Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2499451 C 2008/11/18

(11)(21) 2 499 451

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 2005/03/04

(41) Mise à la disp. pub./Open to Public Insp.: 2005/09/11

(45) Date de délivrance/Issue Date: 2008/11/18

(30) Priorité/Priority: 2004/03/11 (JP2004-069032)

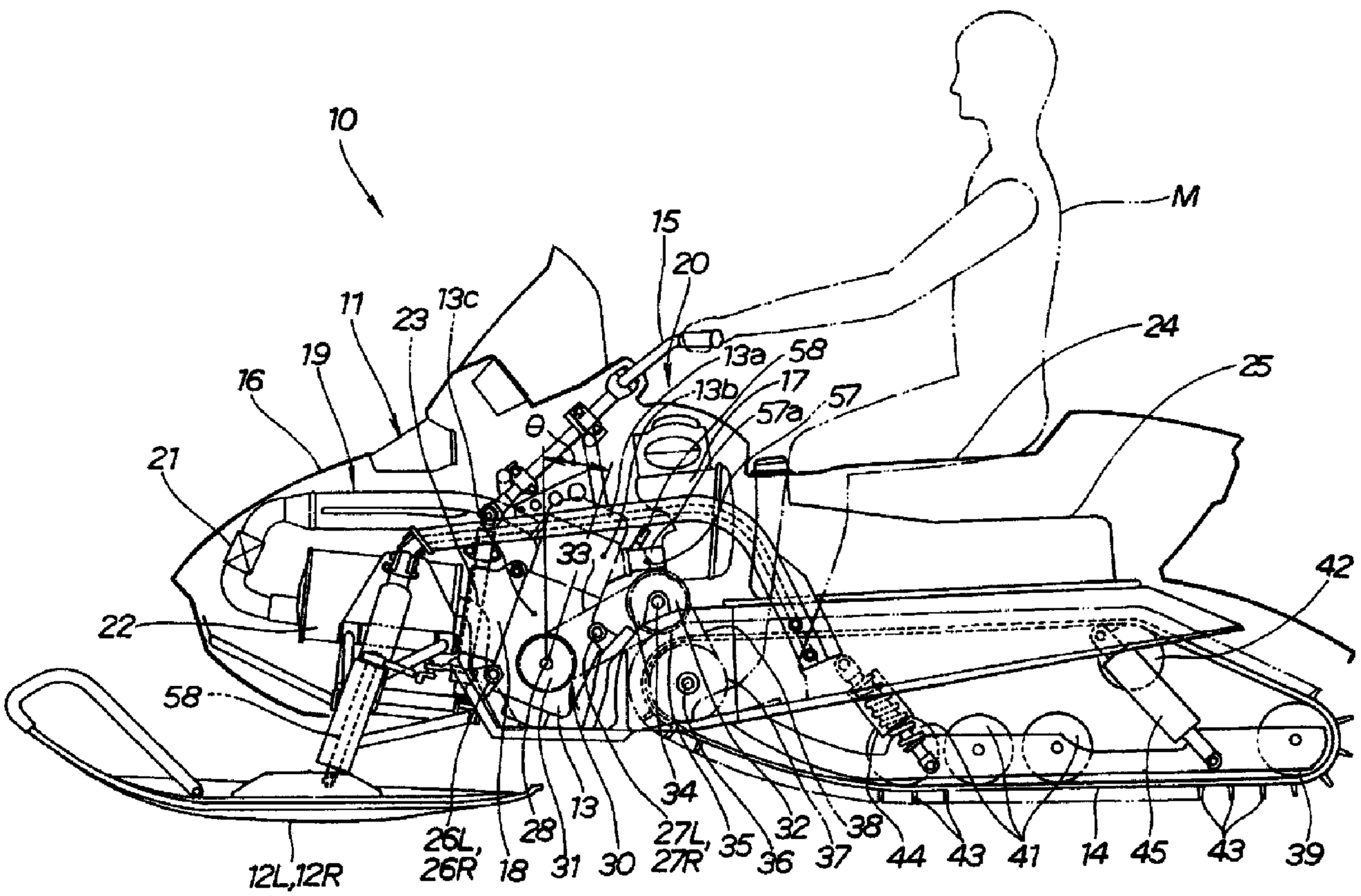
(51) Cl.Int./Int.Cl. *B62D 55/07* (2006.01), *F02M 35/024* (2006.01), *F02M 35/10* (2006.01), *F02M 35/16* (2006.01)

(72) Inventeurs/Inventors:
ABE, TOMOHISA, JP;
YAMADA, KOZO, JP;
HOI, YOSUKE, JP

(73) Propriétaire/Owner:
HONDA MOTOR CO., LTD., JP

(74) Agent: DENNISON ASSOCIATES

(54) Titre : MOTONEIGE
(54) Title: SNOWMOBILE



(57) Abrégé/Abstract:
To narrow the layout of an engine and a rider, to contrive concentration of mass, to enhance turning performance, and to enhance pleasantness of traveling. In a snowmobile comprising a track belt provided on the vehicle body rear side, the track belt being

CA 2499451 C 2008/11/18

(11)(21) 2 499 451

(13) C

(57) Abrégé(suite)/Abstract(continued):
driven by an engine disposed at a front portion of the vehicle body, and a left-right pair of skis provided at front portions of the vehicle body, the skis being steered by an operation on a steering handle, a cylinder of the engine is inclined rearwards. Specifically, a cylinder head of the engine is inclined by an angle ∅ rearwards from the vertical axis. A steering shaft is passed on the front side of the engine, and an intake system including an air cleaner is provided on the rear side of the engine. Besides, a seat for the rider is provided on the rear side of the engine provided at the vehicle body front portion, and a fuel tank is provided at a lower portion of the seat in the state of being long in the front rear direction. Namely, the air cleaner is disposed between the fuel tank and the engine.

ABSTRACT OF THE DISCLOSURE

To narrow the layout of an engine and a rider, to contrive concentration of mass, to enhance turning performance, and to enhance pleasantness of traveling. In a snowmobile comprising a track belt provided on the vehicle body rear side, the track belt being driven by an engine disposed at a front portion of the vehicle body, and a left-right pair of skis provided at front portions of the vehicle body, the skis being steered by an operation on a steering handle, a cylinder of the engine is inclined rearwards. Specifically, a cylinder head of the engine is inclined by an angle Ø rearwards from the vertical axis. A steering shaft is passed on the front side of the engine, and an intake system including an air cleaner is provided on the rear side of the engine. Besides, a seat for the rider is provided on the rear side of the engine provided at the vehicle body front portion, and a fuel tank is provided at a lower portion of the seat in the state of being long in the front rear direction. Namely, the air cleaner is disposed between the fuel tank and the engine.

SNOWMOBILE

FIELD OF THE INVENTION

The present invention relates to a snowmobile in which a steering shaft is provided on the front side of an engine and an intake system including an air cleaner is laid out on the rear side of the engine.

BACKGROUND OF THE INVENTION

Conventionally, there has been known a snowmobile in which a steering shaft is provided on the rear side of an engine and an intake system is disposed between the engine and the steering shaft (refer to, for example, Japanese Patent Laid-open No. 2002-364468 (Fig. 1)

In Fig. 1 of Japanese Patent Laid-open No. 2002-364468 (Fig. 1), symbol 1 denotes a snowmobile, symbol 2 denotes an engine, symbol 25 denotes a steering shaft, the steering shaft 25 is disposed on the rear side of the engine 2, and an intake passage is laid out between a main body of the engine 2 and the steering shaft 25. The snowmobile 1 has a structure in which the engine 2 is mounted on a vehicle body frame 10 while being inclined rearwards relative to the traveling direction of the snowmobile 1.

By laying out the engine 2 on the front side of the steering shaft 25, it is contrived to make small the disposing height of the engine 2 on the vehicle body, thereby to contrive to lower the center of gravity of the vehicle body, and to enhance the turning performance of the snowmobile 1.

However, since the engine 2 is laid out on the front side and the rider is seated on the rear side, with the steering shaft 25 therebetween, there is a limitation in narrowing the interval between the engine 2 and the rider.

In other words, it is difficult to concentrate the mass of the engine 2 and the mass of the rider toward the center of the vehicle body, and there is a limitation in reducing the moment of inertia of the vehicle.

If the masses can be concentrated toward the center of the vehicle body by reducing the interval between the engine 2 and the rider, it is possible to reduce the moment of inertia, to enhance the turning performance of the snowmobile 1, and to permit a more pleasant traveling.

Accordingly, it is an object of the present invention to narrow the layout of an engine and a rider, to contrive concentration of masses, and to enhance the pleasantness of traveling.

SUMMARY OF THE INVENTION

The present invention resides in a snowmobile comprising a track belt provided on the vehicle body rear side, the track belt being driven by an engine disposed at a front portion of the vehicle body, and a left-right pair of skis provided at front portions of the vehicle body, the skis being steered by an operation on a steering handle, characterized in that a cylinder of the engine is inclined rearwards, a steering shaft is passed on the front side of the engine, and an intake system including an air cleaner is provided on the rear side of the engine cylinder.

According to the present invention, the cylinder of the engine is inclined rearwards. As a result, the center of gravity of the engine is disposed nearer to the vehicle body rear side. By the layout of the steering shaft on the front side of the engine in addition to the rearward inclination of the engine, it is possible to contrive a lowering of the center of gravity of the engine, and to set the center of gravity of the vehicle body as a whole close to the center of the vehicle body.

Therefore, the center of gravity of the vehicle body can be concentrated into the vicinity of the vehicle body center, and the turning performance can be enhanced.

An aspect of the invention is characterized in that a throttle body provided in an intake passage communicated with the engine is integrally provided with an injector for injecting a fuel, and the injector is provided on the upper side of the throttle body.

According to this aspect of the invention, the throttle body provided in the intake passage communicated with the engine is integrally provided with the injector for injecting the fuel, and the injector is provided on the upper side of the throttle body, so that gas stagnation of the fuel can be prevented. In addition, the mountability of the injector can be enhanced.

Another aspect of the invention resides in a snowmobile comprising a track belt provided on the vehicle body rear side, the track belt being driven by an engine disposed at a front portion of the vehicle body, and a left-right pair of skis provided at front portions of the vehicle body, the skis being steered by an operation on a steering handle, characterized in that an air cleaner is provided on the rear side of the engine, the air cleaner is provided with an upper chamber at an upper portion and a lower chamber at a lower portion, with an air-filtering element therebetween, both left and right side surfaces of the upper chamber are each provided with an intake duct for taking in air, and an upper surface of the upper chamber is provided with a maintenance lid for maintenance.

According to this aspect of the invention, the upper surface of the upper chamber is provided with the maintenance lid, so that it is possible to easily check the condition of the element, and to easily detach and attach the element.

A further aspect of the invention is characterized in that the intake duct is so bent that an intake port is directed downwards.

According to this aspect of the invention, the intake duct is so bent that the intake port is directed downwards, so that water such as snow and ice can be restrained from penetrating in through the intake port.

Yet another aspect of the invention is characterized in that rear end opening portions of the intake ducts are provided at both the left and right side surfaces of the upper chamber oppositely to each other with a predetermined interval therebetweeen.

According to this aspect of the invention, the rear end opening portions of the intake ducts are oppositely disposed at a predetermined interval, so that the closure of the rear end opening portion on one side can be complemented.

Another aspect of the invention resides in a snowmobile comprising a track belt provided on the vehicle body rear side, the track belt being driven by an engine disposed at a front portion of the vehicle body, and a left-right pair of skis provided at front portions of the vehicle body, the skis being steered by an operation on a steering handle, characterized in that an air cleaner is provided on the rear side of the engine, the air cleaner is provided with an upper chamber at an upper portion and a lower chamber at a lower portion, with an air-filtering element therebetween, a plurality of intake pipes are provided in the inside of the lower chamber, and the intake pipes are attached to an air cleaner case through a set plate.

According to this aspect of the invention, the intake pipes are attached to the air cleaner case through the set plate, so that it is unnecessary to prepare fastening members or the like for attaching the intake pipes on the basis of each intake pipe, and the set plate can be used in place of the fastening members or the like.

Since the set plate can be used in place of the fastening members or the like, the number of the fastening members required can be reduced.

Another aspect of the invention is characterized in that an outer wall of each of the intake pipes is provided with a projection piece portion, the set

plate is provided with slit portions for inserting the projection piece portions therein, and the intake pipes are positioned and fixed to the air cleaner case by communicating the projection piece portions into the slit portions and turning the projection piece portions by a predetermined angle.

According to this aspect of the invention, the set plate is provided with the slit portions for inserting the projection piece portions therein and the intake pipes are positioned and fixed to the air cleaner case by turning the projection piece portions by a predetermined angle, so that the operation for positioning and fixing the intake pipes can be easily carried out.

As a result, it is possible to contrive a reduction in the number of steps for assembling the intake pipes onto the air cleaner case.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are shown in the drawings, wherein:

Fig. 1 is an overall side view of a snowmobile according to the present invention.

Fig. 2 is a side view of a front portion of the snowmobile according to the present invention.

Fig. 3 is a plan view of the front portion of the snowmobile according to the present invention (a vehicle body cover is omitted).

Fig. 4 is an exploded perspective view of an air cleaner according to the present invention.

Fig. 5 is a sectional view of the air cleaner according to the present invention.

Fig. 6 is a view along arrow 6 of Fig. 5 (a cover portion is removed).

Fig. 7 illustrates the gist of detaching and attaching the air cleaner.

Fig. 8 is a perspective view of an intake pipe and a set plate according to the present invention.

Fig. 9 shows functional views of Fig. 7.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The best mode for carrying out the present invention will be described below, based on the accompanying drawings. Incidentally, the drawings are to be looked at according to the posture of symbols.

In addition, L is a subscript indicating the left as viewed from the driver, and R is a subscript indicating the right as viewed from the driver.

Fig. 1 is an overall side view of a snowmobile according to the present invention. The snowmobile 10 is a snow vehicle which comprises a left-right pair of skis 12L, 12R (12R is behind 12L, here and hereinafter), an engine 13 and a track belt 14 in this order from the front side toward the rear side of a vehicle body 11, which can travel by driving the track belt 14 by the power of the engine 13, and in which the skis 12L, 12R can be steered by operating a steering handle 15. Further, a seat 24 for the rider is provided on the rear side of the engine 13 provided at a front portion of the vehicle body, and a fuel tank 25 is provided at a lower portion of the seat 24 in the state of being long in the front-rear direction.

Symbol M denotes the rider, 13a denotes a cylinder head cover, 13b denotes a cylinder head, 13c denotes a cylinder, 16 denotes a vehicle body cover, 17 denotes an air cleaner, 18 denotes an oil tank, 19 denotes an exhaust pipe, 21 denotes a catalyst, 22 denotes a silencer, 23 denotes a tail pipe, 57 denotes a throttle valve, 57a denotes a throttle body, and 58 denotes an injector.

First, an intake and exhaust system will be described. Air taken in through the air cleaner 17 is fed into a combustion chamber of the engine 13. An exhaust gas generated upon combustion is discharged into the atmosphere through the exhaust pipe 19, the catalyst 21, the silencer 22, and the tail pipe 23.

The tail pipe 12 extends from the silencer 22, then extends toward the depth of the drawing, and then extends downward, whereby the exhaust gas is blown to the snow surface.

Since the air cleaner 17 is disposed between the fuel tank 25 and the engine 13, inspection of the air cleaner 17 and replacement of an element can be easily carried out.

Next, a running system will be described. The engine 13 is mounted on a vehicle body frame through engine hangers 26L, 26R, 27L, 27R, and a drive pulley 31 is fitted over a crankshaft 28 of the engine 13.

A CVT belt 33 is wrapped around the drive pulley 31 and a driven pulley 32 disposed under the air cleaner 17, whereby a belt-type non-stage transmission 30 is constituted. A cross shaft 34 for supporting the driven pulley 32 is extended toward the depth of the drawing, a sprocket 35 is attached to the tip end of the cross shaft 34, and a chain 38 is wrapped around the sprocket 35 and a sprocket 37 annexed to a drive wheel 36.

The power of the engine 13 is transmitted sequentially through the drive pulley 31, the CVT belt 33, the driven pulley 32, the cross shaft 34, the sprocket 35, the chain 38, and the sprocket 37, whereby the drive wheel 36 can be rotated normally or reversely.

The track belt 14 is wrapped around the drive wheel 36 disposed at a front portion, the driven wheel 39 disposed at a rear portion, a plurality of rotary wheels 41 disposed at an intermediate lower portion, and an idler 42 disposed at an upper portion, and projections 43 provided on the outside surface of the track belt 14 are driven into the snow surface, for traveling. Vertical movements generated at the time of riding over the ruggedness on the snow surface and the like are absorbed by rear cushions 44, 45.

Incidentally, the cylinder 13c of the engine 13 is laid out in the state of being inclined rearwards. Specifically, the cylinder head 13b of the engine 13 is laid out in the state of being inclined by an angle Ø to the rear side from the vertical axis.

Fig. 2 is a side view of a front portion of the snowmobile according to the present invention, in which the steering handle 15 and the skis 12L, 12R are connected by use of a steering shaft 50 (described below) and links.

Incidentally, symbol 57 denotes a throttle valve provided on the downstream side of the air cleaner 17, and 58 denotes an injector provided on the downstream side relative to the throttle valve 57.

A throttle body 57a constituting the throttle valve 57 provided in the intake passage communicated with the engine 13 is integrally provided with the injector 58 for injecting the fuel, and the injector 58 is provided on the upper side of the throttle body 57a, so that gas stagnation of the fuel can be prevented. In addition, the mountability of the injector 58 can be enhanced.

The steering shaft 50 is composed of a steering shaft upper portion 52 provided with a steering handle holder 51 at the top end thereof and inclined forwardly downwards, a universal joint 53 attached to the lower end of the steering shaft upper portion 52, and a steering shaft lower portion 54 extending substantially vertically downwards from the universal joint 53.

A lever 155 is provided at the lower end of the steering shaft lower portion 54, a drive member 156 extended in the vehicle width direction (the face-back direction of the drawing) is connected to the lever 155, levers 157 are attached respectively to the left and right ends of the drive member 156, and vertically directed spindles 158L, 158R are rotated about roughly vertical axes by the levers 157, whereby the skis 12L, 12R can be steered.

Incidentally, the spindles 158L, 158R are rotatably contained in front leg portions 59L, 59R vertically movably supported by lower arms 80L, 80R, upper arms 90L, 90R and front suspensions 164L, 164R which are vertically movably mounted to the vehicle body frame.

In addition, a characteristic feature lies in that the silencer 22 is disposed on the front side (the left side in the figure) of the engine 13, and the

steering shaft lower portion 54 of the steering shaft 55 is passed between the silencer 22 and the engine 13.

The engine 13 is disposed on the rear side relative to the steering shaft lower portion 54. Namely, the steering shaft lower portion 54 is disposed on the front side of the engine 13, so that the engine 13 can be easily moved rearwards.

Meanwhile, there can be contemplates two structures, i.e., a structure in which the steering shaft lower portion 54 is passed on the front side of the silencer 22 and another structure in which the steering shaft lower portion 54 is passed between the silencer 22 and the engine 13.

If the steering shaft lower portion 54 is passed on the front side of the silencer 22, the overall length of the steering shaft 55 becomes large. From this point of view, in the present invention, the steering shaft lower portion 54 is passed between the silencer 22 and the engine 13, so that a shortening of the steering shaft 55 can be easily achieved.

In addition, a characteristic features resides in that the universal joint 53 is interposed at an intermediate portion of the steering shaft 55, and the steering shaft lower portion 54 is set close to the engine 13.

When the steering shaft lower portion 54 can be set close to the engine 13, the silencer 22 can also be set close to the engine 13 in conjunction with this. As a result, it is possible to achieve concentration of mass in the vehicle body front-rear direction.

The vehicle body frame 176 is a frame in which intermediate frames 178L, 178R formed in U shape in side view are connected to front portions of a rear frame 177 having a roughly U shaped section opened to the lower side so as to be situated astride the top surface and the left and right side surfaces of the track belt 14, and a front frame 179 is connected to front portions of the intermediate frames 178L, 178R, and which is characterized in that a reinforcement as described below is applied to the intermediate frames 178L, 178R.

The intermediate frames 178L, 178R are made to be frames U-shaped in side view and each provided with a cutout portion 181 for permitting the crankshaft 28 or the like to be passed therethrough. Since the intermediate frames 178L, 178R are U-shaped frames, it is desirable to apply appropriate reinforcement to the frames.

In view of this, an L-shaped reinforcement member 182 and an I-shaped reinforcement member 183 are annexed to each of the intermediate frames 178L, 178R along the cutout portion 181, to thereby reinforce the cutout portion 181.

Further, an upper portion of the front frame 179 and a front upper portion of the rear frame 177 are connected by side frames 47L, 47R so as to cross the cutout portion 181. Specifically, the front suspensions 164L, 164R are mounted to the front frame 179, and the tip ends of the side frames 47L, 47R are connected to the vicinity of a suspension receiving portion 185 provided for the mounting. The rear cushion 44 is mounted to the rear frame 177, and the rear ends of the side frames 47L, 47R are connected to a cushion receiving portion 186 provided for the mounting.

By this, the front frame 179 and the rear frame 177 can be firmly connected to each other.

Fig. 3 is a plan view of a front portion of the snowmobile according to the present invention (a vehicle body cover is omitted), in which the air cleaner 17 is mounted onto left and right side frames 47L, 47R, which are component elements of the vehicle body 11, from the upper side through left and right cleaner fixing brackets 48L, 48R, fixing portions 46L, 46R as parts of the air cleaner 17 are extended to the left and right sides, and the fixing portions 46L, 46R and the cleaner fixing brackets 48L, 48R (hereinafter referred to as the brackets) are fastened by clamping them between fastening means 49L, 49R.

A steering shaft 55 composed of a steering shaft upper portion 52, a universal joint 53, and a steering shaft lower portion 54 is provided on the front side of the engine 13. As has been described above, an intake system

20 including the air cleaner 17 is provided on the rear side of the engine 13.

Incidentally, symbol 51 denotes an air supply pipe for supplying air from the air cleaner 17 to the engine 13, symbols 56L and 56R denote left and right front suspensions, 57 denotes a throttle valve, 58 denotes an injector, symbols 59L and 59R denote left and right front leg portions, and 60 denotes a drive member.

Fig. 4 is an exploded perspective view of the air cleaner according to the present invention. The air cleaner 17 is composed of an element case 76 provided therein with an element, an upper case 68 for containing the element case 76 therein, a maintenance lid 67 to be put on the upper case 68, intake ducts 65L, 65R to be annexed to left and right side surfaces of the upper case 68, a lower case 69 to be connected to the bottom of the upper case 68, intake pipes 93ΣΣΣ to be contained in the lower case 69, a set plate 92 for fixing the intake pipes 93 to the lower case 69, and a cover portion 96 for closing the lower case 69.

The set plate 92 is mounted in the inside of a lower portion front side surface 69f of the lower case 69, the intake pipes 93 are attached to the set plate 92 by fitting in, and they are covered with the cover portion 96.

Next, the upper case 68 is fitted into a top opening portion 71 of the lower case 69 from the upper side, the element case 76 surrounding the element is fitted in position, and the maintenance lid 67 is mounted onto the element case 76 through a lid fixing member 98.

Finally, the intake ducts 65L, 65R are attached to left and right side surfaces 68a, 68b of the upper case 68. The sectional configuration of the air cleaner 17 thus assembled will be described below.

Fig. 5 is a sectional view of the air cleaner according to the present invention, in which the element case 76 is a component part comprising rectifying vanes 94 formed integrally with a tubular body having a flange portion 77, and the element 61 can be disposed adjacent to the rectifying vanes 94.

An upper chamber 62 is provided on the upper side of the element 61 for filtering air 99, and a lower chamber 63 is provided on the lower side of the element 61. In other words, the member forming the upper chamber 62 is the upper case 68, and the member forming the lower chamber 63 is the lower case 69.

The lower case 69 is fixed to the side frame 47 through the bracket 48, and a side portion 73 provided at the periphery of an opening portion 72 in the bottom surface of the upper case 68 is fitted into an opening hole 71 provided in the top surface 69t of the lower case 69.

The upper case 68 may be attached to the lower case 69 by use of an adhesive, fusing, or fitting.

Then, a recessed portion 78 provided in the down-directed surface of the flange portion 77 at a lower portion of the element case 76 is fitted over a projected portion 74 formed in the inside of the upper case 68.

Next, vertical members 79 are disposed adjacent to the periphery of the element case 76, leg portions 84 are extended downwards from the lower surface 83 of the maintenance lid 67 toward the top surfaces 81 of these vertical members 79, and the tip ends 84a of the leg portions 84 are caused to abut on the top surfaces 81 of the vertical members 79.

Therefore, the element case 76 can be fixed in the inside of the upper chamber 62 of the upper case 68, by the projected portion 74 of the upper case 69, the recessed portion 78 of the element case 76, the top surfaces 81 of the vertical members 79, and the tip ends 84a of the leg portions 84 of the maintenance lid 67.

Both left and right side surfaces 64L, 64R (the surface on the opposite side of 64L) of the upper chamber 62 are provided with rear end opening portions 86L, 86R oppositely to each other, and the intake ducts 65L, 65R are attached to the rear end opening portions 86L, 86R from the left and right sides. The intake ducts 65L, 65R are formed in the shapes of being so bent that intake ports 88, 88 are directed downwards.

The front side surface 69f of a lower portion of the lower case 69 is provided with air output holes 91, and the intake pipes 93 are attached to the air output holes 91 through the set plate 92.

The rear side surface 69r of the lower portion of the lower case 69, which is a surface opposed to the air outlet holes 91, is a large opening portion 95, and the cover portion 96 is mounted in position for closing the large opening portion 95.

Fig. 6 is a view along arrow 6 of Fig. 5 (the cover portion 96 has been removed), in which the intake ducts 65L, 65R for taking in air are disposed on both the left and right side surfaces 64L, 64R of the upper chamber 62.

The rear end opening portions 86L, 86R of the upper case intake ducts 65L, 65R are disposed opposite to each other with a predetermined interval therebetween, so that the closure of the intake duct on one side can be complemented.

In the figure, in the condition where the cover portion 96 (see Fig. 4) of the lower case 69 is removed, the set plate 92 and the plurality of intake pipes 93 (indicates plurality, here and hereinafter) attached to the set plate 92 can be visually checked. The mounting structure of these intake pipes 93 will be described in detail later.

Now, the functions of the air cleaner 17 will be described below.

Air 99 taken in through the intake ports 88 of the intake ducts 65L, 65R disposed on the left and right sides enters the upper case 68, flows around from the upper side to be filtered by the element 61 (see Fig. 3) surrounded by the element case 76, enters the lower case 69, and passes through the intake pipes 93 mounted to the lower case 69.

Returning to Fig. 5, the air 99 having passed through the intake pipe 93 enters into the air supply pipe 51, and is supplied to the engine side.

Since the intake ducts 65L, 65R are so bent that their intake ports 88 are directed downwards, water such as snow and ice can be restrained from penetrating in through the intake ports 88.

Fig. 7 illustrates the gist of detaching and attaching the air cleaner, showing that maintenance such as checking of the element 61 and replacement of the element 61 can be easily carried out.

In (a), lid fixing members 98 provided at support shafts 97 on side surfaces of the upper case 68 are disengaged from fitting portions 67k provided on the top surface 67t of the maintenance lid 67.

In (b), the maintenance lid 67 is removed to the upper side, and the element case 76 having been restricted by the lid leg portions 84 projected downwards from the lower surface 83 of the maintenance lid 67 is lifted up. Since the restriction by the lid leg portions 84 is removed, the element case 76 incorporating the element 61 therein can be easily removed from the upper case 68.

Therefore, the condition of the element 61 can be easily checked visually, and the element 61 can be detached and attached easily.

Fig. 8 is a perspective view of the intake pipe and the set plate according to the present invention. Since the mounting manner of the intake pipes 93 is the same for each of the intake pipes 93, the following description will be made referring to one intake pipe 93.

The intake pipe 93 was provided in the inside of the lower chamber 63, and the intake pipe 93 was attached to an air cleaner case 112 through the set plate 92. In this embodiment, the air cleaner case 112 indicates the lower case 69.

The lower case 69 is a member which comprises small projected portions 113, 113 disposed diagonally at the circumference of the air output hole 91 bored in the lower portion front side surface 69f thereof, and stopper portions 114, 114 disposed at end portions of the small projected portions 113, 113.

The set plate 92 is composed of flange portions 116, and a connection portion 117 for connecting the flange portions 116 to each other.

The flange portions 116 are members provided with an intake pipe insertion hole 118, and slit portions 119, 119 disposed diagonally at the circumference of the intake pipe insertion hole 118. On the other hand, the connection portion 117 is a member provided with set plate mounting holes 121.

The intake pipe 93 is a member provided with two projection piece portions 122, 122 disposed diagonally at the circumference of one end thereof.

The set plate 92 is preliminarily mounted to the lower case 69 by fastening bolts 123, the projection piece portions 122, 122 of the intake pipe 93 are inserted into the slit portions 119, 119 provided in the set plate 92, and the intake pipe 93 is mounted by turning it to a predetermined angle.

Since the intake pipe 93 is mounted to the air cleaner case 112 by the set plate 92, it is unnecessary to prepare fastening members or the like for mounting the intake pipes 93 on the basis of each of the intake pipes 93, and such fastening members or the like can be substituted by the set plate 92.

Since the set plate 92 can be used as a substitute for the fastening members or the like, it is possible to reduce the number of fastening members required.

Fig. 9 shows functional views of Fig. 7, in which an outer wall 93a of the intake pipe 93 is provided with the projection piece portions 122, the set plate 92 is provided with the slit portions 119 for inserting the projection piece portions 122 therein, the projection piece portions 122 are communicated with the slit portions 119, and the projection piece portions 122 are turned by a predetermined angle, whereby the intake pipe 93 is positioned and fixed to the air cleaner case 112.

(a) shows that, in the condition where the center axis 125 of the intake pipe 93 is inclined to the left side by an angle Ø a from the vertical axis 126, the projection pieces 122 of the intake pipe 93 are matched to the positions of the slit portions 119 and inserted into the slit portions 119.

(b) is a sectional view along line b-b of (a), in which the tip end surfaces 122f of the projection piece portions 122 are in abutment on the surfaces 113a of the small projected portions 113 provided on the lower case.

In (c), the center axis 125 of the intake pipe 93 has been turned from the angle Ø a to an angle Ø b (Ø b < Ø a).

(d) is a sectional view along line d-d of (c), showing the condition in which the tip end surfaces 122f of the projection piece portions 122 are in abutment on the surfaces 113a of the small projected portions 113 provided on the lower case, the rear end surfaces 122r of the projection piece portions 122 are in abutment on a flange back surface 116r of the set plate 92, and the outer wall 93a of the intake pipe 93 is in abutment on a flange inner circumferential surface 116i of the set plate 92. Namely, the intake pipe 93 is turned while being restricted by the lower case 69 and the set plate 92.

In (e), the center axis 125 of the intake pipe 93 has been turned from the angle Ø b (0 < Ø b) until it coincides with the vertical axis 126.

(f) is a sectional view along line f-f of (e), showing the condition where the tip end surfaces 122f of the projection piece portions 122 are in contact with a set portion 127 provided in the lower case 69, the rear end surfaces 122r of the projection piece portions 122 are in abutment on the flange back surface 116r of the set plate 92, and the outer wall 93a of the intake pipe 93 is in abutment on the flange inner circumferential surface 116i of the set plate 92.

In this case, the dimensions of outer circumferential surfaces 122g of the projection piece portions 122 of the intake pipe 93 and the flange inner circumferential surface 116i of the set plate 92 are set respectively within

predetermined tolerances, and the turned intake pipe 93 can thereby be fixed to the set plate 92 and the lower case 69.

Since the set plate 92 is provided with the slit portions 119 for insertion of the projection piece portions 122 therein and the intake pipe 93 is positioned and fixed to the air cleaner case 112 by rotating the projection piece portions 122 by a predetermined angle, the operation for positioning and fixing the intake pipe 93 can be easily carried out.

As a result, the intake pipes 93 can be assuredly mounted to the air cleaner case 112. In addition, it is possible to contrive a reduction in the number of assembling steps.

Besides, returning to Fig. 1, in addition to the rearward inclination of the engine 13, the steering shaft 55 is passed on the front side of the engine 13, and the intake system 20 including the air cleaner 17 is provided on the rear side of the cylinder 13c constituting the engine 13; therefore, it is possible to contrive a lowering of the center of gravity of the engine, and to set the center of gravity of the vehicle body as a whole close to the center of the vehicle body.

As a result, the turning performance can be enhanced, and more pleasant traveling can be achieved.

The present invention is preferable for application to snowmobiles
Although various preferred embodiments of the present invention have been described herein in detail, it will be appreciated by those skilled in the art, that variations may be made thereto without departing from the spirit of the invention or the scope of the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMIED ARE DEFINED AS FOLLOWS:

1. A snowmobile comprising a track belt provided on the vehicle body rear side, said track belt being driven by an engine disposed at a front portion of the vehicle body, and a left-right pair of skis provided at front portions of said vehicle body, said skis being steered by an operation on a steering handle, wherein a cylinder of said engine is inclined rearwards, a steering shaft is passed on the front side of said engine, and an intake system including an air cleaner is provided on the rear side of said engine cylinder.

2. A snowmobile as set forth in claim 1, wherein a throttle body provided in an intake passage communicated with said engine is integrally provided with an injector for injecting a fuel, and said injector is provided on the upper side of said throttle body.

3. A snowmobile as claimed in claim 1 wherein said air cleaner is provided with an upper chamber at an upper portion and a lower chamber at a lower portion, with an airfiltering element therebetween, both left and right side surfaces of said upper chamber are each provided with an intake duct for taking in air, and an upper surface of said upper chamber is provided with a maintenance lid for maintenance.

4. A snowmobile as set forth in claim 3, wherein said intake duct is so bent that an intake port is directed downwards.

5. A snowmobile as set forth in claim 3, wherein rear end opening portions of said intake ducts are provided at said left and right side surfaces of said upper chamber oppositely to each other with a predetermined interval therebetween.

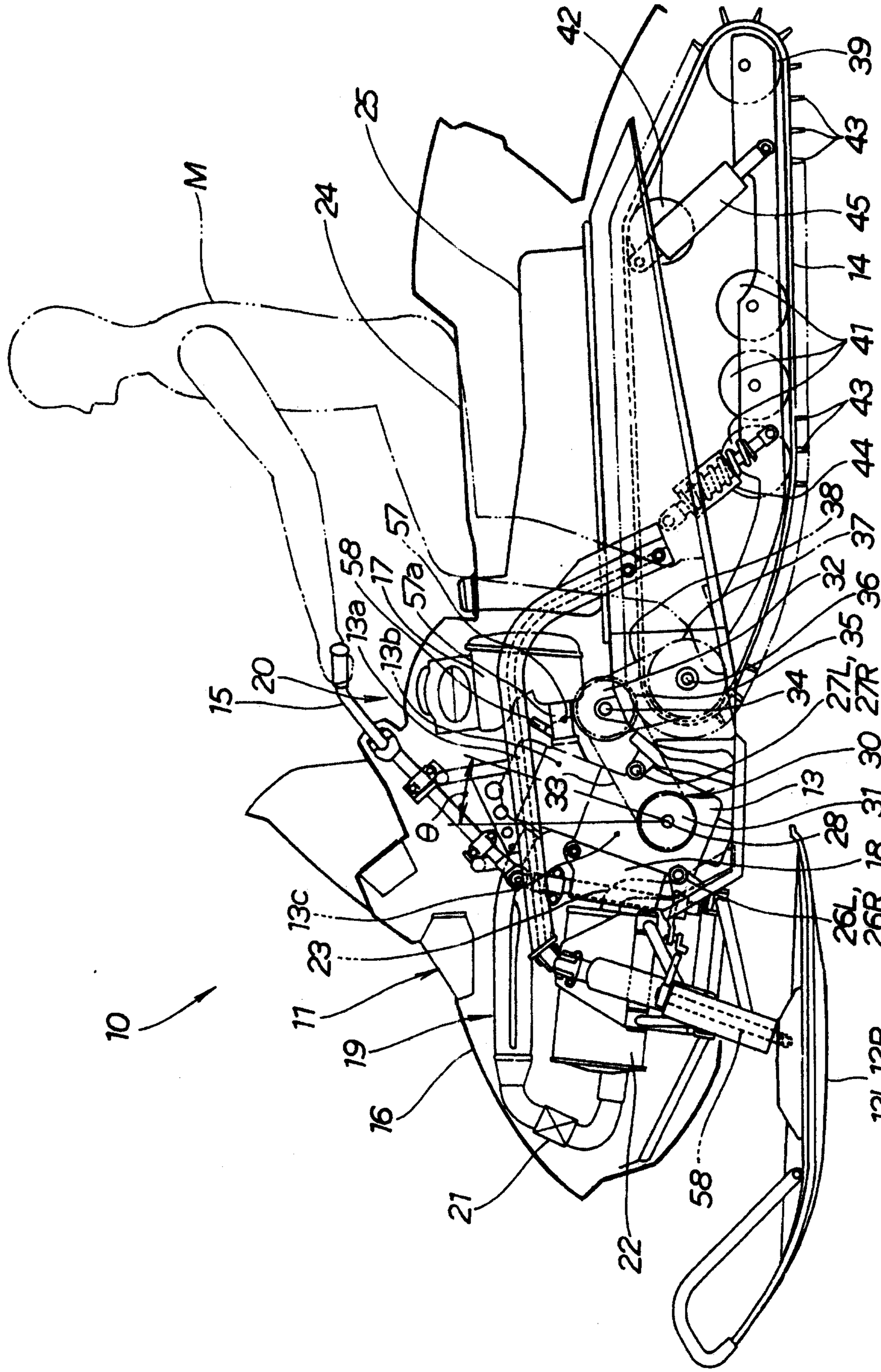
6. A snowmobile as claimed in claim 1 wherein said air cleaner is provided with an upper chamber at an upper portion and a lower chamber at a lower portion, with an airfiltering element therebetween, a plurality of intake pipes are provided in the inside of said lower chamber, and said intake pipes are attached to an air cleaner case through a set plate.

7. A snowmobile as set forth in claim 6, wherein an outer wall of

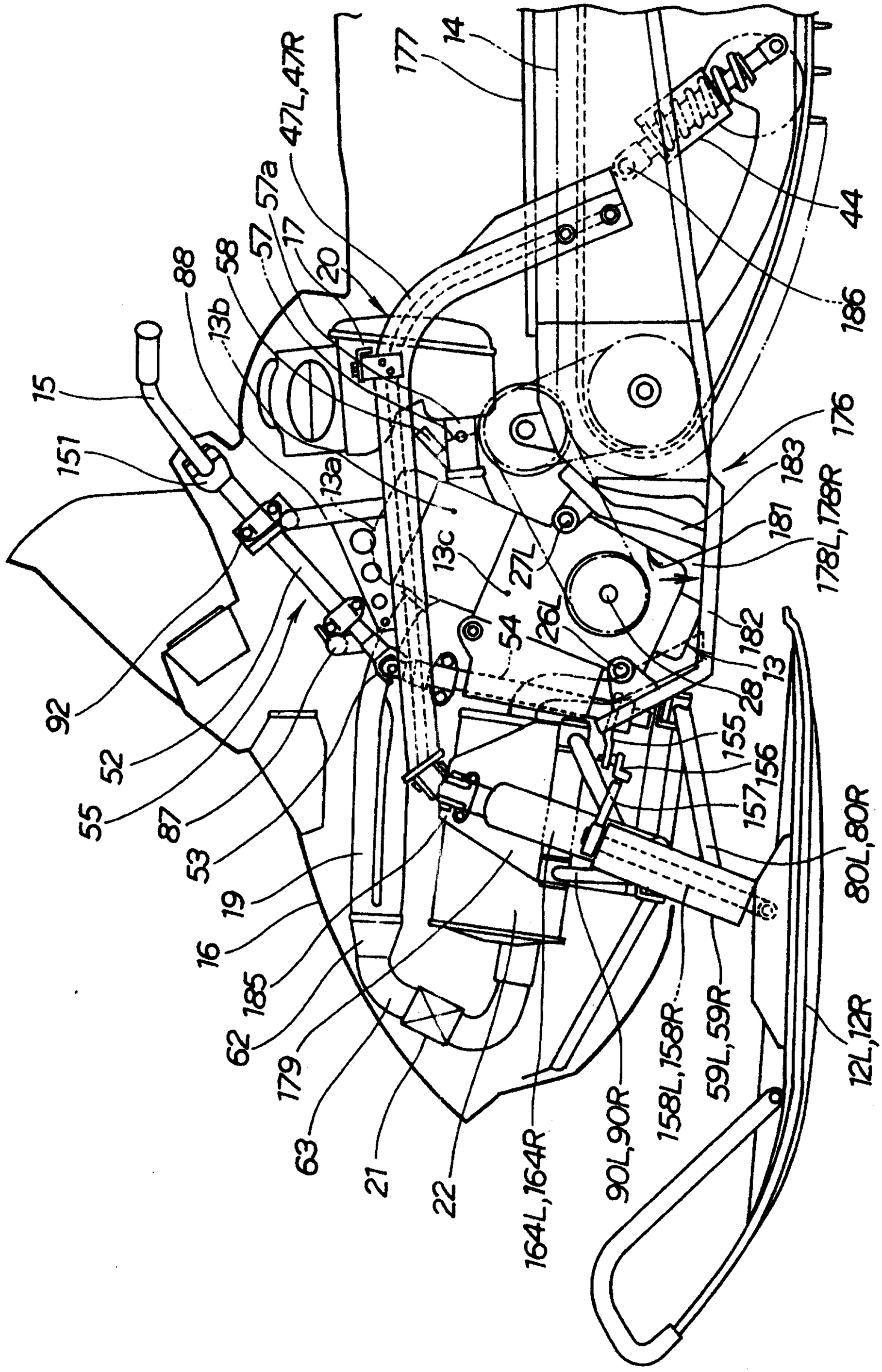
each said intake pipe is provided with a projection piece portion, said set plate is provided with slit portions for inserting said projection piece portions therein, and said intake pipes are positioned and fixed to said air cleaner case by communicating said projection piece portions into said slit portions and turning said projection piece portions by a predetermined angle.

[Name of Document] Drawings

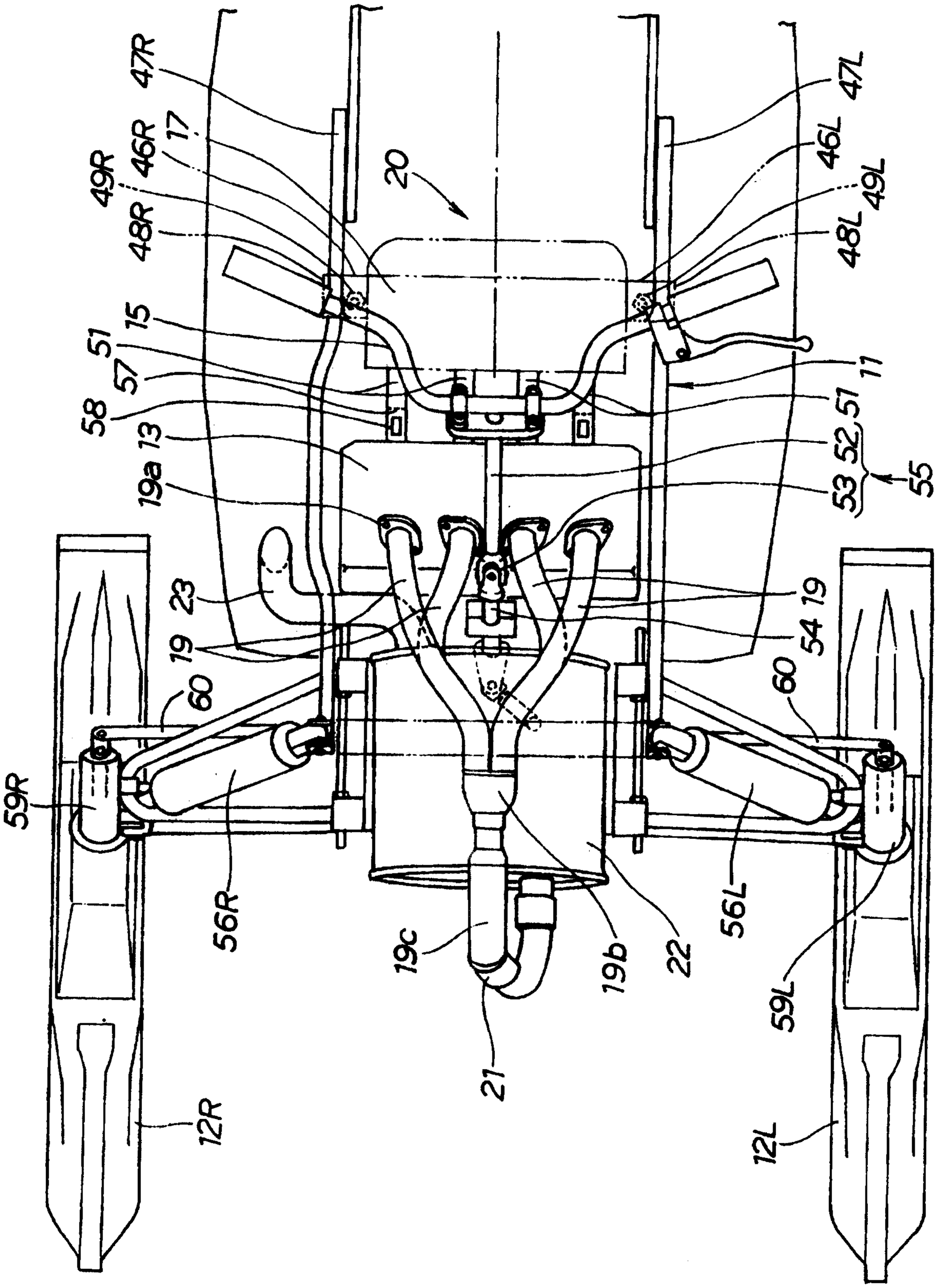
[FIG. 1]



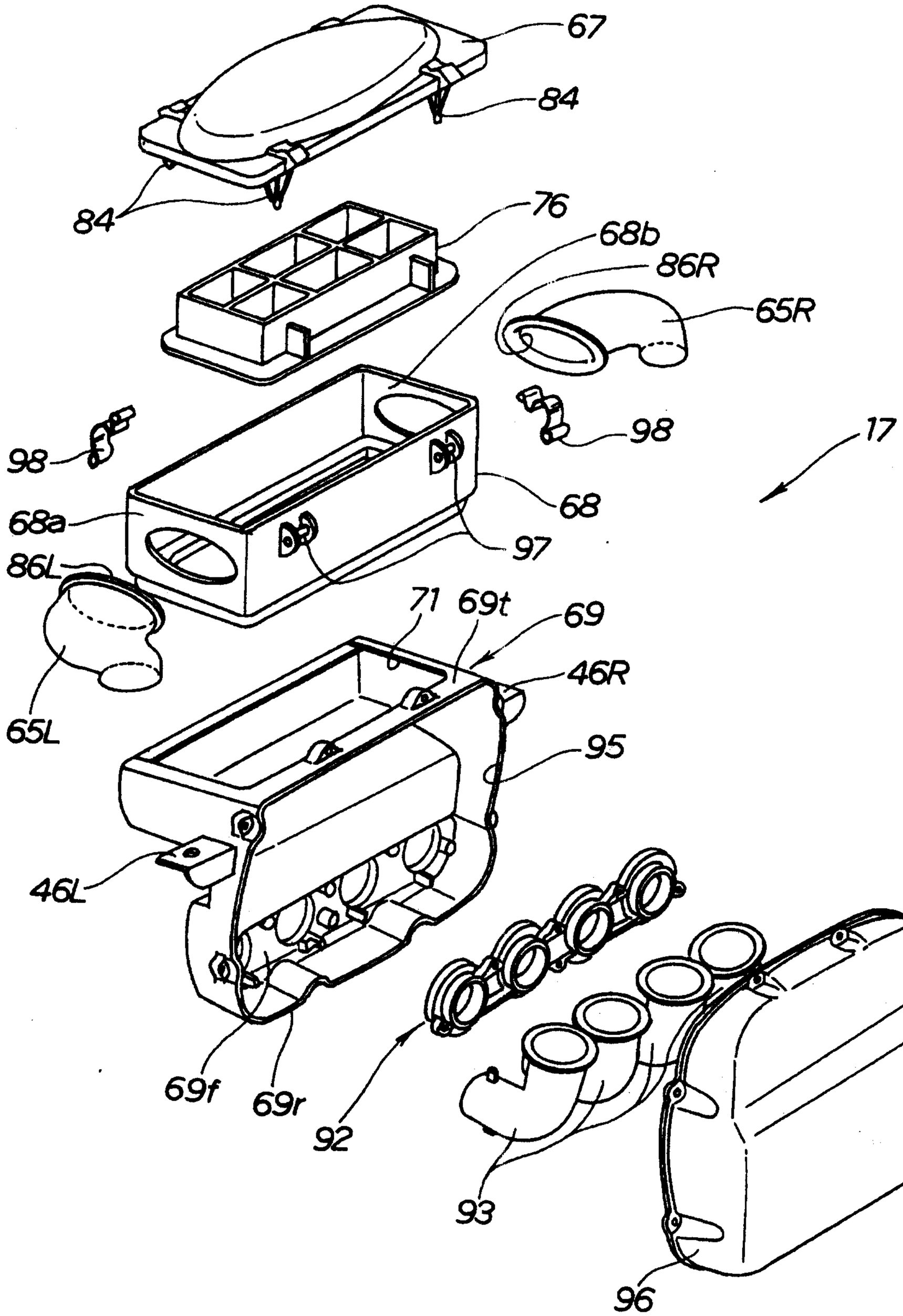
[FIG. 2]


177
14
47L,47R
57a
57
17
20
88
58
13b
44
186
15
151
13a
13c
27L
54
26L
92
52
55
87
53
19
16
62
185
179
63
21
22
164L,164R
90L,90R
158L,158R
59L,59R
12L,12R
80L,80R
157
156
155
28
13
182
181
183
178L,178R
176

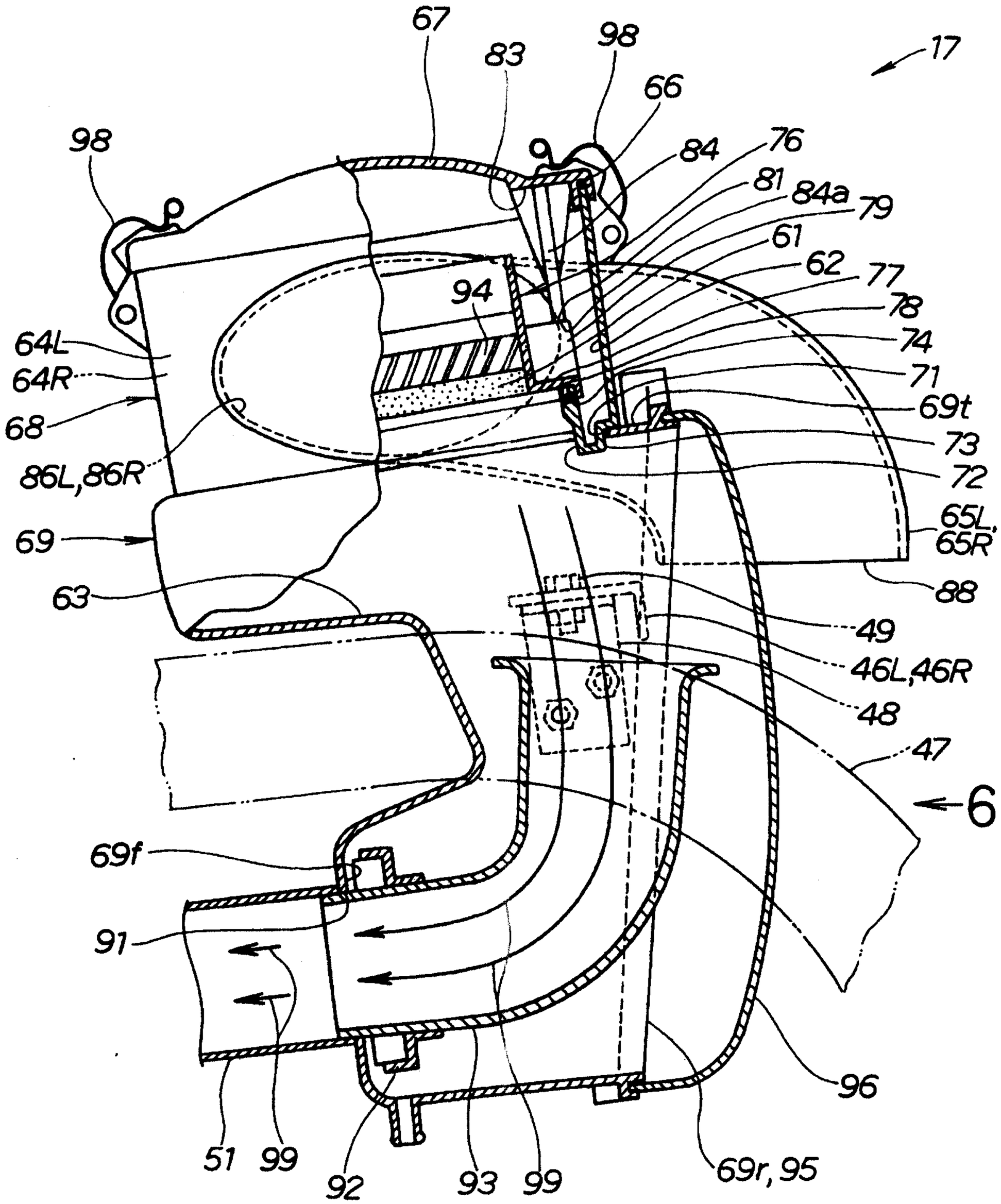
[FIG. 3]


47R
46R
17
49R
48R
20
47L
46L
49L
48L
15
51
57
58
13
19a
11
57
52
53
55
23
19
54
60
59R
56R
19c
19b
22
56L
59L
21
12R
12L

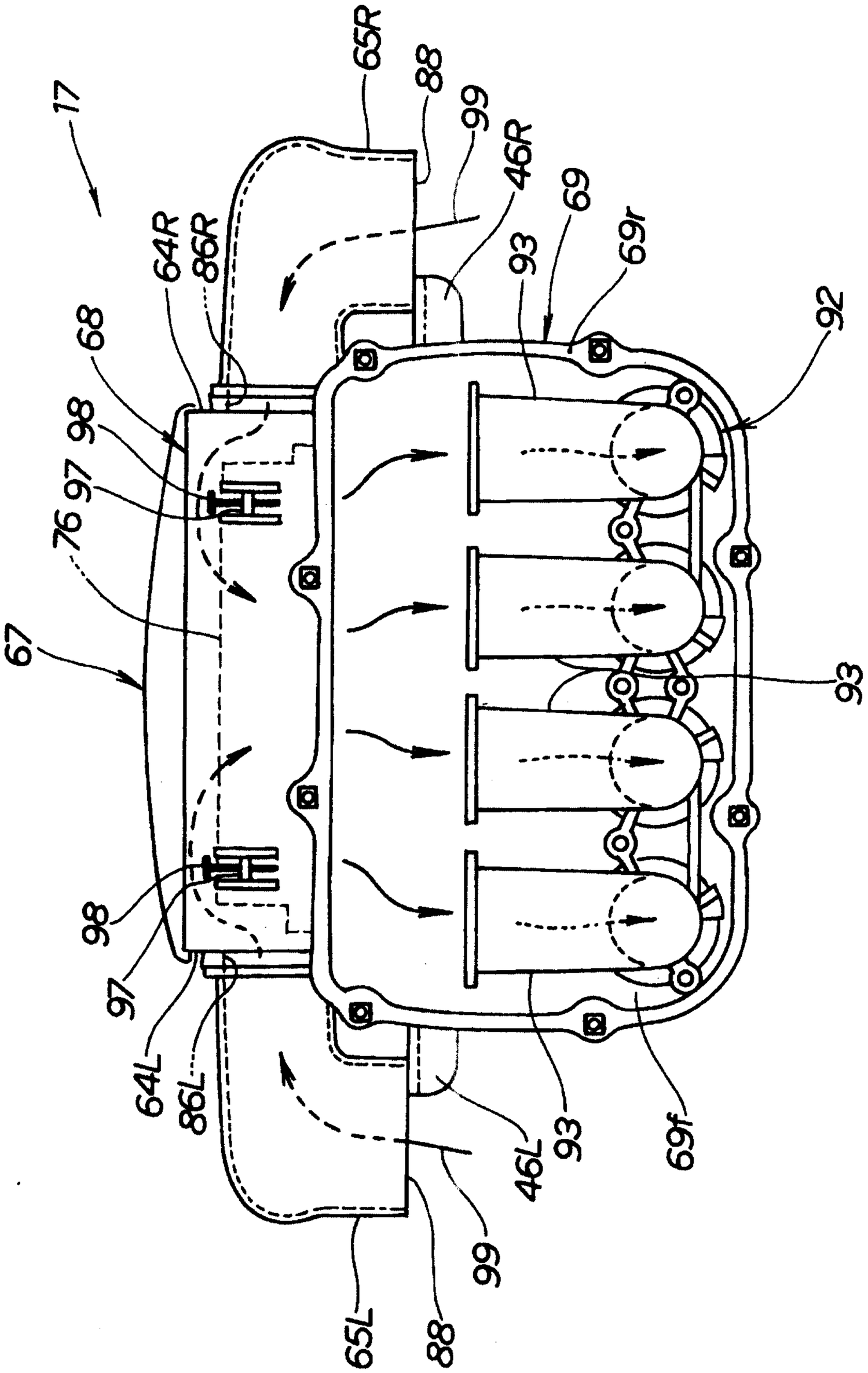
[FIG. 4]


67
84
84
76
68b
86R
65R
98
98
17
68
68a
97
86L
71
69t
69
46R
65L
95
46L
69f
69r
92
93
96

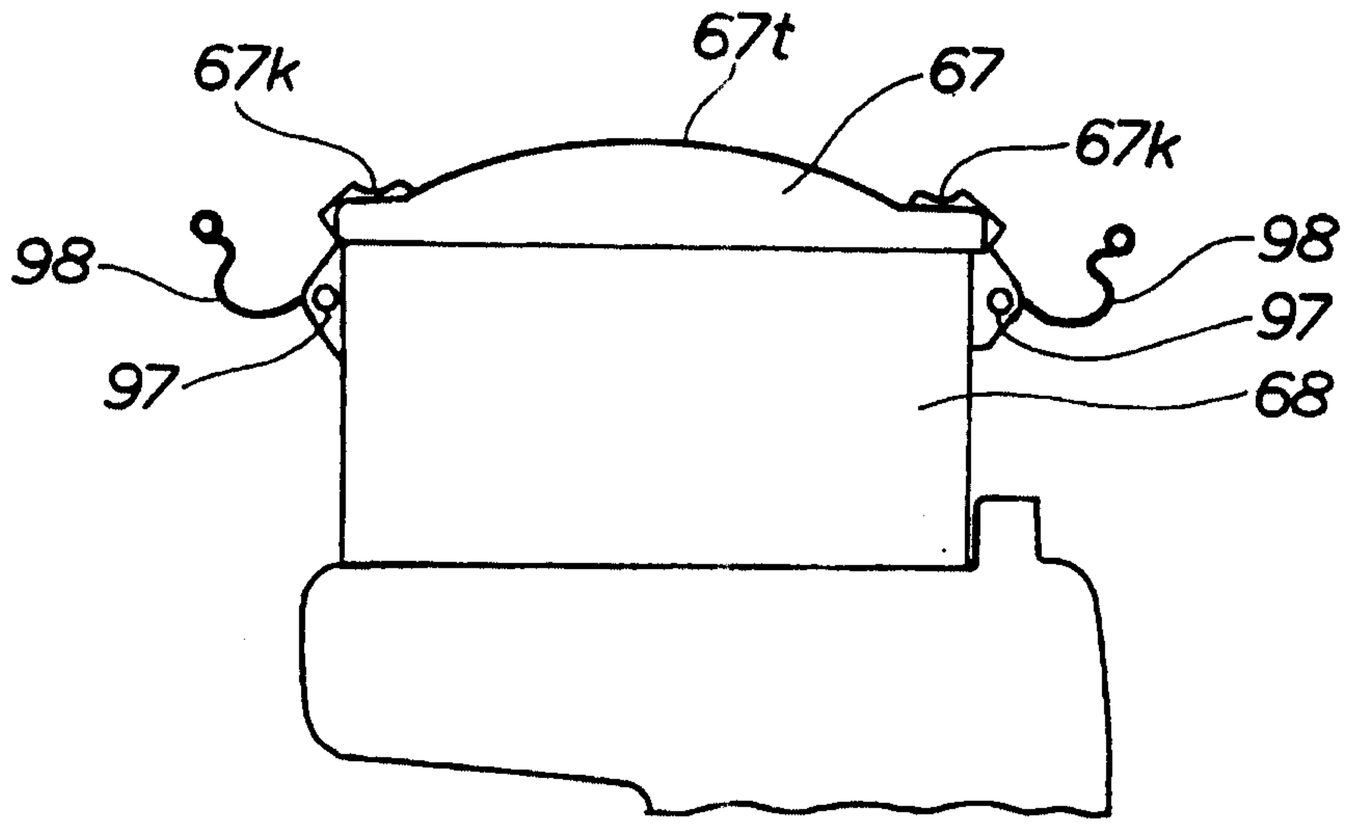
[FIG. 5]


67
83
98
66
17
98
84
76
81
84a
79
61
62
77
78
74
71
69t
73
72
65L,
65R
88
49
46L,46R
48
47
6
94
64L
64R
68
86L,86R
69
63
69f
91
51
99
92
93
99
69r, 95
96

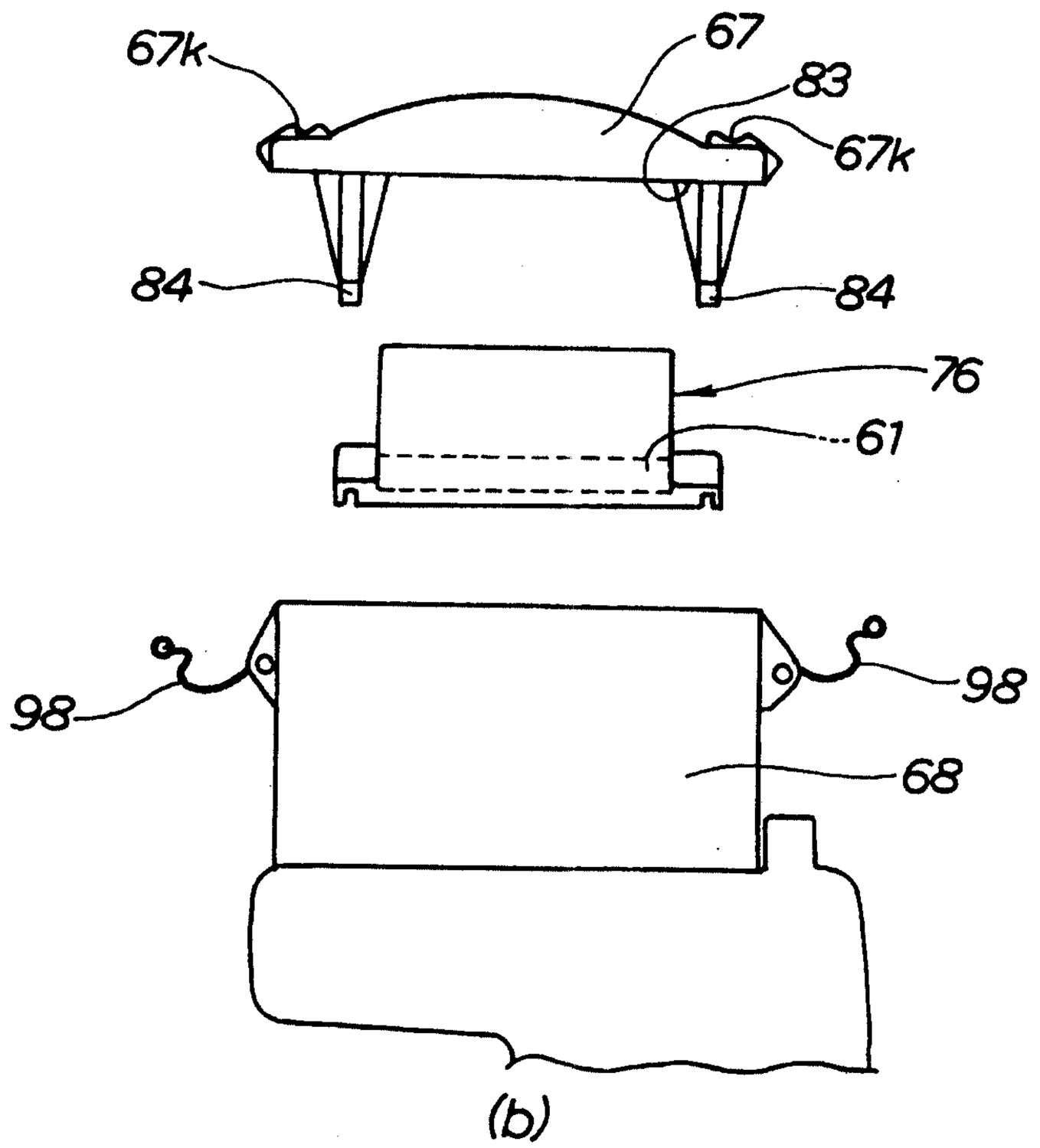
[FIG. 6]


17
65R
88
99
46R
69
69r
93
92
64R
86R
68
98
97
76
67
93
98
97
64L
86L
46L
93
69f
99
65L
88

[FIG. 7]

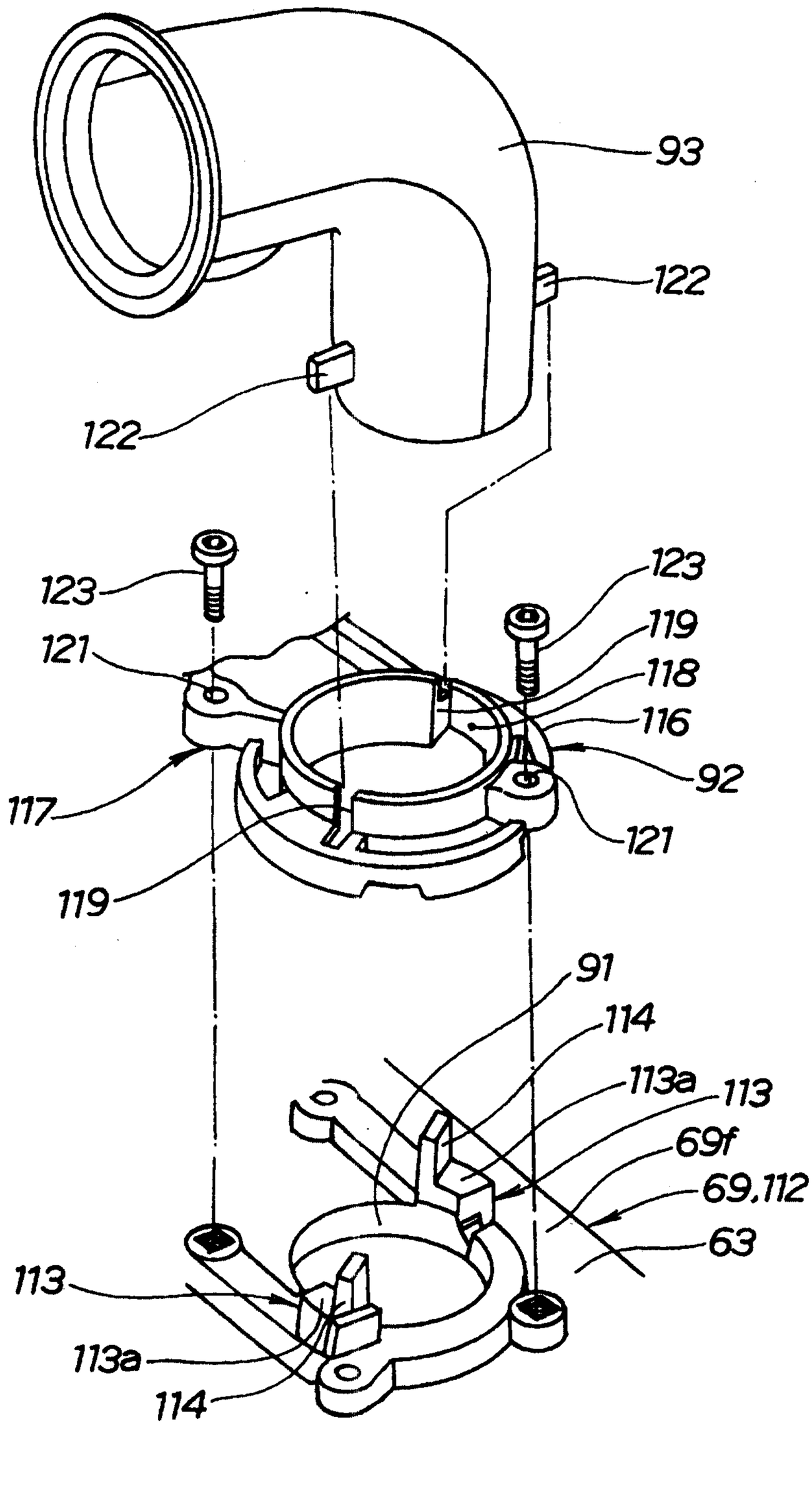


(a)

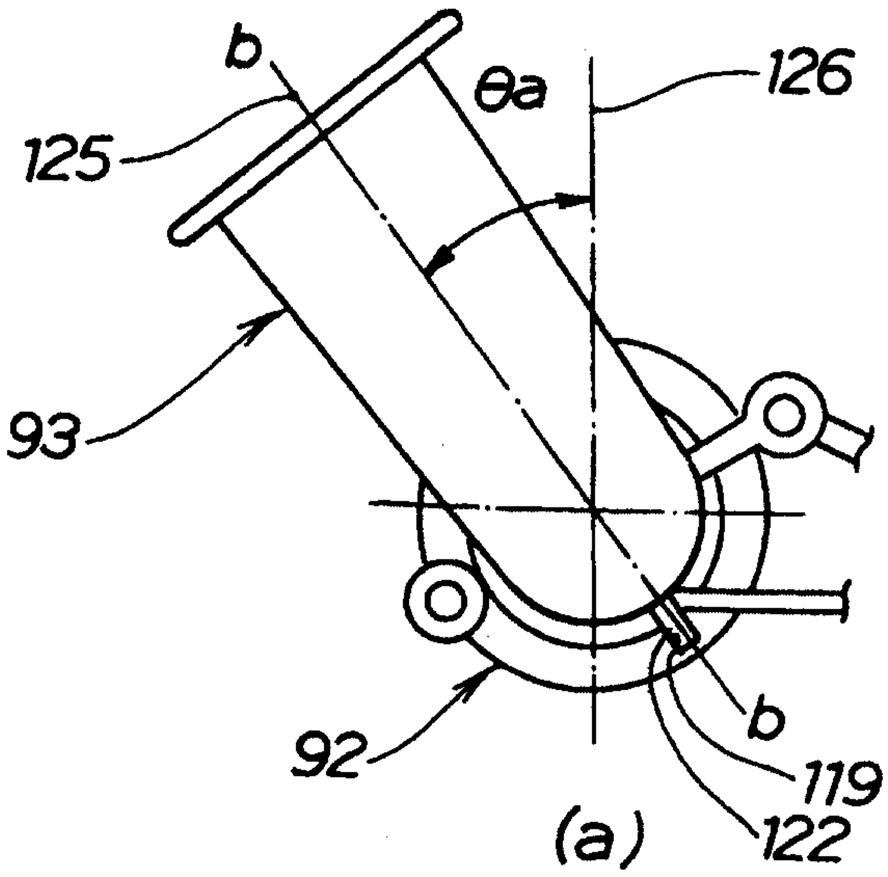


(b)

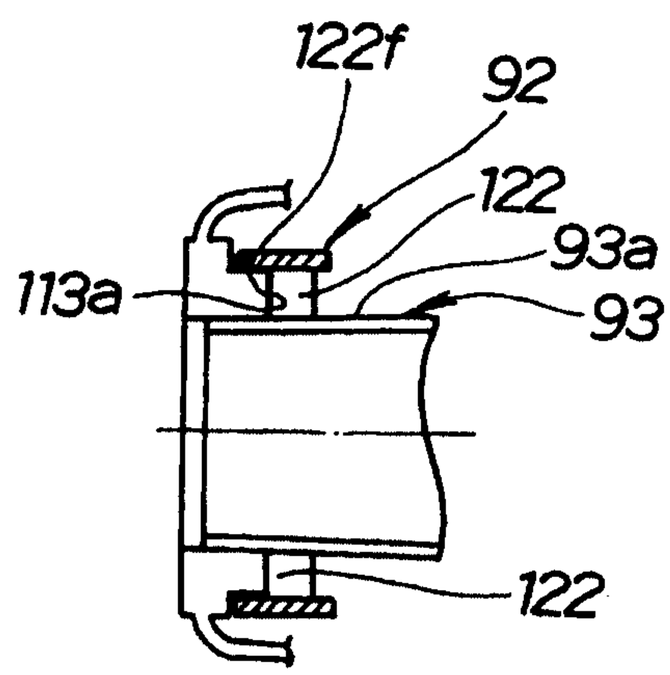
[FIG. 8]


93
122
122
123
123
121
119
118
116
92
121
117
119
91
114
113a
113
69f
69.112
63
113
113a
114

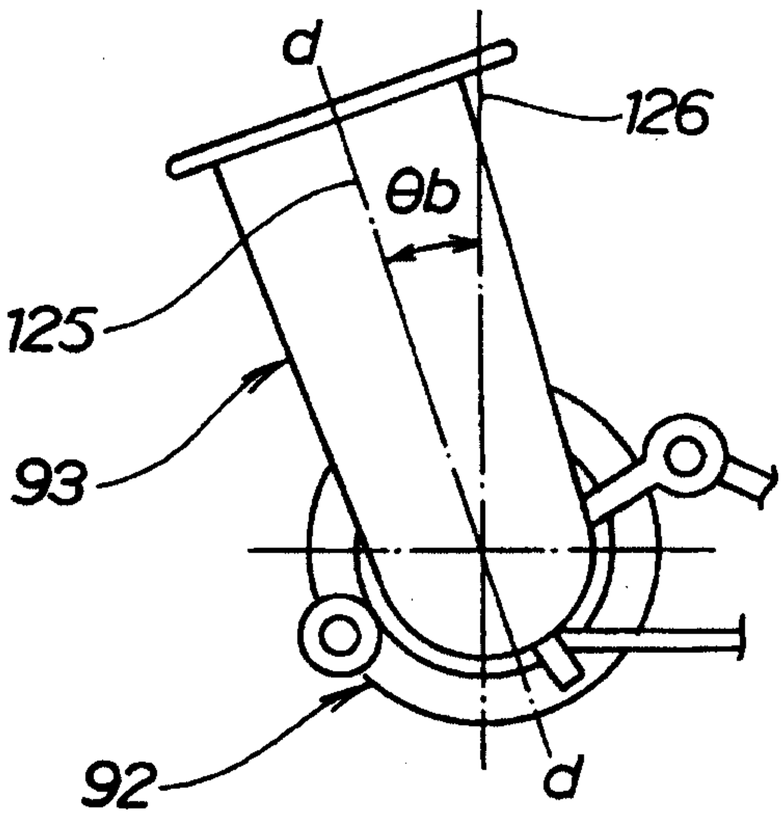
[FIG. 9]


b
θa
126
125
93
92
b
119
122

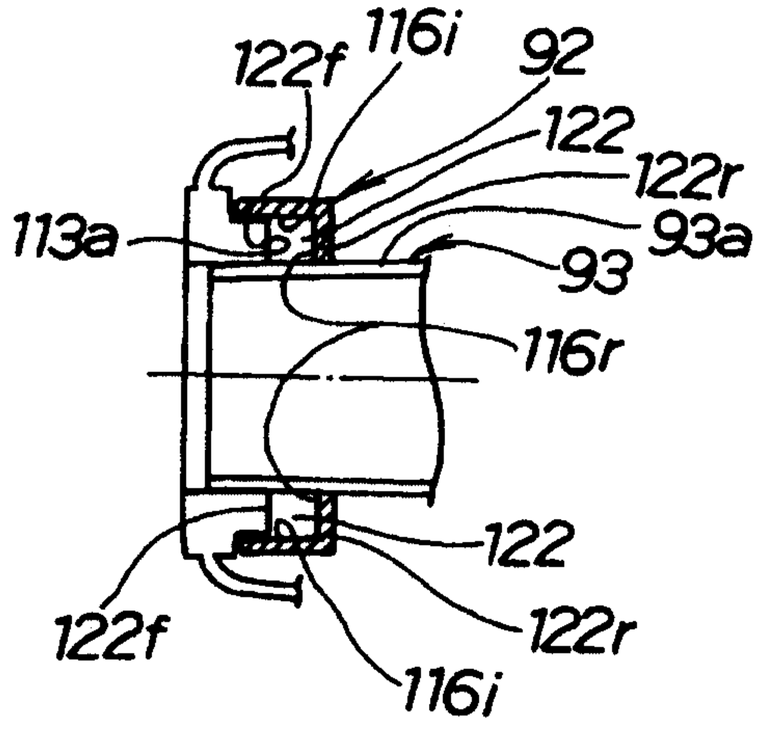
(a)


122f
92
122
93a
113a
93
122

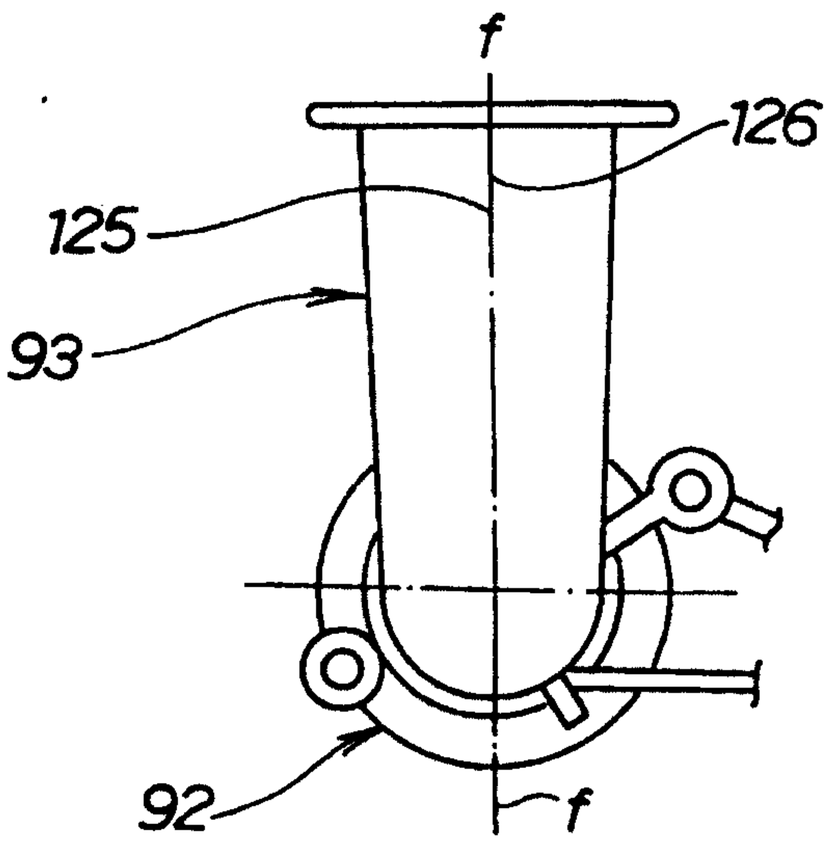
(b)


d
126
θb
125
93
92
d

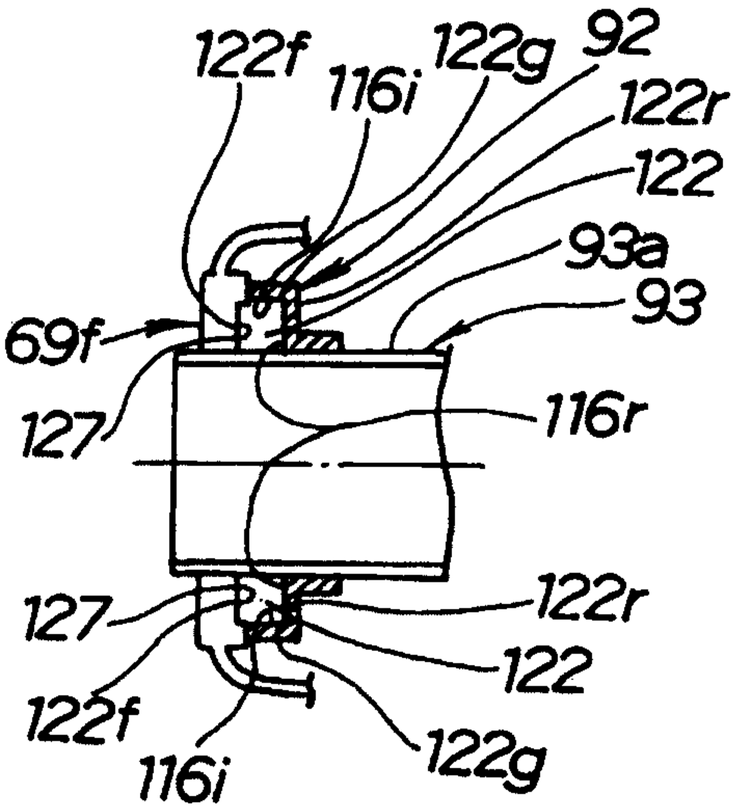
(c)


122f
116i
92
122
122r
93a
113a
93
116r
122
122f
122r
116i

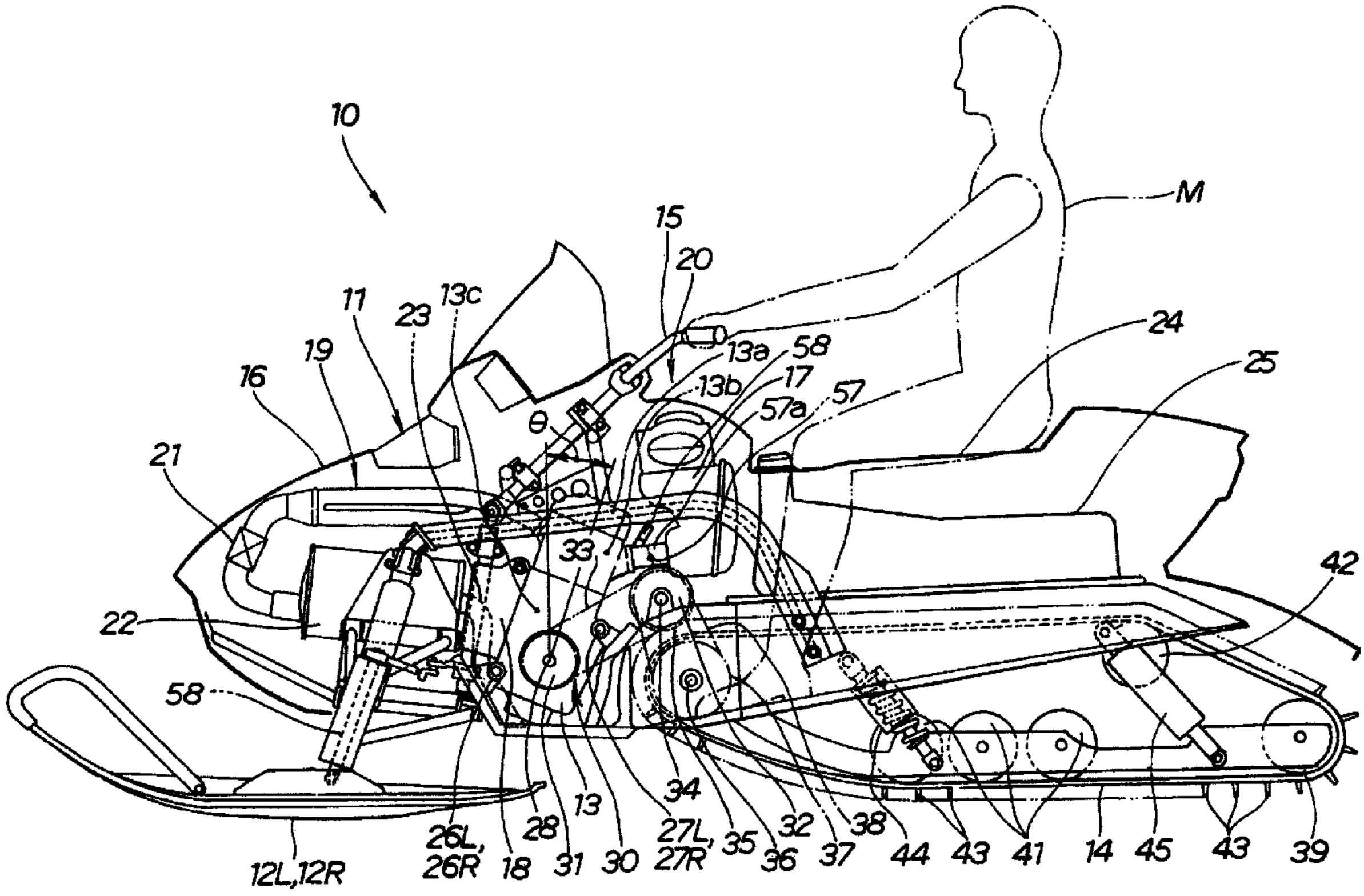
(d)


f
126
125
93
92
f

(e)


122f
116i
122g
92
122r
122
93a
93
69f
127
116r
127
122r
122
122f
116i
122g

(f)


10
M
15
20
11
23
13c
19
16
13a
58
24
25
13b
17
57
57a
θ
21
33
42
22
58
34
13
26L,
26R
28
18
31
30
27L,
27R
35
36
32
37
38
44
43
41
14
45
43
39
12L,12R