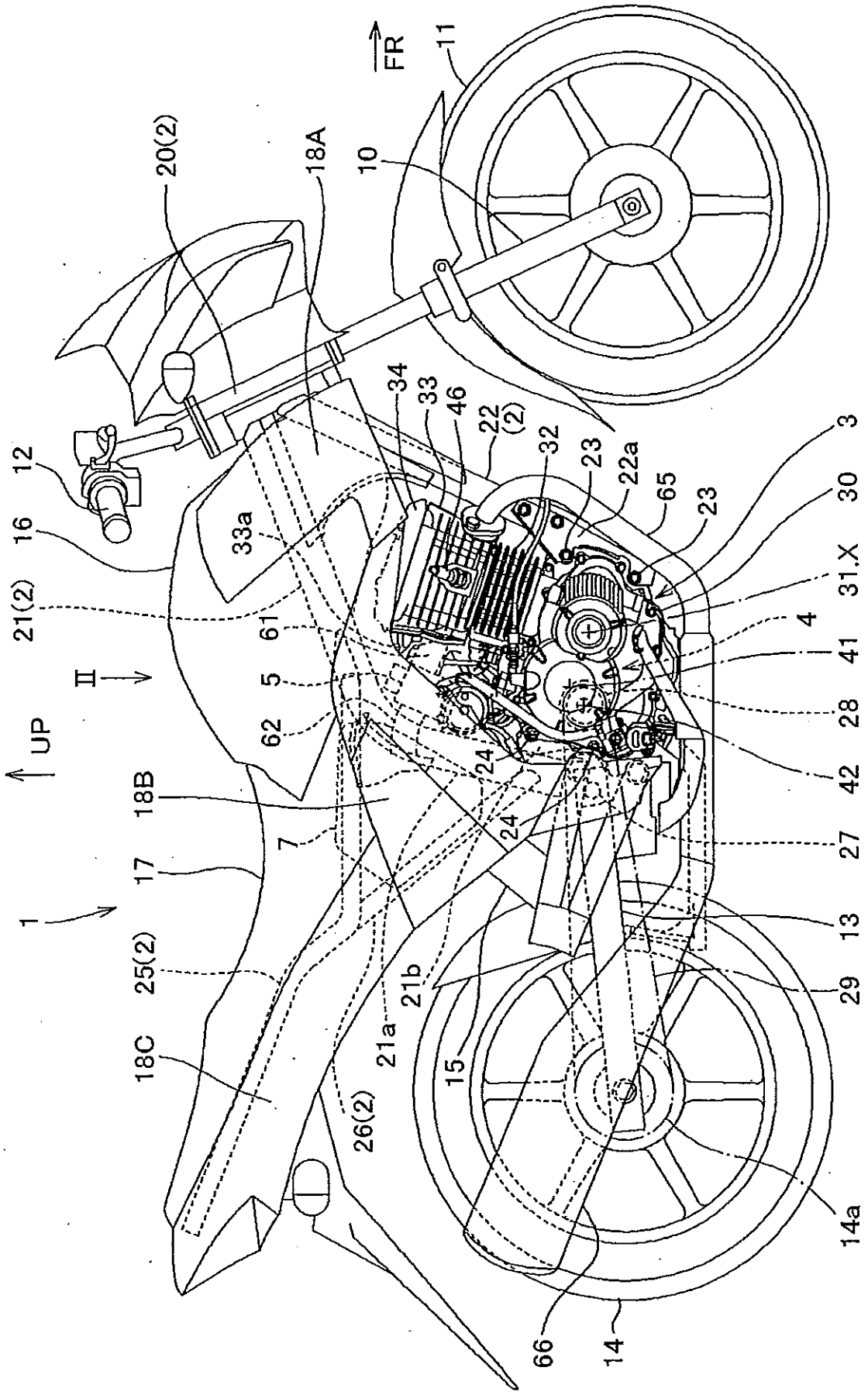
A carburetor air vent tube piping structure for a saddle riding type vehicle, the saddle riding type vehicle 1 having an internal combustion engine 3 and an air cleaner case 7 arranged longitudinally below a fuel tank 16, and having an intake air passage formed by an upstream side intake pipe 62 and a downstream side intake pipe 61 with a carburetor 5 interposed between the upstream side intake pipe 62 and the downstream side intake pipe 61, wherein a detouring portion top portion 80 of an air vent tube 8 connected to a side portion of one of a left and a right of the carburetor 5, the air vent tube 8 detouring above the upstream side intake pipe 62 and extending to a side of the other of the left and the right of the carburetor 5, is supported at a higher

position than an upper portion of the upstream side intake pipe 62 by a supporting rib 71 provided to the air cleaner case 7, upstream of the carburetor 5.

[Selected Drawing] FIG. 3

NAME OF DOCUMENT DRAWINGS

FIG.1



[RANJNA MEHTA-DUTT]
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.2

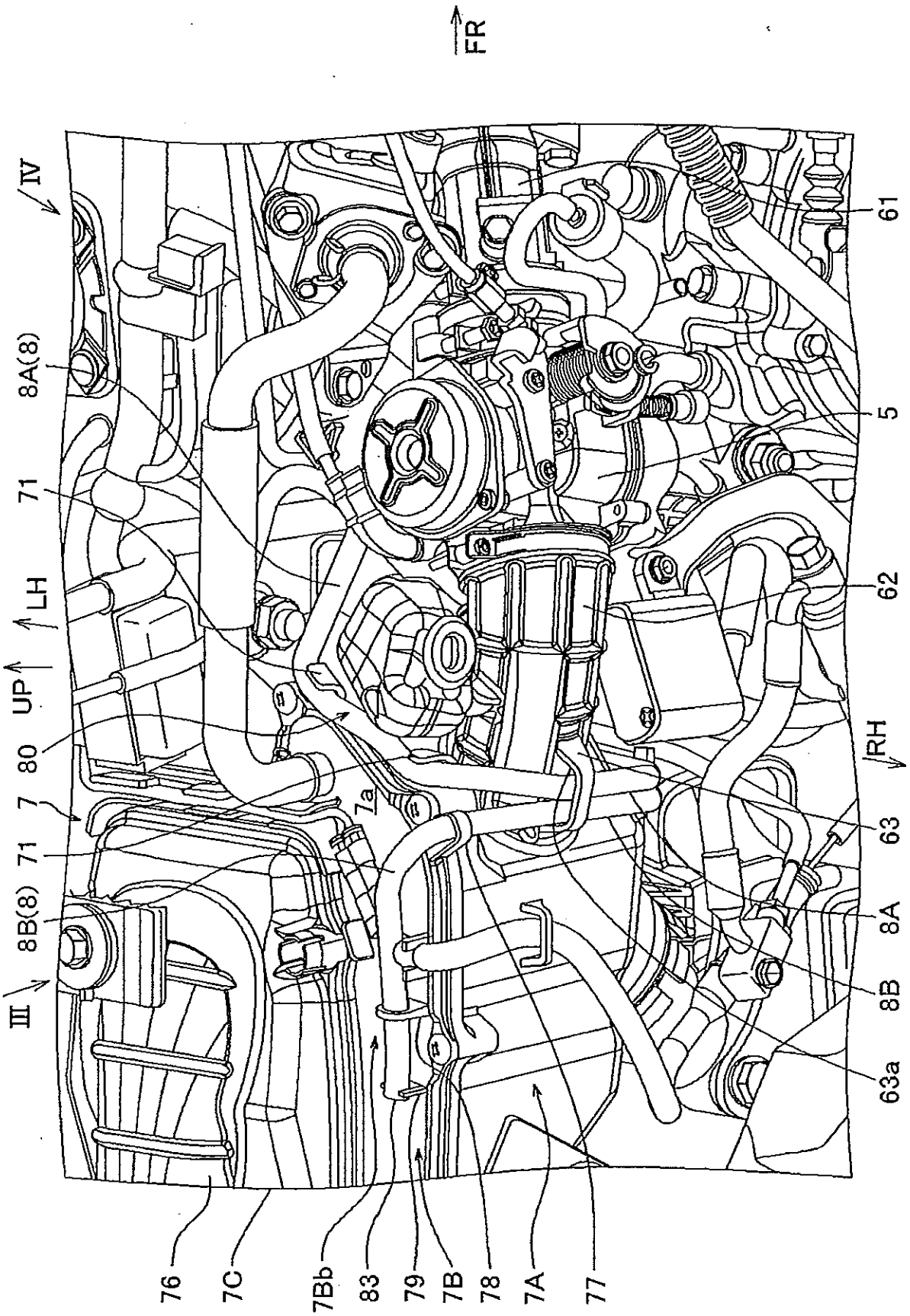

FR
IV
8A(8)
71
LH
UP
80
7
71
8B(8)
III
61
5
62
RH
63
8A
8B
63a
7a
76
7C
7Bb
83
79
7B
78
7A
77

FIG.3

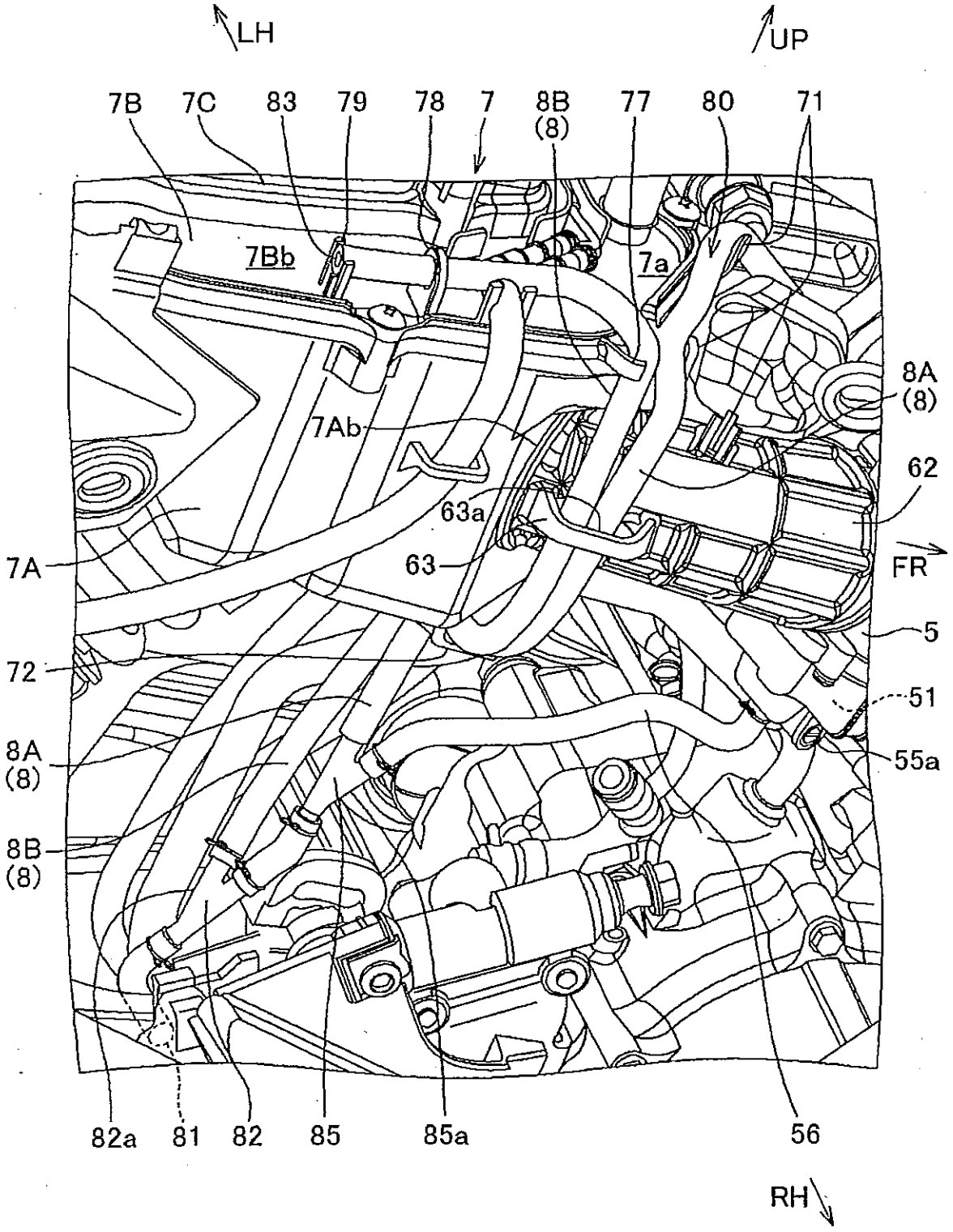

LH
UP
7B
7C
83
79
78
7
8B
(8)
77
80
71
7Bb
7a
8A
(8)
7Ab
62
63a
7A
63
FR
5
72
51
8A
(8)
55a
8B
(8)
82a
81
82
85
85a
56
RH

FIG.4

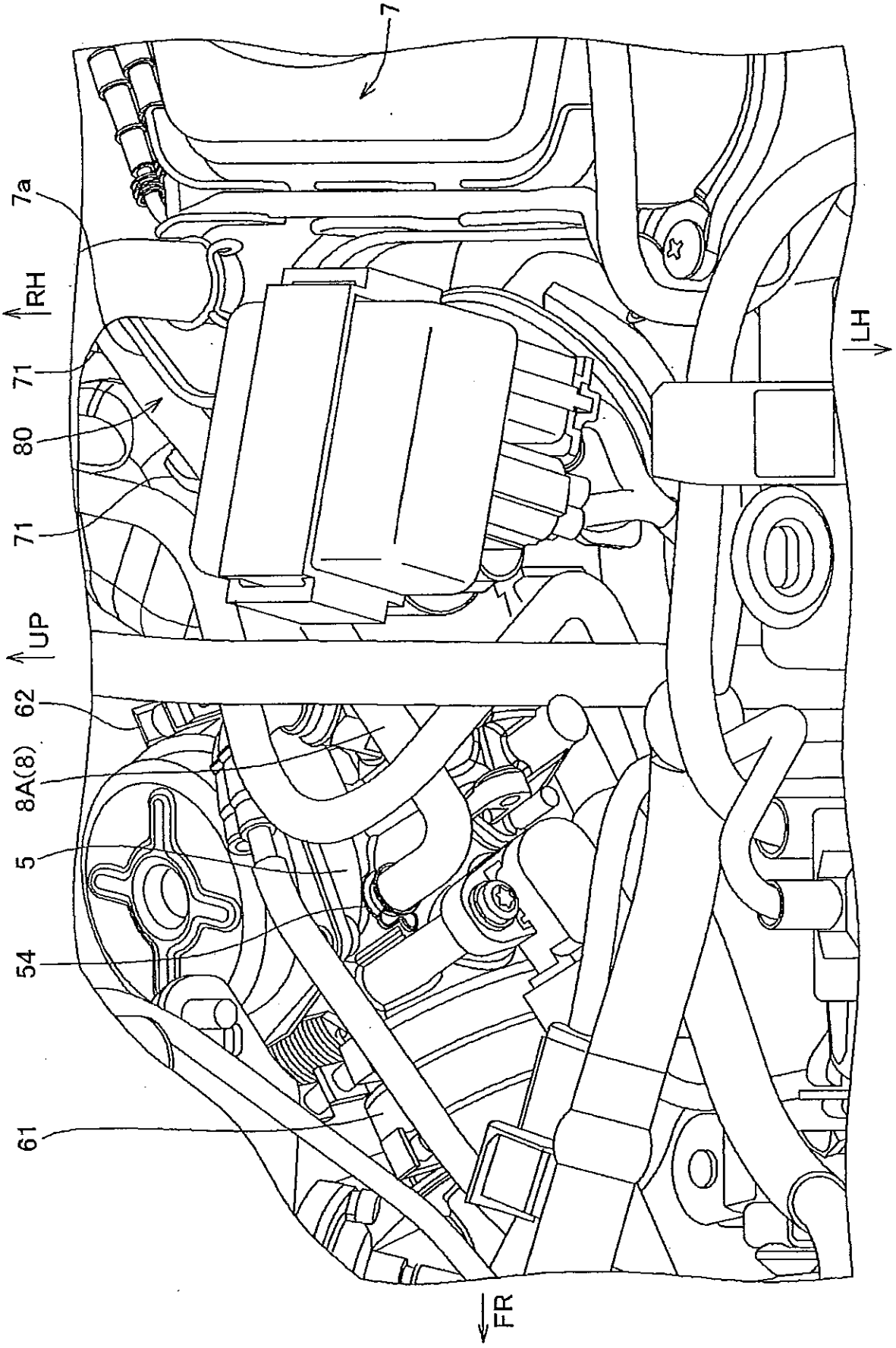


FIG.5

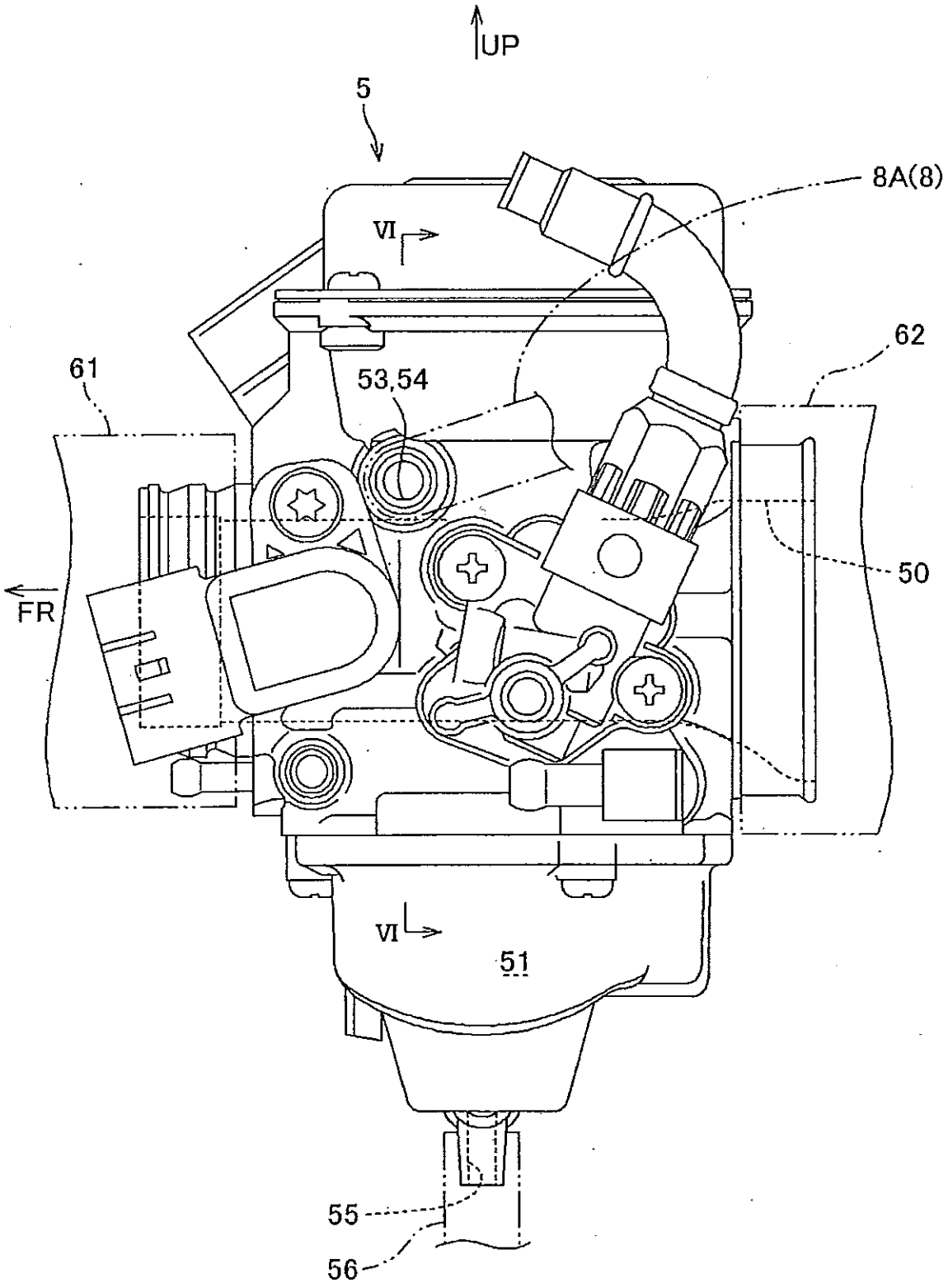


FIG.6

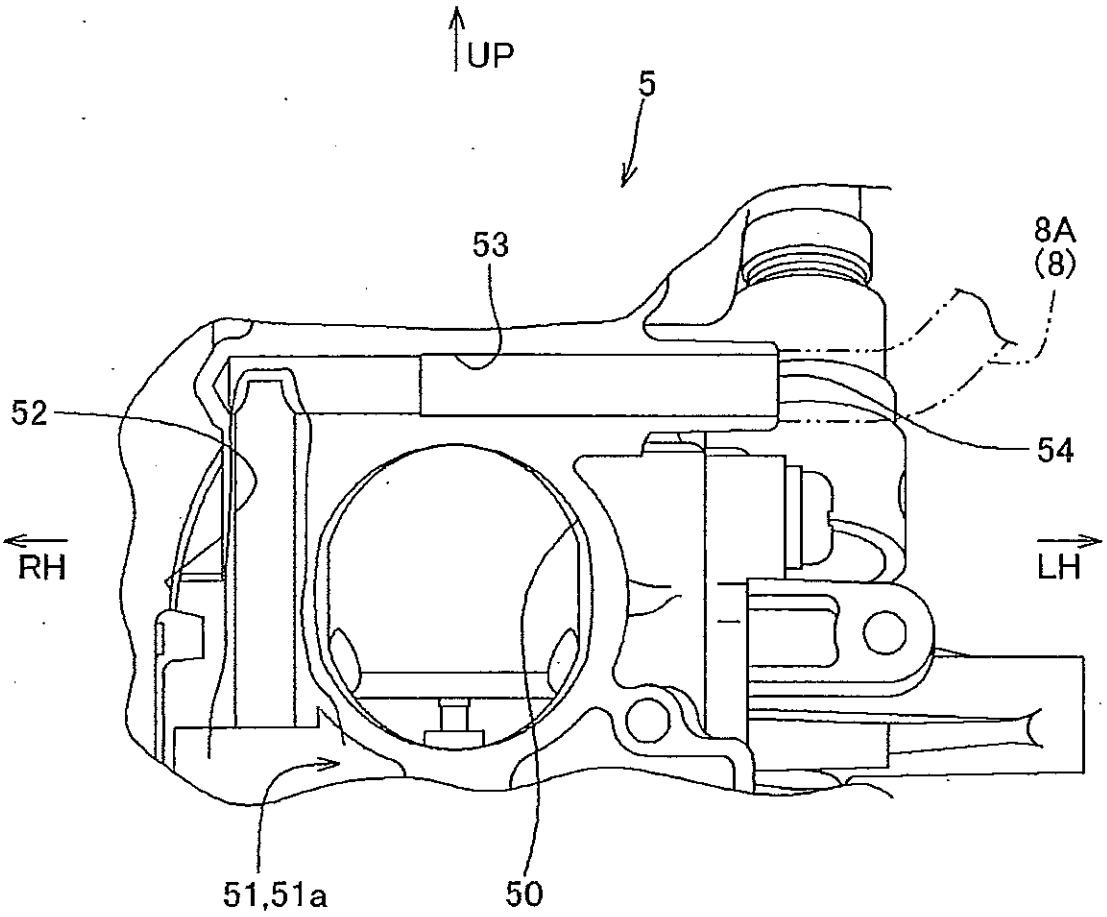
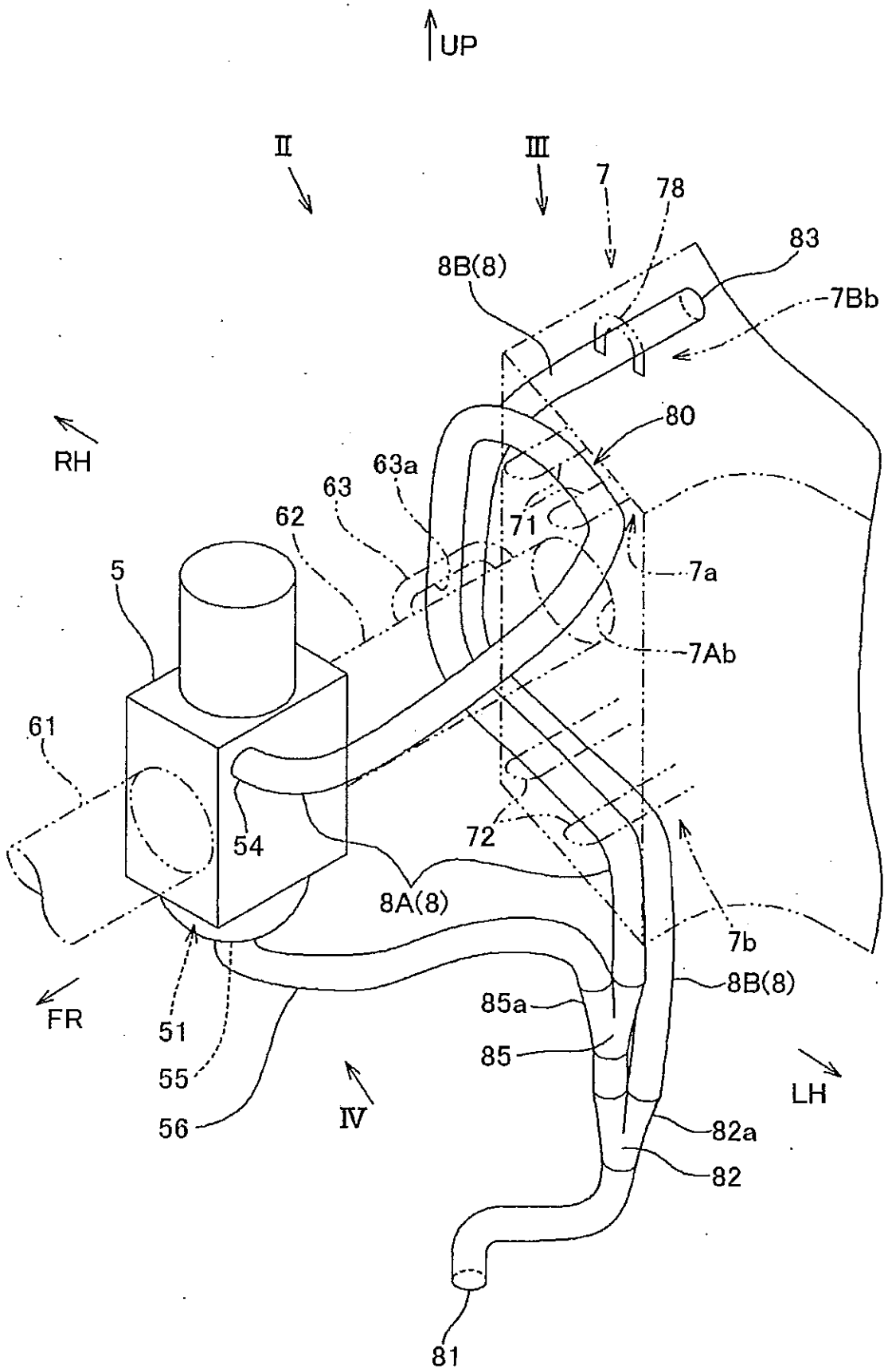
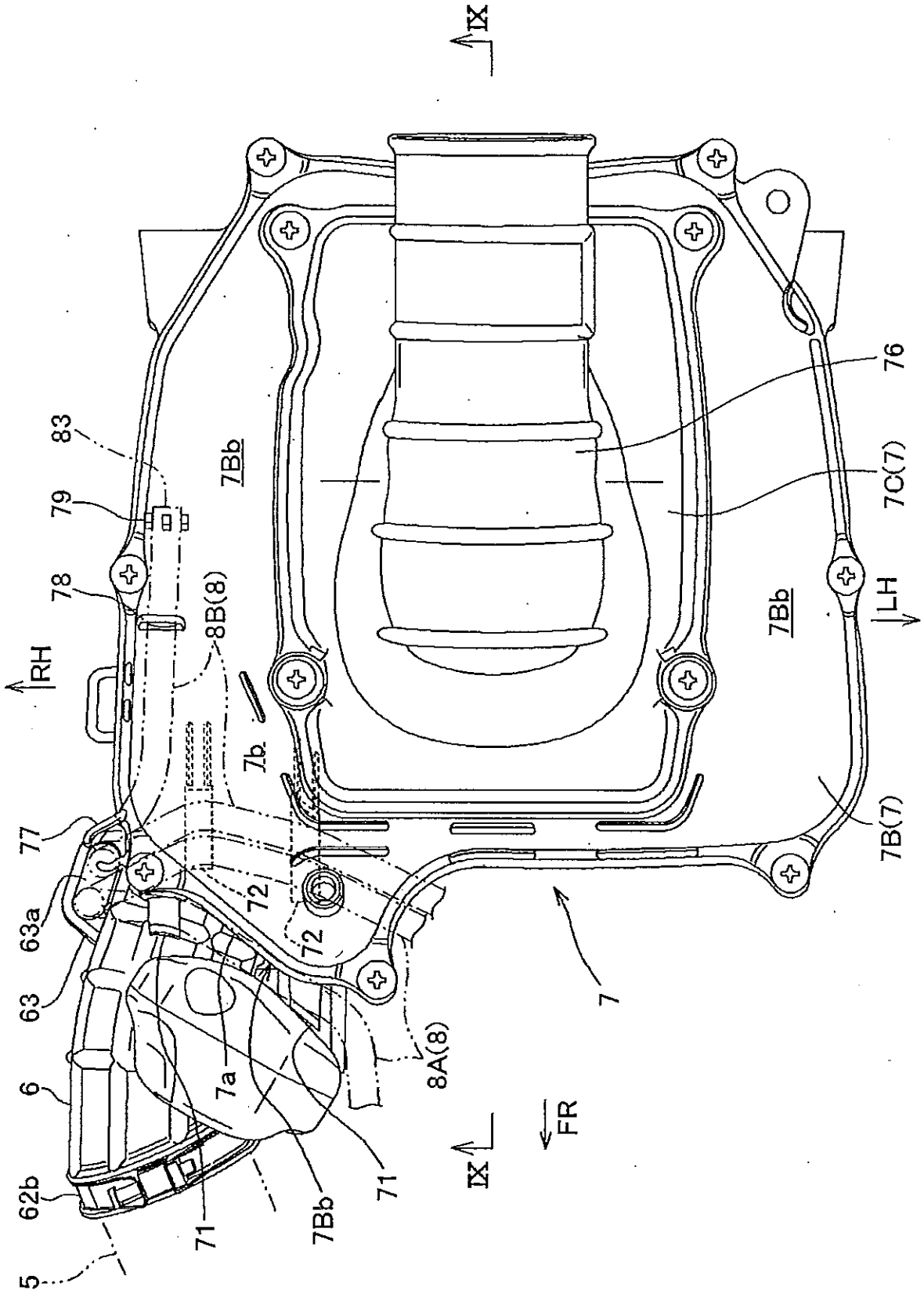


FIG.7



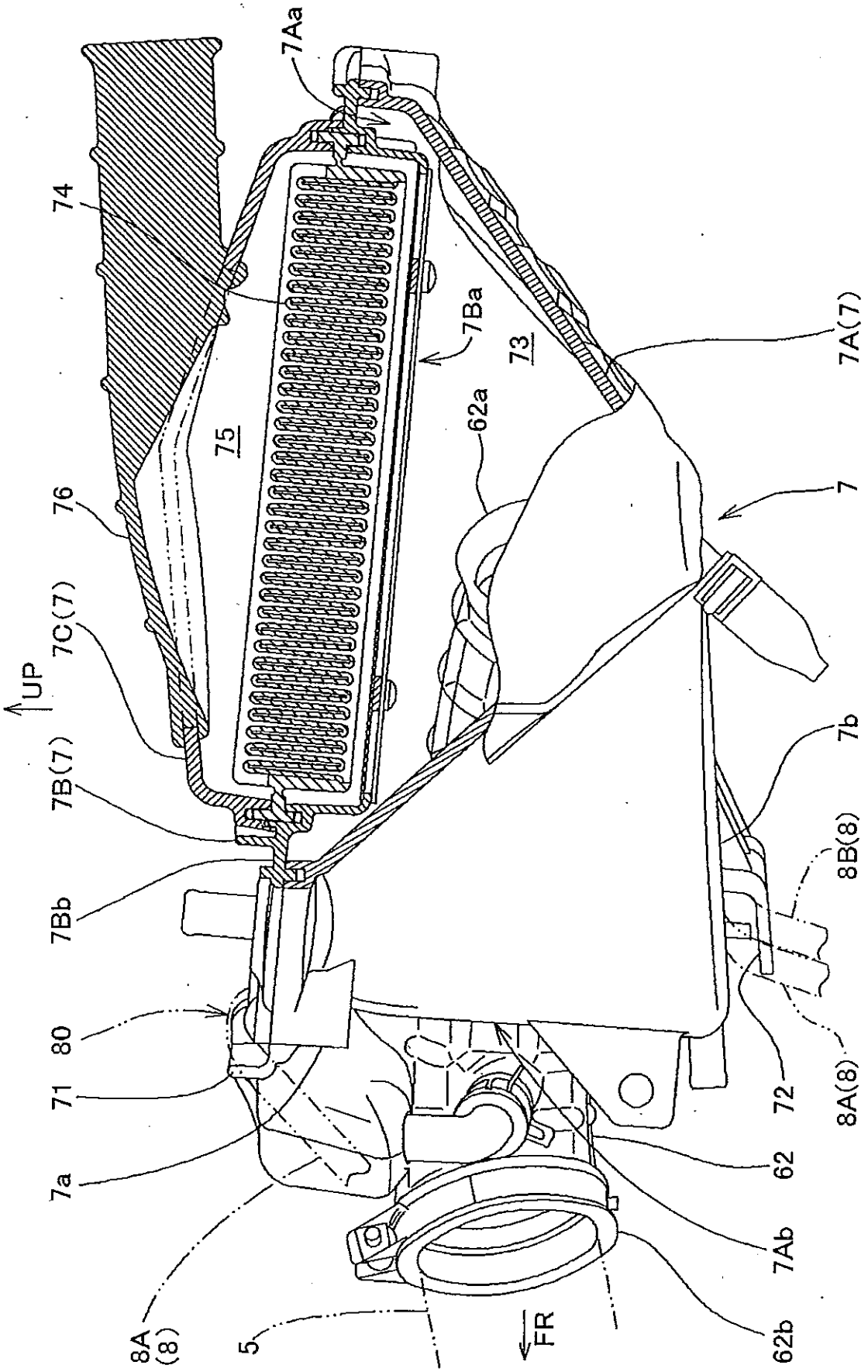
[RANJNA MEHTA-DUTT]
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.8



[RANJNA MEHTA-DUTT]
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.9



[RANJNA MEHTA-DUTT]
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FORM 2
THE PATENTS ACT 1970
[39 OF 1970]
&
THE PATENTS (AMENDMENT) RULES, 2006
COMPLETE SPECIFICATION

[See Section 10; rule 13]

"CARBURETOR AIR VENT TUBE PIPING STRUCTURE FOR SADDLE RIDING TYPE VEHICLE"

HONDA MOTOR CO., LTD., a corporation of Japan, of 1-1, Minami-Aoyama 2-chome, Minato-ku, Tokyo 107-8556, Japan,

The following specification particularly describes the invention and the manner in which it is to be performed:

Carburetor Air Vent Tube Piping Structure for Saddle Riding Type Vehicle

[Technical Field]

[0001]

The present invention relates to a piping structure of an air vent tube attached to a carburetor in a saddle riding type vehicle.

[Background Art]

[0002]

In a conventional saddle riding type vehicle having an internal combustion engine and an air cleaner case arranged longitudinally below a fuel tank, and having an intake air passage formed by a front intake pipe and a rear intake pipe with a carburetor interposed between the intake pipes, the outside air inlet opening of an air vent tube of the carburetor is disposed at a position in the vicinity of the rear intake pipe, as shown in Patent Document 1 below, for example.

[0003]

However, in the saddle riding type vehicle shown in Patent Document 1, while the outside air inlet opening is located at a position higher than a road surface and thus

provision is made for suppressing the effect of a traveling wind, there are a problem of the air vent tube being clogged by dust in the outside air inlet opening which dust occurs due to a moisture or a liquid within the air vent tube, and a problem of external appearance quality being degraded by dirt on members surrounding the outside air inlet opening.

[Prior Art Document]

[Patent Document]

[0004]

[Patent Document 1]

Japanese Patent No. 4000188 (FIGS. 1 to 5)

[Summary of the Invention]

[Problem to be Solved by the Invention]

[0005]

The present invention has been made in view of such related art. It is an object of the present invention to provide a carburetor air vent tube piping structure for a saddle riding type vehicle which structure can prevent an air vent function from being hindered by reducing the entry of a fuel from a carburetor into an air vent tube, and can improve air vent performance without increasing the number of parts.

[Means for Solving the Problem]

[0006]

In order to solve the above problems, according to an invention of claim 1, there is provided a carburetor air vent tube piping structure for a saddle riding type vehicle, the saddle riding type vehicle having an internal combustion engine and an air cleaner case arranged longitudinally below a fuel tank, and having an intake air passage formed by an upstream side intake pipe and a downstream side intake pipe with a carburetor interposed between the upstream side intake pipe and the downstream side intake pipe, wherein a detouring portion top portion of an air vent tube connected to a side portion of one of a left and a right of the carburetor, the air vent tube detouring above the upstream side intake pipe and extending to a side of the other of the left and the right of the carburetor, is supported at a higher position than an upper portion of the upstream side intake pipe by a supporting rib provided to the air cleaner case upstream of the carburetor.

[0007]

According to an invention of claim 2, in the carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 1, on the side of the other of the left and the right of the carburetor,

the air vent tube is inserted into and retained by an insertion hole formed by die cutting in an upward-downward direction in a side portion of the upstream side intake pipe.

[0008]

According to an invention of claim 3, in the carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 2, the air vent tube includes: a first air vent tube passing from the detouring portion top portion through the insertion hole and extending downward; and a second air vent tube communicating with the first air vent tube in a coupling portion of a lower portion of the first air vent tube, the second air vent tube passing through the insertion hole and extending upward, a side of an upper outside air inlet opening of an end portion of the second air vent tube being supported by the air cleaner case again; and wherein the first and second air vent tubes are vertically inserted into and retained by the insertion hole side by side.

[0009]

According to an invention of claim 4, in the carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 3, the air cleaner

case includes: a lower case; an air cleaner element holder covering an upward opening of the lower case and forming a clean chamber with a flange surface left on a periphery of the opening of the lower case; and an air cleaner cover covering an upper portion of an air cleaner element on the air cleaner element holder; and the side of the upper outside air inlet opening of an upper part of the second air vent tube is retained by the flange surface.

[0010]

According to an invention of claim 5, in the carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 4, the air vent tube also has a lower outside air inlet opening below the coupling portion on an undersurface side of the vehicle.

[0011]

According to an invention of claim 6, in the carburetor air vent tube piping structure for the saddle riding type vehicle according to claim 5, a drain tube connected to a drain passage of the carburetor is further coupled to an upper part of the coupling portion of the first air vent tube.

[Effect of the Invention]

[0012]

According to the carburetor air vent tube piping structure for the saddle riding type vehicle according to the invention of claim 1, because the detouring portion top portion of the air vent tube is supported at a position higher than the upper portion of the upstream side intake pipe by the supporting rib of the air cleaner case, the entry of a fuel from the carburetor into the air vent tube is reduced. Thus, an air vent function is performed more reliably, and air vent performance can be improved without an increase in the number of parts.

[0013]

According to the invention of claim 2, in addition to the effect of the invention of claim 1, it is possible to retain the air vent tube by the upstream side intake pipe without complicating a process of manufacturing the upstream side intake pipe, and assemble the air vent tube without increasing the number of parts.

[0014]

According to the invention of claim 3, in addition to the effect of the invention of claim 2, while the retaining structure is simplified by retaining the first and second air vent tubes by the upstream side intake pipe at a common retaining position, variations in internal pressure are suppressed with the air vent tube

formed long, and the effect of a traveling wind is further reduced by the upper outside air inlet opening, so that air vent performance is improved.

[0015]

According to the invention of claim 4, in addition to the effect of the invention of claim 3, in work of replacement of the air cleaner element, the air cleaner element can be replaced without the second air vent tube being removed. Maintainability is therefore improved.

[0016]

According to the invention of claim 5, in addition to the effect of the invention of claim 4, the upper and lower outside air inlet openings of the air vent tube are arranged so as to be distributed vertically in the vehicle. Dirt in the upper outside air inlet opening is prevented by guiding a moisture and a liquid component to the lower outside air inlet opening, and the effect of a traveling wind is prevented by the upper outside air inlet opening located on the flange surface of the air cleaner case and below the fuel tank. Therefore high air vent performance can be ensured over a long period of time.

[0017]

According to the invention of claim 6, in addition

to the effect of the invention of claim 5, also for a moisture or a liquid from the drain passage, the lower outside air inlet opening of the air vent tube is shared as an outlet for the moisture or the liquid. Thereby parts affecting peripheries thereof can be reduced while assemblability is maintained. Thus a degradation in external appearance quality can be prevented.

[Brief Description of the Drawings]

[0018]

[FIG. 1]

FIG. 1 is a right side view of a motorcycle according to a present embodiment.

[FIG. 2]

FIG. 2 is a right side top perspective view of the central portion of the motorcycle shown with covers removed, the right side top perspective view corresponding substantially to the direction of an arrow II in FIG. 1.

[FIG. 3]

FIG. 3 is a right side perspective view looking down on the undersurface side of the vehicle from the side of a connecting tube and an air cleaner case, the right side perspective view corresponding substantially to the direction of an arrow III in FIG. 2.

[FIG. 4]

FIG. 4 is a left side top perspective view of a carburetor of the motorcycle and peripheries thereof, the left side top perspective view corresponding substantially to the direction of an arrow IV in FIG. 2.

[FIG. 5]

FIG. 5 is a left side view of the carburetor according to the present embodiment.

[FIG. 6]

FIG. 6 is a sectional view of the front of the carburetor as viewed in the direction of arrows from a line VI-VI in FIG. 5.

[FIG. 7]

FIG. 7 is a schematic perspective view of the arrangement of an air vent tube formed by a first and a second air vent tube and a drain tube, the schematic perspective view corresponding substantially to the direction of an arrow VII in FIG. 4. Incidentally, an arrow II, an arrow III, and an arrow IV in FIG. 7 indicate approximate perspective directions of FIG. 2, FIG. 3, and FIG. 4, respectively.

[FIG. 8]

FIG. 8 is a top view of the air cleaner case and the connecting tube, the top view corresponding to the

direction of an arrow VIII in FIG. 7.

[FIG. 9]

FIG. 9 is a left sectional view of the air cleaner case, the left sectional view being taken in the direction of arrows from a line IX-IX in FIG. 8.

[Mode for Carrying Out the Invention]

[0019]

A carburetor air vent tube piping structure for a saddle riding type vehicle according to one embodiment of the present invention will be described with reference to FIGS. 1 to 9.

In the present embodiment, the saddle riding type vehicle is a motorcycle 1 having an internal combustion engine 3. Directions such as a forward direction, a rearward direction, a left direction, a right direction, an upward direction, a downward direction, and the like in the description of claims and the present specification are in accordance with the direction of the vehicle (motorcycle) provided with the carburetor air vent tube piping structure according to the present embodiment.

In the drawings, an arrow FR indicates the forward direction of the vehicle, an arrow LH indicates the left direction of the vehicle, an arrow RH indicates the right

direction of the vehicle, and an arrow UP indicates the upward direction of the vehicle.

[0020]

As shown in FIG. 1, which shows the right side of the motorcycle ("saddle riding type vehicle" in the present invention) 1 according to the present embodiment, a main frame 21 of a vehicle body frame 2 of the motorcycle 1 according to the present embodiment extends rearward from a head pipe 20 through a center in a vehicle width direction while tilting slightly downward, and then bends downward to form a main steeply inclined portion 21a, and further a down frame 22 extends obliquely rearward and downward from the head pipe 20 through the center in the vehicle width direction.

[0021]

The front portion of a crankcase 30 in the internal combustion engine 3 is attached to a supporting bracket 22a on the lower portion of the down frame 22 by bolts 23 at two upper and lower positions. The rear portion of the crankcase 30 is attached to a supporting bracket 21b on the lower portion of the main steeply inclined portion 21a of the main frame 21 by bolts 24 at two upper and lower positions. The internal combustion engine 3 is thereby supported by the vehicle body frame 2.

A pair of left and right seat rails 25 extends rearward from the bent portion of the main frame 21 while forming a bent portion midway. A back stay 26 coupling the bent portion of the seat rail 25 to the central portion of the main steeply inclined portion 21a supports the seat rail 25.

[0022]

In the vehicle body frame 2 as described above, the head pipe 20 pivotally supports a front fork 10. The lower end of the front fork 10 rotatably supports a front wheel 11. Steering handlebars 12 are provided at an upper end of a pivot of the front fork 10. A rear fork 13 whose front end is rotatably supported by a pivot shaft 27 provided to the lower portion of the main frame 21 extends rearward. The rear end of the rear fork 13 rotatably supports a rear wheel 14. A rear cushion 15 is interposed between the central portion of the rear fork 13 and the back stay 26.

[0023]

A fuel tank 16 is installed so as to straddle both of the left side and the right side of the main frame 21. A seat 17 is provided in the rear of the fuel tank 16 so as to be supported by the seat rails 25.

A front cover 18A covers the upper portion of the

down frame 22 of the vehicle body frame 2 from both of the left side and the right side. A side cover 18B covers both of the left side and the right side between the internal combustion engine 3 and the seat 17. A rear cover 18C covers the rear half of the seat rails 25.

[0024]

The internal combustion engine 3 and an air cleaner case 7 in the rear of the internal combustion engine 3 are arranged longitudinally below the fuel tank 16.

The internal combustion engine 3 in the present embodiment is integrally provided with a transmission 4 in a rear portion within the crankcase 30 to form a so-called power unit. The internal combustion engine 3 in the present embodiment is an SOHC type four-stroke-cycle internal combustion engine having an air-cooled single cylinder which internal combustion engine is mounted in the motorcycle 1 with a crankshaft 31 of the internal combustion engine 3 orientated in the vehicle width direction, that is, the left-right direction of the motorcycle 1, and with the cylinder rising in a state of slightly leaning forward.

[0025]

A cylinder block 32 and a cylinder head 33 are stacked in order obliquely above the crankcase 30 that

rotatably supports the crankshaft 31 of the internal combustion engine 3, and are fastened integrally with each other. A cylinder head cover 34 is put on the cylinder head 33. The cylinder block 32, the cylinder head 33, and the cylinder head cover 34 are projected from the crankcase 30 in a state of slightly leaning forward.

[0026]

In addition, a main shaft 41 and a counter shaft 42 are disposed in the rear portion of the crankcase 30 so as to be parallel with the crankshaft 31. A plurality of sets of speed change gears of the main shaft 41 and the counter shaft 42, which speed change gears are not shown in the figures, are in mesh with each other at all times to form the transmission 4.

The counter shaft 42 penetrates the crankcase 30 in the left direction and projects to the outside. The counter shaft 42 forms a final output shaft of the internal combustion engine 3. An output sprocket 28 is spline-fitted to the projecting part of the counter shaft 42.

A drive chain 29 wound around the output sprocket 28 is stretched over a driven sprocket 14a on the side of the rear wheel 14 to form a chain transmission mechanism.

Thus power is transmitted to the rear wheel 14.

[0027]

A metallic intake pipe ("downstream side intake pipe" in the present invention) 61 that is connected to an intake port 33a of the cylinder head 33 and which extends rearward is connected to a carburetor 5. The carburetor 5 is coupled to the air cleaner case 7 on an upstream side which air cleaner case is located in the rear of the carburetor 5 via a connecting tube ("upstream side intake pipe" in the present invention) 62 made of a hard rubber.

That is, the connecting tube 62 and the intake pipe 61 arranged longitudinally with the carburetor 5 interposed therebetween form an intake air passage from the air cleaner case 7 to the intake port 33a of the cylinder head 33.

[0028]

An exhaust pipe 65 extending frontward from the cylinder head 33 bends downward, further bends rearward, extends rearward and on the right side along the undersurface of the crankcase 30, and is coupled to a muffler 66 disposed to the right of the rear wheel 14.

[0029]

FIG. 2 is a right side top perspective view of the

central portion of the motorcycle 1 shown with the covers 18A to 18C removed, the right side top perspective view corresponding substantially to the direction of an arrow II in FIG. 1. As shown in FIG. 2, the intake pipe 61 connected to the intake port (see FIG. 1) 33a opening in the rear of the cylinder head 33 of the internal combustion engine 3 extends rearward and is connected to the carburetor 5.

[0030]

As shown in FIG. 5, which shows the left side of the carburetor 5 according to the present embodiment, and FIG. 6, which shows a cross section of the front of the carburetor 5 as viewed in the direction of arrows from a line VI-VI in FIG. 5, the carburetor 5 is a publicly known negative pressure actuation type carburetor including a venturi portion formed by a negative pressure actuation type venturi piston and a throttle valve, which are not shown in the figures, in an airflow passage 50 disposed in a forward-rearward direction. A float chamber 51 that temporarily stores a fuel until the fuel is supplied to the airflow passage 50 is provided below the venturi portion.

A float not shown in the figures is included in the float chamber 51. A float valve opened or closed

according to vertical movement of the float that follows the liquid level of the fuel acts to supply the float chamber 51 with the fuel supplied under pressure at all times due to a gravity fall thereof from the fuel tank 16 so as to maintain a constant height of the liquid level. The fuel is thus stored without overflowing.

[0031]

Therefore, the inside of the float chamber 51 needs to be maintained at atmospheric pressure at all times to maintain the buoyancy of the float properly and supply the fuel to the venturi portion properly. As shown in FIG. 2 and FIG. 4, an air vent tube 8 that makes a space 51a above the liquid level of the fuel in the float chamber 51 (see FIG. 6) communicate with an external atmospheric space is provided to secure ventilation to the outside.

As shown in FIG. 6, a vertical through hole 52 communicating with the space 51a above the liquid level of the fuel in the float chamber 51 and extending upward and a horizontal through hole 53 communicating with the vertical through hole 52 and extending in the left direction are provided in the wall of the carburetor 5. As shown in FIG. 5 and FIG. 6, the horizontal through hole 53 opens in the left side portion of the carburetor 5. The air vent tube 8 is connected to an opening portion

54. A publicly known connecting structure may be used as appropriate.

[0032]

However, when the fuel within the float chamber 51 flows into the air vent tube 8 and clogs the air vent tube 8 due to violent jolting of the motorcycle 1 or the like, or when the ventilation of the air vent tube 8 is hindered by the adhesion of a dust or the like from the outside to the air vent tube 8 which adhesion is caused by a moisture such as a fuel vapor, a condensate, or the like, the air pressure of the float chamber 51 cannot be maintained at atmospheric pressure. Abnormalities in the actuation of the float valve and the supply of the fuel to the venturi portion may thus occur. A piping structure for the air vent tube 8 for avoiding the abnormalities is desired.

In addition, it is necessary to avoid subjecting the air vent tube 8 to a negative pressure due to an effect of a traveling wind of the motorcycle 1.

[0033]

In the present embodiment, the air vent tube 8 includes a first air vent tube ("first air vent tube" in the present invention) 8A connected to the carburetor 5 and a second air vent tube ("second air vent tube" in the

present invention) 8B connected to the first air vent tube 8A.

[0034]

FIG. 4 is a left side top perspective view of the carburetor 5 of the motorcycle 1 and peripheries thereof that are shown with the covers 18A to 18C removed, the left side top perspective view corresponding substantially to the direction of an arrow IV in FIG. 2. FIG. 4 shows the first air vent tube 8A connected to the opening portion 54 in the left side portion of the carburetor 5 and extended obliquely rearward and upward.

[0035]

The first air vent tube 8A connected to the opening portion 54 in the left side portion of the carburetor 5 extends obliquely rearward and upward, and then detours around the upper part of the connecting tube 62 from the left to the right, as shown in FIG. 2. A detouring portion top portion 80 of the first air vent tube 8A extends to the right with respect to the carburetor 5. The first air vent tube 8A then bends downward, and extends to a lower outside air inlet opening 81 opening in the undersurface of the vehicle (see FIG. 3).

[0036]

Supporting ribs 71 provided at an upper front end

edge 7a of the air cleaner case 7 on the upstream side which air cleaner case 7 is located in the rear of the carburetor 5' support the detouring portion top portion 80 of the first air vent tube 8A at a higher position than the upper portion of the connecting tube 62. Thus, even when the motorcycle 1 is shaken greatly or inclined, the entry of the fuel from the float chamber 51 of the carburetor 5 into the first air vent tube 8A is reduced. In addition, a fuel that has entered flows down and returns to the float chamber 51 easily. Even if there is a fuel that goes over the detouring portion top portion 80, the fuel flows down to the lower outside air inlet opening 81 and is discharged from the lower outside air inlet opening 81. An air vent function is therefore prevented from being hindered. Thus, the air vent function is performed more reliably, and air vent performance can be improved without an increase in the number of parts of the air vent tube 8.

[0037]

When the first air vent tube 8A extends downward on the right side with respect to the carburetor 5 and on the right of the connecting tube 62, the first air vent tube 8A is inserted into and retained by an insertion hole 63a formed by die cutting in the upward-downward

direction in the right side portion of the connecting tube 62.

The connecting tube 62 is made of a molded hard rubber. Even with a simple constitution formed by a molding die divided into two upper and lower parts, a retaining portion 63 having the insertion hole 63a in the die cutting direction, that is, the upward-downward direction can be formed on the side surface of the connecting tube 62.

It is therefore possible to retain the first air vent tube 8A by the connecting tube 62 without complicating a process of manufacturing the connecting tube 62, and assemble the first air vent tube 8A without increasing the number of parts.

[0038]

FIG. 3 is a right side perspective view looking down on the undersurface side of the vehicle from the side of the connecting tube 62 and the air cleaner case 7, in substantially the direction of an arrow III in FIG. 2, which is shown with the covers 18A to 18C removed. As shown in FIG. 3, the first air vent tube 8A passing through the insertion hole 63a of the connecting tube 62 and extending downward extends to the central side of the vehicle in the left direction while supported by

supporting hooks 72 provided on a front end side bottom surface 7b of the air cleaner case 7, then extends downward again, and opens downward in the undersurface of the vehicle, thereby forming the lower outside air inlet opening 81.

[0039]

A first Y-shaped tube ("coupling portion" in the present invention) 82 branching upward is interposed in the lower portion of the first air vent tube 8A, that is, slightly above the lower outside air inlet opening 81. The second air vent tube 8B is connected to the side of a branch tube 82a of the first Y-shaped tube 82. The second air vent tube 8B extends upward alongside of the first air vent tube 8A and in an opposite direction from the first air vent tube 8A, then extends to the right while supported by the supporting hooks 72 on the front end side bottom surface 7b of the air cleaner case 7, then bends upward, passes through the insertion hole 63a of the connecting tube 62 and extends upward, then diverges from the first air vent tube 8A, and extends rearward and is supported by the top surface of the air cleaner case 7. The end portion of the second air vent tube 8B forms an upper outside air inlet opening 83.

[0040]

Therefore, the first air vent tube 8A and the second air vent tube 8B are vertically inserted into and retained by the insertion hole 63a of the connecting tube 62 side by side. The retaining portion 63 formed by the connecting tube 62 is thus made common to the first and second air vent tubes 8A and 8B, so that a retaining structure is simplified.

In addition, the first and second air vent tubes 8A and 8B form a long air vent tube 8. Thus, variations in internal pressure are suppressed. The effect of a traveling wind on the air vent tube 8 is thereby further reduced. Therefore air vent performance is improved.

[0041]

As described above, in addition to the upper outside air inlet opening 83, the air vent tube 8 is provided with the lower outside air inlet opening 81 on the undersurface side of the vehicle below the first Y-shaped tube 82 serving as a coupling portion coupling the first air vent tube 8A and the second air vent tube 8B to each other. The upper and lower outside air inlet openings 83 and 81 of the air vent tube 8 are thus arranged so as to be distributed vertically in the vehicle. Dirt in the upper outside air inlet opening 83 in the upper part is prevented by guiding a moisture such

as a fuel vapor or the like and a liquid component such as a fuel or the like to the lower outside air inlet opening 81 in the lower part and discharging the moisture and the liquid component from the lower outside air inlet opening 81, and the effect of a traveling wind is prevented by the upper outside air inlet opening 83 located at a higher position than a road surface and below the fuel tank. Therefore high air vent performance is ensured over a long period of time.

[0042]

In addition, as shown in FIG. 3, a drain tube 56 is connected to a drain passage 55 in a bottom portion communicating with the float chamber 51 of the carburetor 5 (see FIG. 5). The drain tube 56 extends obliquely downward, and is coupled to the side of a branch tube 85a of a second Y-shaped tube 85 that is interposed above the first Y-shaped tube 82 in the first air vent tube and which branches upward. The drain tube 56 communicates with the branch tube 85a of the second Y-shaped tube 85. Incidentally, a connecting structure for connecting the drain tube 56 to the drain passage 55 is a publicly known appropriate structure.

[0043]

Therefore, a moisture such as a fuel vapor or the

like or a liquid such as a fuel or the like from the drain passage 55 flows into the first air vent tube 8A via the drain tube 56, and can be discharged from the lower outside air inlet opening 81. By sharing the lower outside air inlet opening 81 as an outlet for the moisture or the liquid, assemblability is maintained, and parts affecting peripheries thereof due to the moisture or the liquid can be reduced. Thus, a degradation in external appearance quality can be prevented.

Incidentally, the drain passage 55 is normally closed by a stopper bolt 55a (see FIG. 3), and is opened when a fuel within the float chamber 51 is discharged and replaced, for example.

[0044]

The arrangement of the air vent tube 8 formed by the first and second air vent tubes 8A and 8B and the drain tube 56 described above is shown in FIG. 7 as a schematic perspective view corresponding substantially to the direction of an arrow VII in FIG. 4.

An arrow II, an arrow III, and an arrow IV in FIG. 7 indicate approximate perspective directions of FIG. 2, FIG. 3, and FIG. 4, respectively.

[0045]

As shown in FIG. 7, the detouring portion top

portion 80 of the first air vent tube 8A is supported by the supporting ribs 71 of the air cleaner case 7 above the connecting tube 62. The first air vent tube 8A is passed downward through the insertion hole 63a of the connecting tube 62, is then supported by the supporting hooks 72 of the air cleaner case 7, extends in the left direction to the central side of the vehicle, and thereafter extends downward.

On the other hand, the second air vent tube 8B coupled to the first air vent tube 8A and communicating with the first air vent tube 8A in the lower part extends upward, is then supported by the supporting hooks 72 of the air cleaner case 7, extends to the right side of the vehicle, further turns upward, passes upward through the insertion hole 63a of the connecting tube 62, and is thereafter supported by the top surface of the air cleaner case 7. A supporting structure by which the air vent tube 8 is supported on the air cleaner case 7 will be described in the following with reference to FIG. 8 and FIG. 9.

[0046]

FIG. 8 is a top view of the air cleaner case 7 and the connecting tube 62, the top view corresponding to the direction of an arrow VIII in FIG. 7. FIG. 9 is a left

sectional view of the air cleaner case 7, the left sectional view being taken in the direction of arrows from a line IX-IX in FIG. 8.

As shown in FIG. 9, the air cleaner case 7 includes: a lower case 7A made of a resin, the lower case 7A widely opening upward; an air cleaner element holder 7B made of a resin, the air cleaner element holder 7B having an air cleaner element retaining portion 7Ba in the center of an upward opening 7Aa of the lower case 7A, covering the opening 7Aa with a flange surface 7Bb left on a periphery, and defining a clean chamber 73; and an air cleaner cover 7C made of a resin, the air cleaner cover 7C covering the upper portion of an air cleaner element 74 retained by the air cleaner element retaining portion 7Ba, and defining a dirty chamber 75.

[0047]

An upstream end 62a of the connecting tube 62 is inserted into and fixed to the front end side of the lower case 7A. A downstream end 62b of the connecting tube 62 is connected to the carburetor 5.

The air cleaner element holder 7B includes the central air cleaner element retaining portion 7Ba and the flange surface 7Bb on the periphery of the air cleaner element retaining portion 7Ba. The periphery of the

flange surface 7Bb is airtightly fastened to the periphery of the upward opening 7Aa of the lower case 7A. Thus, the opening 7Aa is closed, and the clean chamber 73 is defined. The air cleaner element retaining portion 7Ba has a retaining structure that allows an airflow from the dirty chamber 75 to the clean chamber 73 through the cleaner element 74 retained by the air cleaner element retaining portion 7Ba.

An intake air duct 76 is attached to the upper portion of the air cleaner cover 7C. An outside air flowing from the intake air duct 76 into the dirty chamber 75, is cleaned through the cleaner element 74, enters the clean chamber 73, passes through the connecting tube 62, the carburetor 5, and the intake pipe 61, and is sucked into the intake port 33a of the internal combustion engine 3.

[0048]

The above-described supporting ribs 71 for supporting the detouring portion top portion 80 of the first air vent tube 8A are provided at two positions of the upper portion of a connecting tube inserting portion 7Ab of the lower case 7A, which upper portion forms the upper front end edge 7a of the air cleaner case 7 (see FIG. 2).

On the other hand, the retaining portion 63 having the above-described insertion hole 63a which retaining portion retains the first and second air vent tubes 8A and 8B such that the first and second air vent tubes 8A and 8B are vertically inserted in the insertion hole 63a side by side is positioned on the right side portion of the inserted and fixed connecting tube 62 (see FIG. 2 and FIG. 3).

In addition, the above-described supporting hooks 72 by which the first and second air vent tubes 8A and 8B are supported side by side are provided at two positions of the front end side bottom surface 7b of the lower case 7A (see FIG. 3).

[0049]

Further, as shown in FIG. 8, a guide hook 77 for guiding the second air vent tube 8B that passes through the insertion hole 63a and which extends upward is projected from both of the lower case 7A located above the insertion hole 63a and the flange surface 7Bb of the air cleaner element holder 7B (see FIG. 2 and FIG. 3). Locking hooks 78 and 79 for holding the second air vent tube 8B that passes through the guide hook 77 and which extends rearward on the air cleaner case 7 are further provided on the flange surface 7Bb of the air cleaner

case 7 (see FIG. 2 and FIG. 3). The side of the upper outside air inlet opening 83 of the upper part of the second air vent tube 8B is retained on the flange surface 7Bb by these locking hooks 78 and 79.

[0050]

As described above, in the air vent tube piping structure according to the present embodiment, the air vent tube 8 is retained by the supporting ribs 71, the supporting hooks 72, the guide hook 77, and the locking hooks 78 and 79 formed integrally with the air cleaner case 7, the insertion hole 63a of the retaining portion 63 molded integrally with the connecting tube 62, and the like. Therefore the air vent tube 8 can be assembled easily with the number of parts for piping reduced.

[0051]

Features of the carburetor air vent tube piping structure for the motorcycle 1 according to the present embodiment described above will be summarized in the following.

[0052]

In the motorcycle 1 having the internal combustion engine 3 and the air cleaner case 7 arranged longitudinally below the fuel tank 16, and having an intake air passage formed by the connecting tube 62 and

the intake pipe 61 with the carburetor 5 interposed between the connecting tube 62 and the intake pipe 61, the detouring portion top portion 80 of the air vent tube 8 connected to the left side portion of the carburetor 5, the air vent tube 8 detouring above the connecting tube 62 and extending to the right of the carburetor 5, is supported at a higher position than the upper portion of the upstream side intake pipe 62 by the supporting ribs 71 provided on the air cleaner case 7 upstream of the carburetor 5.

[0053]

Therefore, because the detouring portion top portion 80 of the air vent tube 8 is supported at a position higher than the upper portion of the connecting tube 62 by the supporting ribs 71 of the air cleaner case 7, the entry of a fuel from the carburetor 5 into the air vent tube 8 is reduced. Thus, an air vent function is performed more reliably, and air vent performance can be improved without an increase in the number of parts.

[0054]

In addition, on the right side of the carburetor 5, the air vent tube 8 is inserted into and retained by the insertion hole 63a formed by die cutting in the upward-downward direction in the side portion of the connecting

tube 62. It is therefore possible to retain the air vent tube 8 by the connecting tube 62 without complicating a process of manufacturing the connecting tube 62, and assemble the air vent tube 8 without increasing the number of parts.

[0055]

In addition, the air vent tube 8 includes: the first air vent tube 8A passing from the detouring portion top portion 80 through the insertion hole 63a and extending downward; and the second air vent tube 8B communicating with the first air vent tube 8A at the first Y-shaped tube 82 of the lower portion of the first air vent tube 8A, the second air vent tube 8B passing through the insertion hole 63a and extending upward, the side of the upper outside air inlet opening 83 of an end portion of the second air vent tube 8B being supported by the air cleaner case 7 again. The first and second air vent tubes 8A and 8B are vertically inserted into and retained by the insertion hole 63a side by side. Thus, while the retaining structure is simplified by retaining the first and second air vent tubes 8A and 8B by the connecting tube 62 at a common retaining position, variations in internal pressure are suppressed with the air vent tube 8 formed long, and the effect of a

traveling wind is further reduced by the upper outside air inlet opening 83, so that air vent performance is improved.

[0056]

In addition, the air cleaner case 7 includes: the lower case 7A; the air cleaner element holder 7B covering the upward opening 7Aa of the lower case 7A and forming the clean chamber 73 with the flange surface 7Bb left on the periphery of the opening 7Aa of the lower case 7A; and the air cleaner cover 7C covering the upper portion of the air cleaner element 74 on the air cleaner element holder 7B. The side of the upper outside air inlet opening 83 of the upper part of the second air vent tube 8B is retained by the flange surface 7Bb. Thus, in work of replacement of the air cleaner element 74, the air cleaner element 74 can be replaced without the second air vent tube 8B being removed. Maintainability is therefore improved.

[0057]

In addition, the air vent tube 8 also has the lower outside air inlet opening 81 below the first Y-shaped tube 82 on the undersurface side of the vehicle. Thus, the upper and lower outside air inlet openings 83 and 81 of the air vent tube 8 are arranged so as to be

distributed vertically in the motorcycle 1. Dirt in the upper outside air inlet opening 83 is prevented by guiding a moisture and a liquid component to the lower outside air inlet opening 81, and the effect of a traveling wind is prevented by the upper outside air inlet opening 83 located on the flange surface 7Bb of the air cleaner case 7 and below the fuel tank 16. Therefore high air vent performance can be ensured over a long period of time.

[0058]

The drain tube 56 connected to the drain passage 55 of the carburetor 5 is further coupled to an upper part of the first Y-shaped tube 82 of the first air vent tube 8A. Therefore, also for a moisture or a liquid from the drain passage 55, the lower outside air inlet opening 81 of the air vent tube 8 is shared as an outlet for the moisture or the liquid. Thereby parts affecting peripheries thereof can be reduced while assemblability is maintained. Thus a degradation in external appearance quality can be prevented.

[0059]

A carburetor air vent tube piping structure for a saddle riding type vehicle according to one embodiment of the present invention has been described above. However,

of course, the mode of the present invention is not limited to the embodiment, and includes various modes carried out within the scope of the spirit of the present invention.

For example, the saddle riding type vehicle according to the present invention is not limited to the motorcycle according to the embodiment, but may be for example three-wheeled and four-wheeled buggies and various other saddle riding type vehicles. It suffices for the saddle riding type vehicle according to the present invention to be a saddle riding type vehicle provided with requirements of claim 1.

In addition, the arrangements in the left-right direction of respective devices have been described as specific arrangements shown in the figures for the convenience of description. However, the arrangements may be opposite in the left-right direction from those shown in the foregoing embodiment, and such arrangements are included in the present invention.

[Description of Reference Symbols]

[0060]

1...Motorcycle ("saddle riding type vehicle" in the present invention), 3...Internal combustion engine, 5...Carburetor, 7...Air cleaner case, 7a...Upper front

end edge, 7b...Front end side bottom surface, 7A...Lower case, 7Aa...Opening, 7B...Air cleaner element holder, 7Bb...Flange surface, 7C...Air cleaner cover, 8...Air vent tube, 8A...First air vent tube ("first air vent tube" in the present invention), 8B...Second air vent tube ("second air vent tube" in the present invention), 16...Fuel tank, 18A...Front cover, 18B...Side cover, 18C...Rear cover, 30...Crankcase, 31...Crankshaft, 32...Cylinder block, 33...Cylinder head, 33a...Intake port, 50...Airflow passage, 51...Float chamber, 51a...Space above a fuel liquid level, 52...Vertical through hole, 53...Horizontal through hole, 54...Opening portion, 55...Drain passage, 56...Drain tube, 61...Intake pipe ("downstream side intake pipe" in the present invention), 62...Connecting tube ("upstream side intake pipe" in the present invention), 63...Retaining section, 63a...Inserting hole, 71...Supporting rib, 72...Supporting hook, 73...Clean chamber, 74...Air cleaner element, 75...Dirty chamber, 76...Intake air duct, 77...Guide hook, 78...Locking hook, 79...Locking hook, 80...Detouring portion top portion, 81...Lower outside air inlet opening, 82...First Y-shaped tube ("coupling portion" in the present invention), 83...Upper outside air inlet opening, 85...Second Y-shaped tube

We claim:

[Claim 1]

A carburetor air vent tube piping structure for a saddle riding type vehicle, wherein the saddle riding type vehicle (1) has an internal combustion engine (3) and an air cleaner case (7) arranged forwardly and rearwardly below a fuel tank (16), and wherein an intake air passage is formed by an upstream side intake pipe (62) and a downstream side intake pipe (61) with a carburetor (5) interposed between the upstream side intake pipe (62) and the downstream side intake pipe (61), and wherein an air vent tube (8) is connected to one of left and right side portions of the carburetor (5) and extends to the other side portion of the carburetor (5), characterized in:

that the air vent tube (8) has a detouring portion top portion (80) detouring above the upstream side intake pipe (62), and the detouring portion top portion (80) is supported at a higher position than an upper portion of the upstream side intake pipe (62) by a supporting rib (71) provided on the air cleaner case (7) upstream of the carburetor (5); and

that the air vent tube (8) includes a first air vent tube (8A) extending downward from the detouring portion top portion (80), and a second air vent tube (8B) communicating with the first air vent tube (8A) at a lower portion of the first air vent tube (8A), the second air vent tube (8B) extending upward to terminate at a second air vent tube end portion having an upper outside air inlet opening (83), which second air vent tube end portion is supported by the air cleaner case (7).

[Claim 2]

The carburetor air vent tube piping structure for the saddle riding type vehicle as claimed in claim 1, wherein on the other side of the carburetor (5), the air vent tube (8) is inserted through and retained by an insertion hole (63a) formed in an upward-downward direction in a side portion of the upstream side intake pipe (62).

[Claim 3]

The carburetor air vent tube piping structure or the saddle riding type vehicle as claimed in claim 2, wherein both the first and second air vent tubes (8A and 8B) are vertically inserted side by side through and retained by the insertion hole (63a).

[Claim 4]

The carburetor air vent tube piping structure for the saddle riding type vehicle as claimed in claim 3, wherein the air cleaner case (7) includes a lower case (7A), an air cleaner element holder (7B) covering an upward opening (7Aa) of the lower case (7A) and forming a clean chamber (73) with a flange surface (7Bb) left outside a periphery of the opening (7Aa) of the lower case (7A), and an air cleaner cover (7C) covering an upper portion of an air cleaner element (74) held on the air cleaner element holder (7B); and an upper part of the second air vent tube (SB), adjoining the upper outside air inlet opening (83), is retained by the flange surface (7Bb).

[Claim 5]

The carburetor air vent tube piping structure for the saddle riding type vehicle as claimed in claim 4, wherein the air vent tube (8) has a lower outside air inlet opening (81) below a coupling portion (82) of the first and second air vent tubes (8A, 8B), on an undersurface side of the vehicle.

[Claim 6]

The carburetor air vent tube piping structure for the saddle riding type vehicle as claimed in claim 5, wherein a drain tube (56) connected to a drain passage (55) of the carburetor (5) is further coupled to an upperpart of the coupling portion (82) of the first air vent tube (8A).

Dated: 02/01/2015

Neha Malhotra

[NEHA MALHOTRA]

IN/PA No.: 2687

OF REMFRY & SAGAR

ATTORNEY OF THE APPLICANT[S]

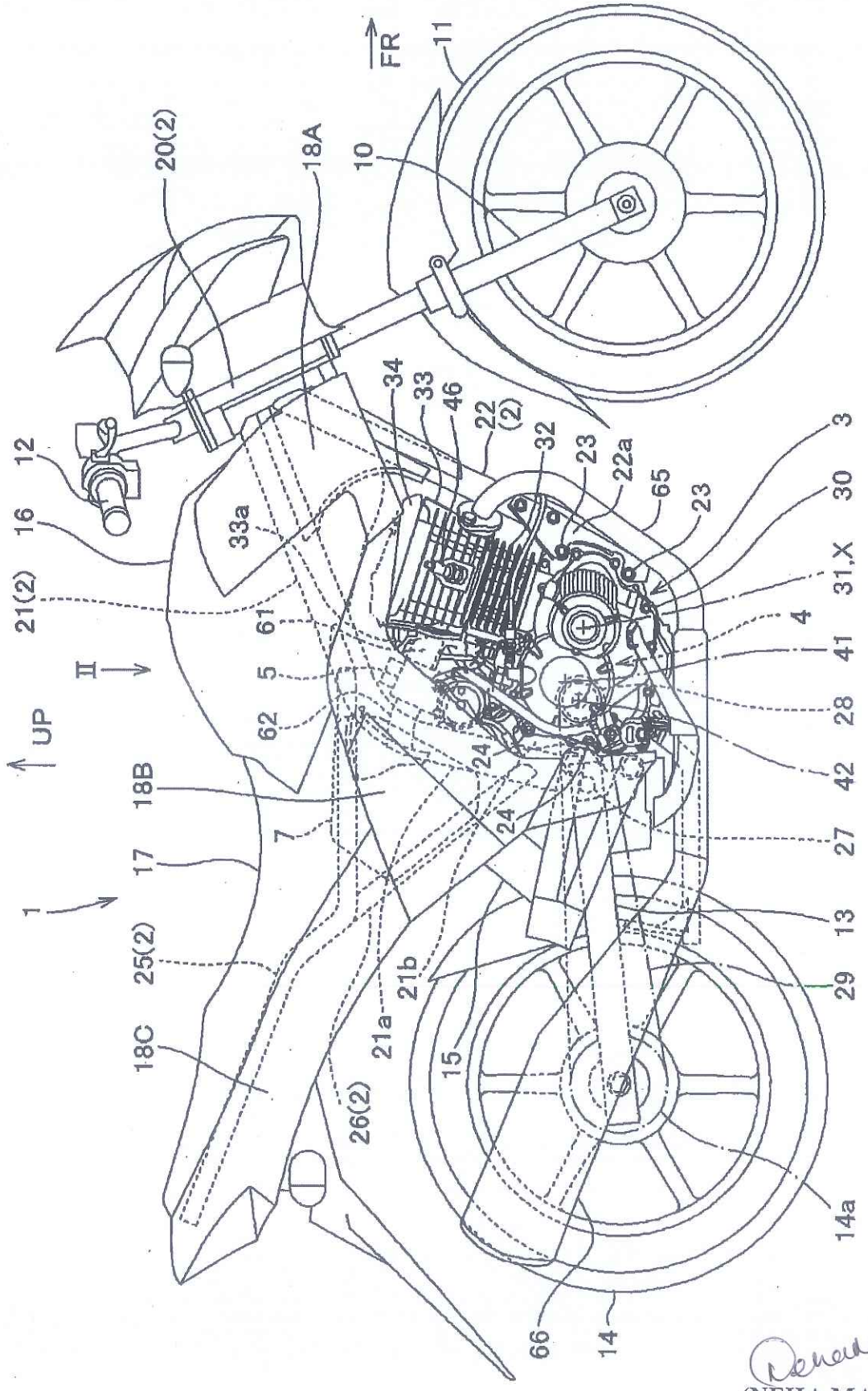
ABSTRACT

"CARBURETOR AIR VENT TUBE PIPING STRUCTURE FOR SADDLE RIDING TYPE VEHICLE"

A carburetor air vent tube piping structure for a saddle riding type vehicle which structure can prevent an air vent function from being hindered by reducing the entry of a fuel from a carburetor into an air vent tube, and can improve air vent performance without increasing the number of parts. A carburetor air vent tube piping structure for a saddle riding type vehicle, the saddle riding type vehicle 1 having an internal combustion engine 3 and an air cleaner case 7 arranged longitudinally below a fuel tank 16, and having an intake air passage formed by an upstream side intake pipe 62 and a downstream side intake pipe 61 with a carburetor 5 interposed between the upstream side intake pipe 62 and the downstream side intake pipe 61, wherein a detouring portion top portion 80 of an air vent tube 8 connected to a side portion of one of a left and a right of the carburetor, the air vent tube 8 detouring above the upstream side intake pipe 62 and extending to a side of the other of the left and the right of the carburetor 5, is supported at a higher position than an upper portion of the upstream side intake pipe by a supporting rib 71 provided to the air cleaner case upstream of the carburetor.

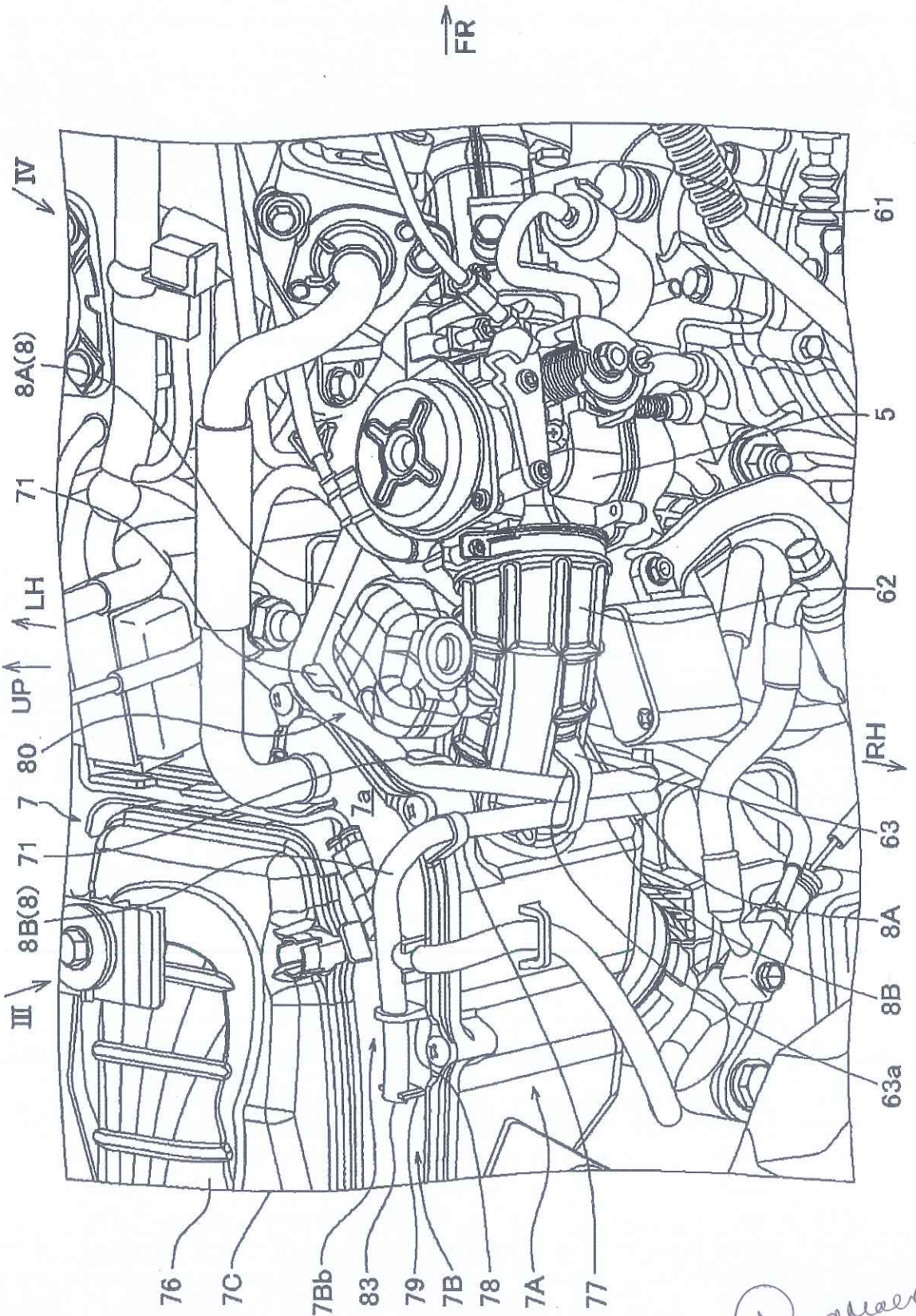
Fig. 3

FIG.1



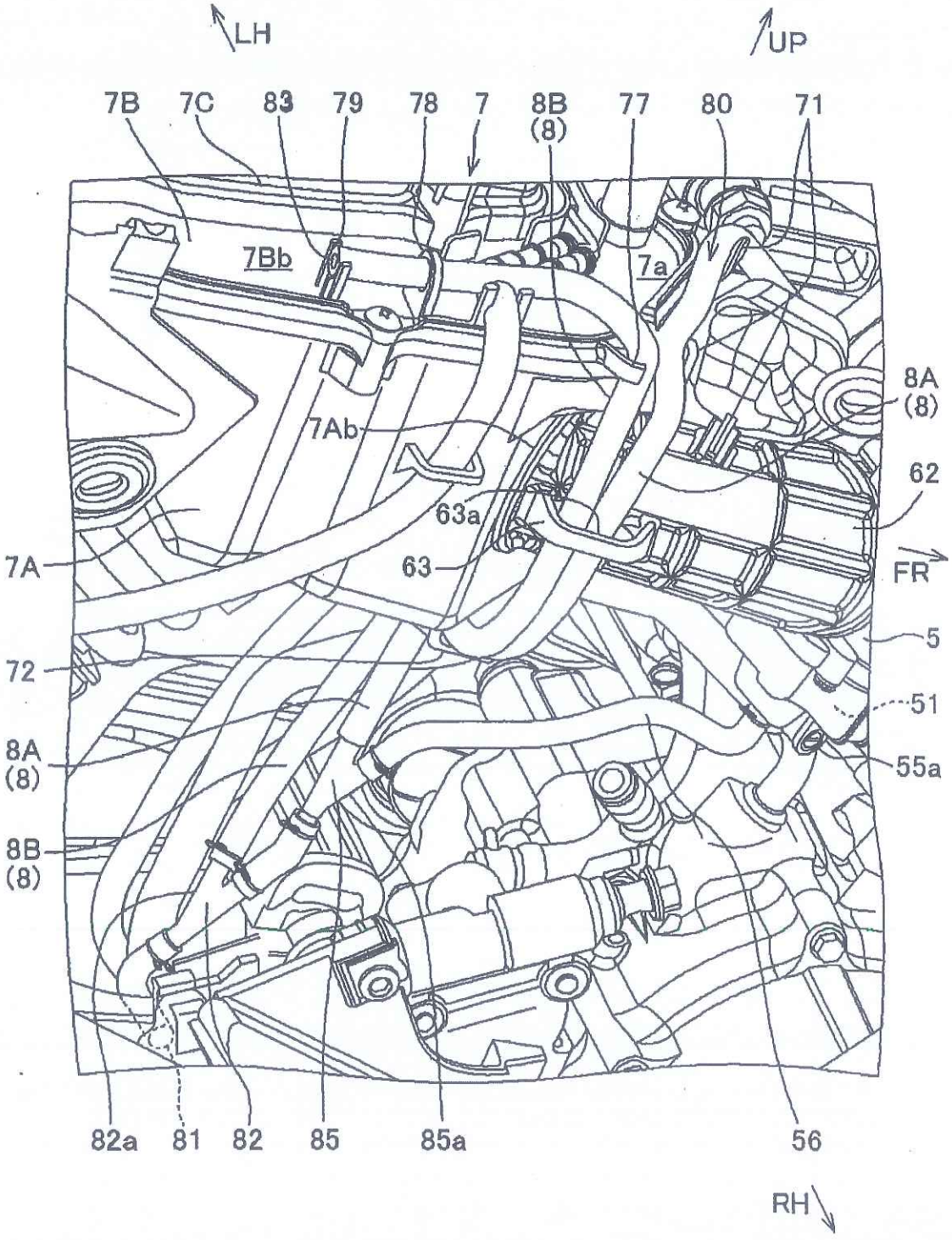
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.2



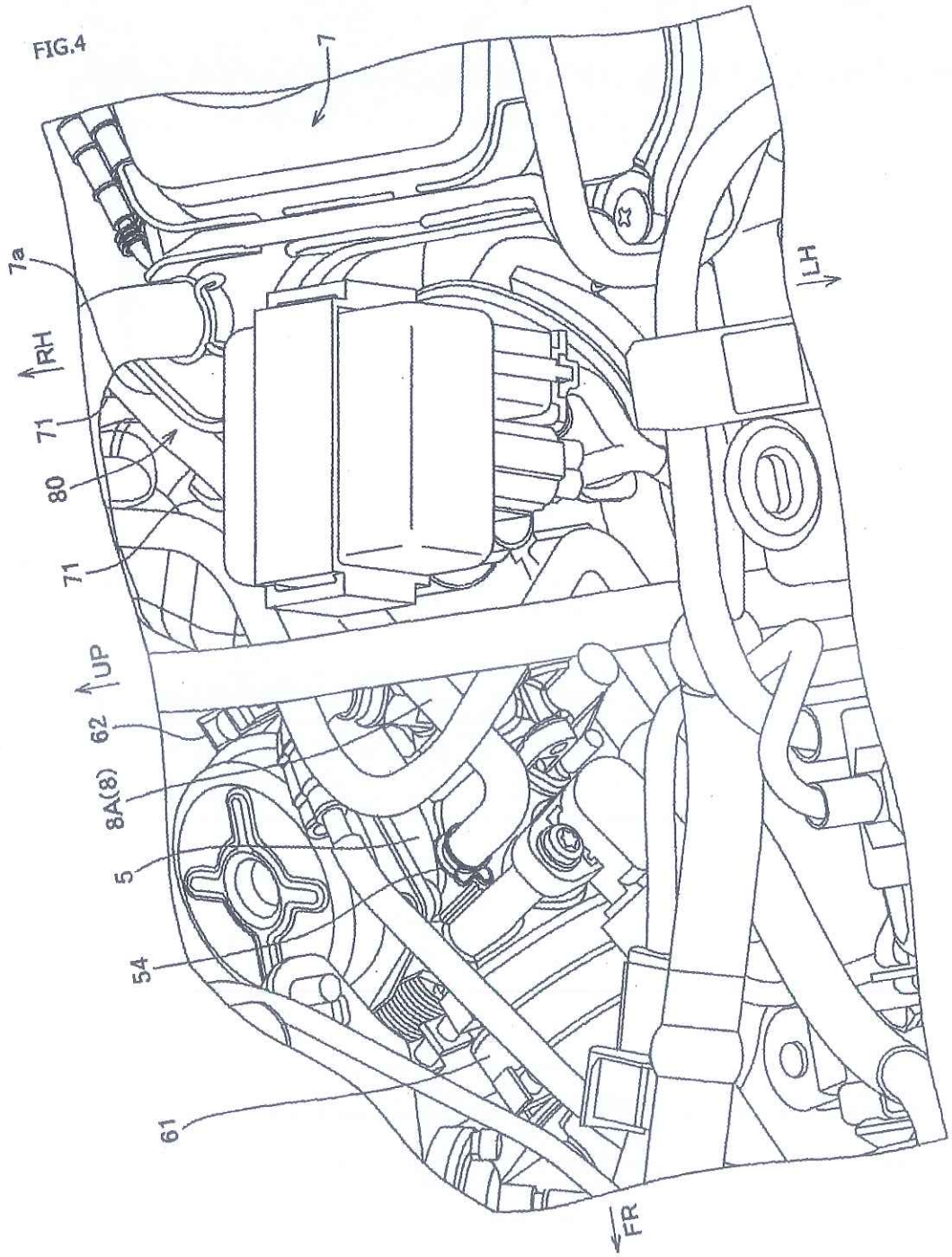
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.3



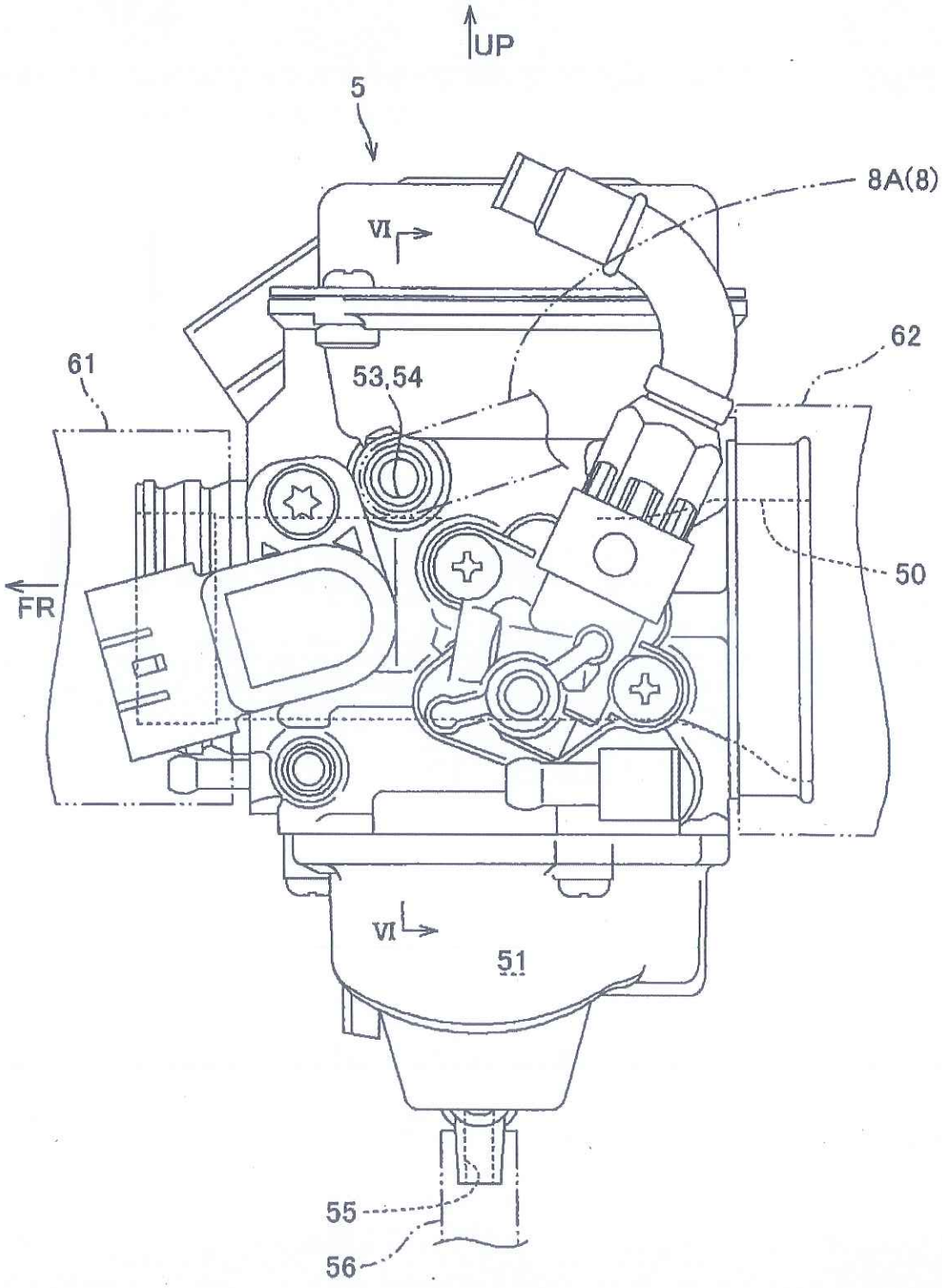
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.4



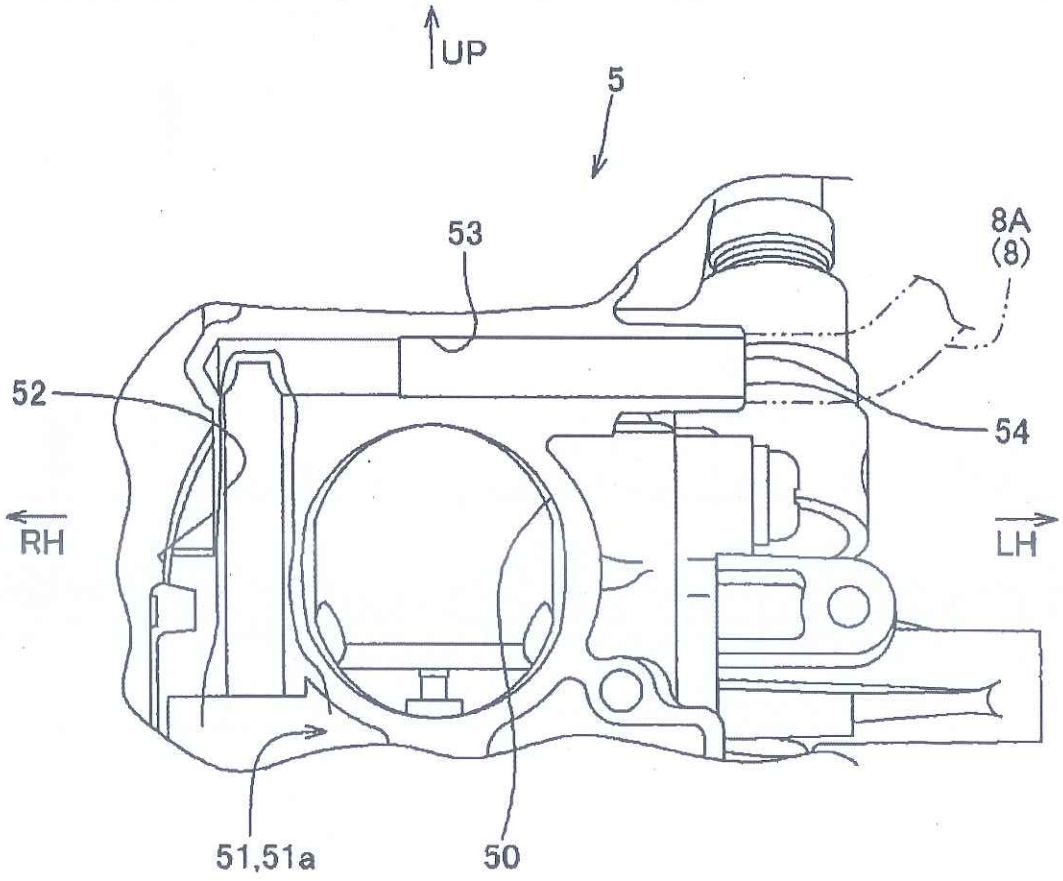
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.5



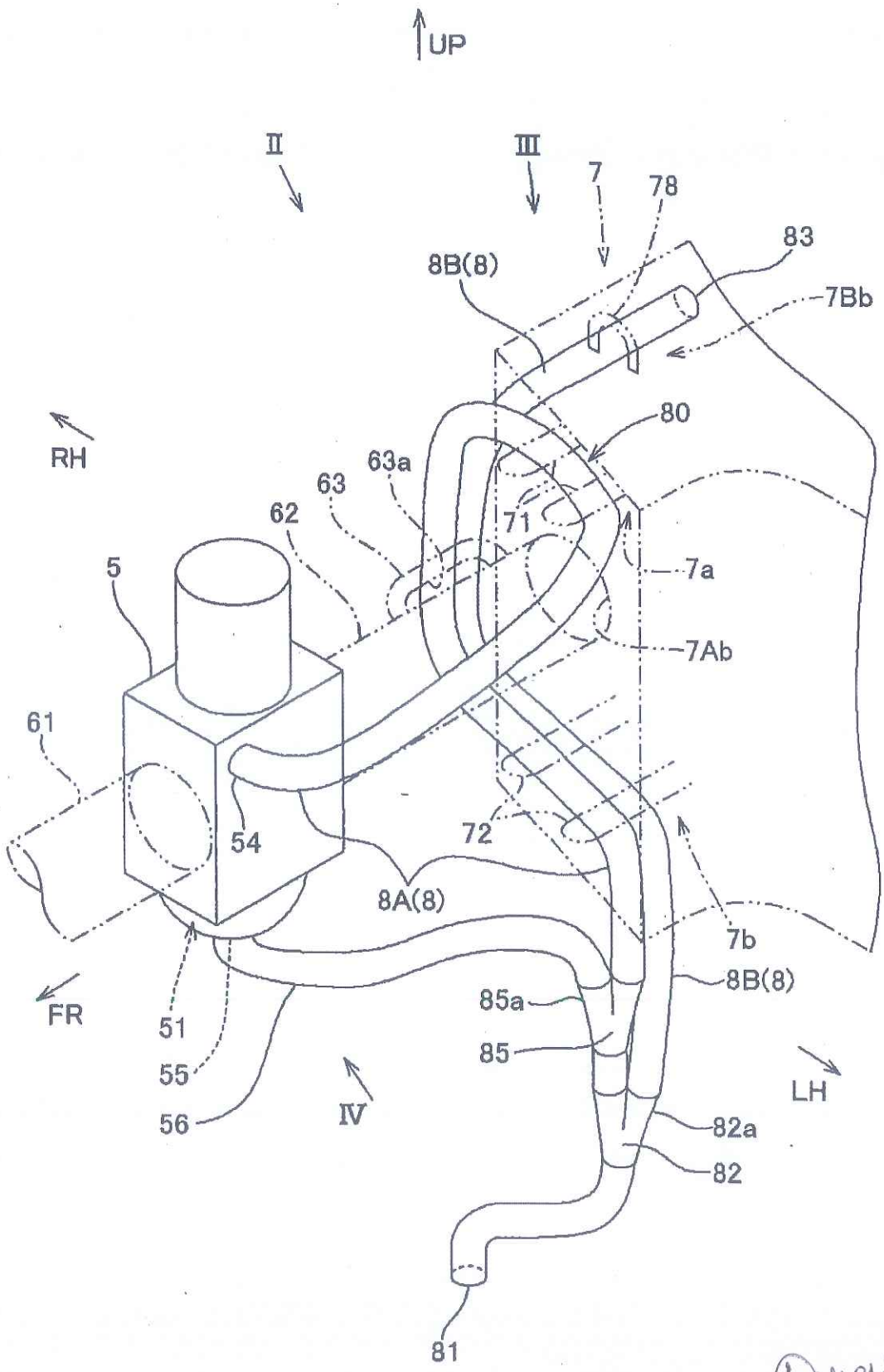
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.6



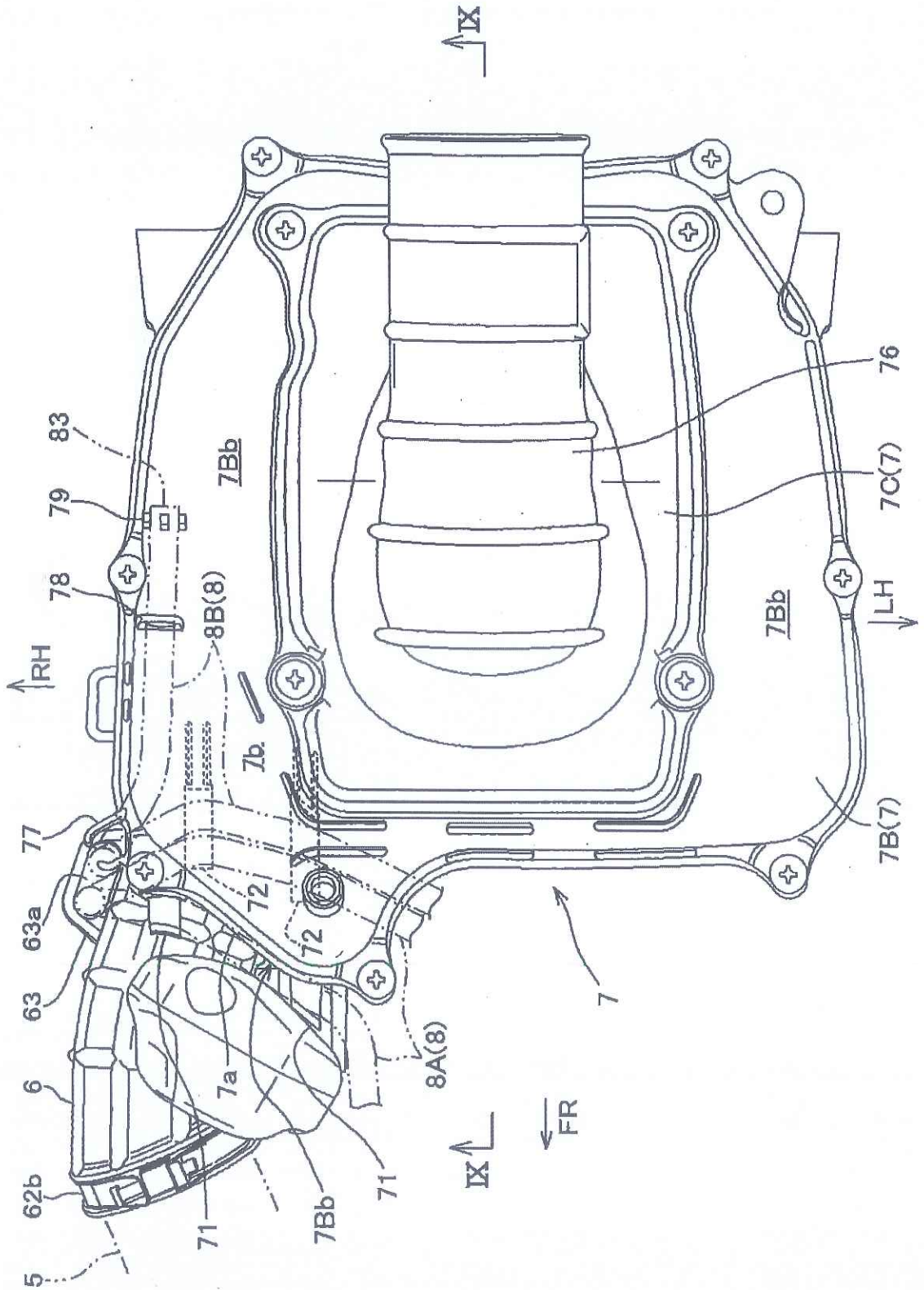
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.7



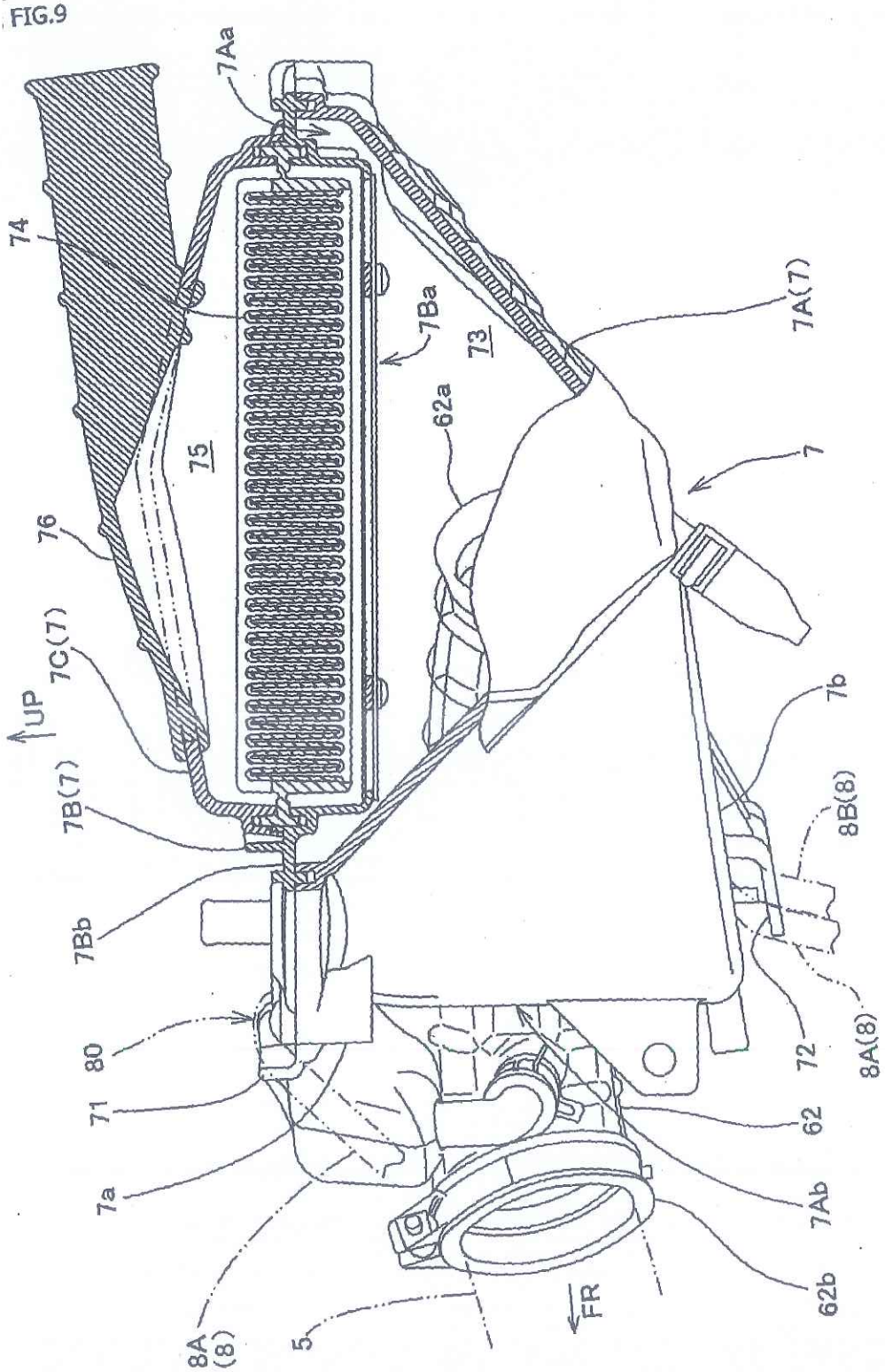
(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.8



(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS

FIG.9



(NEHA MALHOTRA)
IN/PA No. 2687
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANTS