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CA 2706051 C 2012/07/10

(11)(21) 2 706 051

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 2010/06/03

(41) Mise à la disp. pub./Open to Public Insp.: 2011/01/29

(45) Date de délivrance/Issue Date: 2012/07/10

(30) Priorité/Priority: 2009/07/29 (JP2009-176360)

(51) Cl.Int./Int.Cl. *B60G 3/18* (2006.01)

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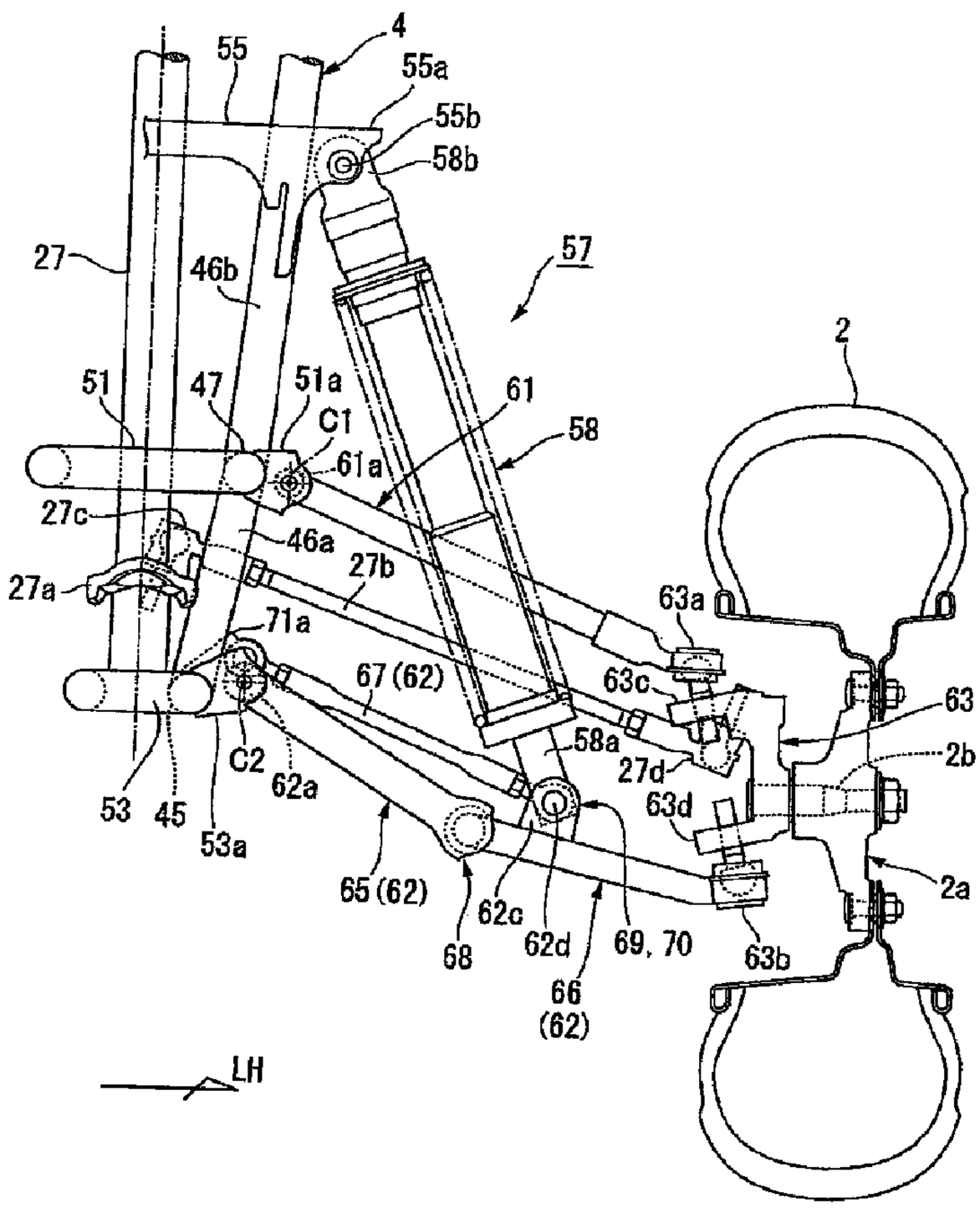
(54) Titre : SYSTEME DE SUSPENSION POUR VEHICULE
(54) Title: VEHICLE SUSPENSION SYSTEM



(57) Abrégé/Abstract:
To enhance, in a vehicle suspension system having a vertically oscillating suspension arm, the degree of freedom in layout and in setting the stroke ratio by minimizing the increase in the number of parts used and weight. A lower arm is formed to include a

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(57) Abrégé(suite)/Abstract(continued):
plurality of arm members. Each of the arm members is oscillatably connected to each other via joints and operatively associated with each other according to a vertical movement of a wheel to thereby cause a cushion unit to make a stroke motion.

ABSTRACT OF THE DISCLOSURE

To enhance, in a vehicle suspension system having a vertically oscillating suspension arm, the degree of freedom in layout and in setting the stroke ratio by minimizing the increase in the number of parts used and weight. A lower arm is formed to include a plurality of arm members. Each of the arm members is oscillatably connected to each other via joints and operatively associated with each other according to a vertical movement of a wheel to thereby cause a cushion unit to make a stroke motion.

VEHICLE SUSPENSION SYSTEM

FIELD OF THE INVENTION

The present invention relates to a suspension system suitable for a small-sized vehicle, such as a saddle-riding type vehicle.

BACKGROUND OF THE INVENTION

A known arrangement of a suspension system in the abovementioned type of vehicle includes a linkage mechanism disposed between a vertically oscillating suspension arm and a vehicle body, and a shock absorber having one end connected to the linkage mechanism (see, for example, Japanese Patent Laid-Open No. Sho 62-61889).

In the known arrangement mentioned above, suspension performance can be improved by varying a stroke ratio (a ratio of an extension/contraction amount of the shock absorber relative to a vertical movement of a wheel) of the suspension system according to the vertical movement of the wheel. On the other hand, having the linkage mechanism separately from the suspension arm tends to invite an increased number of parts used and weight and to impose restrictions on a degree of freedom in layout. In addition, the suspension arm is formed from a single member, which makes it difficult to tune the stroke ratio.

It is therefore an object of the present invention to enhance, in a vehicle suspension system having a vertically oscillating suspension arm, the degree of freedom in layout and in setting the stroke ratio by minimizing the increase in the number of parts used and weight.

SUMMARY OF THE INVENTION

As means for solving the abovementioned problems, according to an aspect of the present invention, there is provided a vehicle suspension system includes a vehicle body frame that constitutes a vehicle body; a suspension arm that has a first end disposed oscillatably on the vehicle body frame and a second end supporting a wheel and a shock absorber that has a first end connected to a side of the vehicle body frame and a second end connected to a side of the suspension arm. In this vehicle suspension system, the suspension arm includes: a first arm member that has a first end oscillatably disposed on the vehicle body frame; a second arm member that has a first end oscillatably connected to a second end of the first arm member and a second end supporting a wheel; and a third arm member that has a first end oscillatably disposed on the vehicle body frame and a second end disposed on the second arm member. Each of the first, second, and third arm members is oscillatably connected to each other via a joint and operatively associated with each other according to a vertical movement of the wheel to thereby cause the shock absorber to make a stroke motion.

According to an aspect of the present invention, the first arm member and the second arm member are disposed so as to form substantially a V-shape as viewed along an oscillation shaft thereof.

According to an aspect of the present invention, the second end of the shock absorber is connected, together with the second end of the third arm member, to the second arm member.

According to an aspect of the present invention, the suspension arm is, in an independent suspension type suspension having a knuckle supported on distal ends of an upper arm and a lower arm, the lower arm.

According to an aspect of the present invention, the suspension system is a double wishbone type suspension for a front wheel in a rear-two-wheel-drive rough terrain vehicle.

According to an aspect of the present invention, a linkage mechanism can be formed from the suspension arm that includes a plurality of arm members without having a linkage mechanism separately, so that the number of parts used and weight of the suspension system can be minimized to thereby enhance a degree of freedom in layout and a degree of freedom in setting the stroke ratio of the suspension system.

According to an aspect of the present invention, the distal end side of the shock absorber can be connected near a bottom portion of the suspension arm that is substantially formed into a V-shape in a view as viewed in the direction of the oscillation shaft. The shock absorber can be disposed at a lower level for a lower center of gravity and a stroke amount of the shock absorber can be increased.

Further, according to an aspect of the present invention, the shock absorber can be disposed at an even lower level for an even lower center of gravity and a stroke amount of the shock absorber can be further increased. This is particularly effective in applying the present invention to a suspension system for a rough terrain vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

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

Fig. 1 is a left side elevational view showing a saddle-riding type vehicle according to an embodiment of the present invention.

Fig. 2 is a left side elevational view showing a front suspension of the saddle-riding type vehicle according to the embodiment of the present invention.

Fig. 3 is a front elevational view showing the front suspension as viewed in a direction along an oscillation shaft.

Fig. 4 is a plan view showing a lower arm of the front suspension.

Fig. 5 is a front elevational view showing an operation of the front suspension, corresponding to Fig. 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A specific embodiment to which the present invention is applied will be described below with reference to the accompanying drawings. Throughout the descriptions given hereunder, expressions indicating directions including front and rear, and right and left, mean the same directions as those in a vehicle unless otherwise specified. In the drawings, an arrow FR indicates forward of the vehicle, an arrow LH indicates leftward of the vehicle, and an arrow UP indicates upward of the vehicle.

A saddle-riding type, four-wheel vehicle (all terrain vehicle) 1 shown in Fig. 1 is a so-called all terrain vehicle (ATV) has left and right front wheels 2 and rear wheels 3 mounted with relatively large-diameter low pressure balloon tires, disposed at front and rear of a vehicle body that is built compact and lightweight. The saddle-riding type, four-wheel vehicle 1 is given a large minimum road clearance to achieve running performance mainly on rough roads.

The left and right front wheels 2 are suspended at a front portion of a vehicle body frame 4 via an independent suspension type (double wishbone type) front suspension 57. The left and right rear wheels 3 are suspended at a rear portion (a sub-frame 60) of the vehicle body frame 4 via, for example, a rigid axle (swing arm type) rear suspension 75.

An engine 5 as a prime mover of the saddle-riding type, four-wheel vehicle 1 is mounted at a substantially central portion of the vehicle body frame 4. The engine 5 is, for example, a single-cylinder engine. The engine 5 is disposed such that a rotation axis of a crankshaft extends in a vehicle width direction (crosswise direction) and has a basic configuration in which a cylinder 7 is vertically arranged forwardly of a crankcase 6 thereof. Power drive transmission can be achieved between an output shaft of the engine 5 and an axle of the rear wheels 3 by, for example, a chain type transmission mechanism. Specifically, the saddle-riding type, four-wheel vehicle 1 is a rear-two-wheel-drive all terrain vehicle.

A throttle body 21 is connected to an upper portion of the cylinder 7 of the engine 5. An air cleaner case 22 is connected to a rear portion of the throttle body 21. On the other hand, an exhaust pipe 23 is connected to a lower portion of the cylinder 7. The exhaust pipe 23 is extended rearwardly so as to turn backward and then connected to a silencer 24 disposed at a rear portion of the vehicle body.

Disposed at a crosswise center on an upper portion of the vehicle body of the saddle-riding type, four-wheel vehicle 1 are, for example, a steering shaft 27, a fuel tank 28, and a saddle-riding type seat 29, disposed in that order from the front side. A handlebar 31 is disposed at an upper end portion of the steering shaft 27. A front wheel steering mechanism is connected to a lower end portion of the steering shaft 27.

A resin vehicle body cover 32 and a resin front fender 33 are disposed at a front portion of the vehicle body of the saddle-riding type, four-wheel vehicle 1. Specifically, the vehicle body cover 32 covers appropriately the front portion of the vehicle body. The front fender 33 covers the left and right front wheels 2 in a space extending from an upward area to a rearward area of the front wheels 2. The saddle-riding type, four-wheel vehicle 1 further includes a rear fender 36 disposed at a rear portion of the vehicle body. The rear fender 36 made of resin covers the left and right rear wheels 3 in a space extending from an upward area to a frontward area of the rear wheels 3.

The vehicle body frame 4 is formed from steel stocks of a plurality of types joined together through, for example, welding. More specifically, the vehicle body frame 4 forms a longitudinally extending box structure at the crosswise center portion of the vehicle body by forming a pair of left and right closed loop structures and connecting the closed loop structures with a plurality of cross members.

The front portion of the vehicle body frame 4 and the front suspension 57 will be described below with reference to Figs. 2 and 3.

A longitudinally extending front lower pipe 45 and a front lower upper pipe 47 are disposed at the front side of a lower portion of the vehicle body frame 4. A vertically extending front pipe 46a connects front end portions of the front lower pipe 45 and the front lower upper pipe 47. A front upper pipe 46b extends upwardly from a front end portion of the front lower upper pipe 47.

A lower-step front cross member 53 and a lower-step rear cross member 54 connect front end portions and rear end portions, respectively, of the left and right front lower pipes 45. A middle-step front cross member 51 and a middle-step rear cross member 52 connect front end portions and rear end portions, respectively, of the left and right front lower upper pipes 47. An upper-step cross member 55 connects upper portions of the left and right front upper pipes 46b.

An upper arm 61 of the front suspension 57 has proximal end sides at front and rear journaled vertically oscillatably at either end on the outside of the middle step front cross member 51 and the middle step rear cross member 52. A lower arm 62 of the front suspension 57 has proximal end sides at front and rear journaled vertically oscillatably at either end on the outside of the lower step front cross member 53 and the lower step rear cross member 54.

Upper and lower ends of a knuckle 63 are oscillatably and rotatably supported on distal end sides of the upper arm 61 and the lower arm 62. A hub portion 2a of the front wheel 2 is rotatably supported on the outside of the knuckle 63. A cushion unit 58 is inserted between either end on the outside of the upper step cross member 55 and the lower arm 62.

The front suspension 57 mainly includes the left and right upper arm 61 and lower arms 62, the left and right knuckles 63, and the left and right cushion units 58. Specifically, each of the left and right upper arm 61 and lower arms 62 has a first end (the proximal end or a crosswise inside end) supported vertically oscillatably on either end at the front of the vehicle body frame 4. Each of the left and right knuckles 63 is supported oscillatably and rotatably on each of a second end (the distal end or a crosswise outside end) of the left and right upper arm 61

and lower arms 62. Each of the left and right cushion units 58 is inserted between each of the lower arms 62 and either side at the front portion of the vehicle body frame 4. An axle 2b is disposed in a protruding condition on the outside of each of the left and right knuckles 63. The hub portion 2a of the front wheel 2 is supported on the axle 2b.

Each of the upper arm 61 and the lower arm 62 is formed substantially into a V-shape that widens so as to branch toward the vehicle body frame 4 side (the proximal end side) from the knuckle 63 side (the distal end side) in a top plan view. Short pipe-like frame connection portions 61a, 62a are integrally joined to branched leading ends (the proximal ends at front and rear of each of the upper arm 61 and the lower arm 62). The frame connection portions 61a, 62a are inclined downwardly toward the rear. Each of the frame connection portions 61a, 62a is disposed so as to extend in parallel with each other and share central axes C1, C2 of the upper arm 61 and the lower arm 62, respectively.

On the other hand, arm connection portions 51a, 52a are disposed on outside ends of the middle step front cross member 51 and the middle step rear cross member 52. The arm connection portions 51a, 52a correspond to the front and rear, respectively, at the proximal end of the upper arm 61. Similarly, arm connection portions 53a, 54a are disposed on outside ends of the lower step front cross member 53 and the lower step rear cross member 54. The arm connection portions 53a, 54a correspond to the front and rear, respectively, at the proximal end of the lower arm 62.

The frame connection portions 61a or 62a of the upper arm 61 or the lower arm 62 are vertically oscillatably supported on the arm connection portions 51a, 52a or 53a, 54a via an oscillation shaft 61b extending along the central axis C1 or an oscillation shaft 62b extending along the central axis C2. Specifically, the upper arm 61 and the lower arm 62 have their proximal ends supported vertically oscillatably on both sides at the front portion of the vehicle body frame 4. In accordance with the embodiment of the present invention, the oscillation shafts 61b, 62b are set as bolts.

An upper wall portion 63c and a lower wall portion 63d of the knuckle 63 are oscillatably and rotatably supported at the distal end of the upper arm 61 and the distal end of the lower arm 62 via a ball joint 63a and a ball joint 63b, respectively.

The lower arm 62 includes an arm side mount 62c that protrudes upwardly thereon. The cushion unit 58 has a lower end portion 58a connected oscillatably to the arm side mount 62c via a connection shaft 62d that extends in parallel with the central axes C1, C2. The upper step cross member 55 includes a frame side mount 55a disposed on each of both outside ends thereof. The cushion unit 58 has an upper end portion 58b connected oscillatably to the frame side mount 55a via a connection shaft 55b that extends in parallel with the central axes C1, C2. Each of the connection shafts 62d, 55b is set as a bolt.

When an impact load or the like is applied to the left and right front wheels 2 from a road surface, each of the left and right front wheels 2 oscillates vertically individually by oscillations of the upper arm 61 and the lower arm 62, and each of the left and right cushion units 58 is individually extended or contracted, so that the load is mildly absorbed through a shock absorbing action of these cushion units 58.

A pitman arm 27a of the front wheel steering mechanism is integrally disposed at a lower end portion of the steering shaft 27. The pitman arm 27a extends rearwardly from a lower end portion of the steering shaft 27. Each of left and right tie rods 27b has a proximal end portion connected to a distal end portion of a corresponding one of distal end portions of the pitman arms 27a via a corresponding one of ball joints 27c. On the other hand, the tie rod 27b has a distal end portion connected to an operation arm portion 63e of the knuckle 63 via the ball joint 27d. This results in the left and right front wheels 2 being steered in the same direction via, for example, the left and right tie rods 27b when the handlebar 31 and the steering shaft 27 are turned.

Referring also to Fig. 4, the lower arm 62 is formed to include a plurality of arm members 65, 66, 67. These arm members 65, 66, 67 are mutually oscillatably connected to each other via joints 68, 70.

Specifically, the lower arm 62 is formed to include a first arm member 65, a second arm member 66, and a third arm member 67. The first arm member 65 has a first end oscillatably disposed on the vehicle body frame 4. The second arm member 66 has a first end oscillatably connected to a second end of the first arm member 65 and a second end supporting the knuckle 63. The third arm member 67 has a first end oscillatably disposed on the vehicle body frame 4 and a second end disposed on the second arm member 66.

The first arm member 65 integrates front and rear first arm portions 65a, a first member 65b, front and rear holding brackets 65c, and the front and rear frame connection portions 62a. Specifically, the front and rear first arm portions 65a constitute front and rear branch arms in the lower arm 62 on the vehicle body side. The first member 65b connects between intermediate portions of the front and rear branch arms on the vehicle body side. The front and rear holding brackets 65c are disposed on the outside ends of the front and rear branch arms.

On the other hand, the second arm member 66 integrates front and rear second arm portions 66a, a second member 66b, a pivot pipe 66c, and a stud retainer 66d of the ball joint 63b. Specifically, the front and rear second arm portions 66a constitute front and rear branch arms in the lower arm 62 on the wheel side. The second member 66b connects between intermediate portions of the front and rear branch arms on the wheel side. The pivot pipe 66c extends across inner side ends of the front and rear branch arms on the wheel side. The stud retainer 66d is disposed on the outside end of the front and rear branch arms on the wheel side.

The front and rear holding brackets 65c of the first arm member 65 and the pivot pipe 66c of the second arm member 66 are oscillatably connected together via a connection shaft 68a that penetrates longitudinally through the front and rear holding brackets 65c and the pivot pipe 66c and extends in parallel with the central axes C1, C2. The connection shaft 68a, the front and rear holding brackets

65c, and the pivot pipe 66c constitute a first joint 68 that oscillatably connects between the first arm member 65 and the second arm member 66. In accordance with the embodiment of the present invention, the connection shaft 68a is set as a long bolt.

The arm side mount 62c mentioned earlier is disposed upwardly at the front portion of the second member 66b in the second arm member 66. The lower end portion 58a of the cushion unit 58 is oscillatably connected to the arm side mount 62c via the connection shaft 62d that extends in parallel with the central axes C1, C2. The connection shaft 62d and the arm side mount 62c constitute a second joint 69 that oscillatably connects between the second arm member 66 and the cushion unit 58. In accordance with the embodiment of the present invention, the connection shaft 62d is set as a bolt.

Further, the connection shaft 62d penetrates through the arm side mount 62c rearwardly and the second end of the third arm member 67 is oscillatably connected to a portion of the connection shaft 62d that has penetrated through the arm side mount 62c. Specifically, the connection shaft 62d and the arm side mount 62c also constitute a third joint 70 that oscillatably connects between the second arm member 66 and the third arm member 67.

In Fig. 4, reference symbol 71a denotes a third arm connection portion that oscillatably connects the first end of the third arm member 67 and reference symbol 71b denotes a connection shaft that penetrates through, and connects together, the first end of the third arm member 67 and the third arm connection portion 71a and extends in parallel with the central axes C1, C2.

The first arm member 65 and the second arm member 66 are disposed so as to form a substantially vertically shallow V-shape as viewed along an oscillation shaft thereof (the connection shaft 68a) (as viewed in a direction of the oscillation shaft, substantially extending along the vehicle longitudinal direction, in a direction along the central axes C1, C2) (see Fig. 3). The distal end side of the first arm member 65 and the proximal end side of the second arm member 66 are disposed near a bottom portion of the abovementioned V-shape.

Consequently, the first joint 68, and the second joint 69 and the third joint 70 disposed therenear are disposed at a level lower than when the lower arm 62 extends linearly from the vehicle body frame 4 to the knuckle 63 as viewed in the direction of the oscillation shaft. Note that the front suspension 57 shown in Fig. 3 is in a condition in which the cushion unit 58 makes a slight stroke motion (for example, a condition of 1G of only a vehicle weight).

In the view as viewed in the direction of the oscillation shaft, the first end of the third arm member 67 is disposed immediately upwardly of the first end of the first arm member 65. On the other hand, in the view as viewed in the direction of the oscillation shaft, the second end of the third arm member 67 (and a second end of the cushion unit 58) is disposed being slightly spaced apart upwardly from a crosswise outside of the second end of the first arm member 65. Specifically, a distance between the second end of the third arm member 67 and the second end of the first arm member 65 is made greater than a distance between the first end of the third arm member 67 and the first end of the first arm member 65.

Through the foregoing arrangements, in a condition in which the lower arm 62 oscillates downwardly (the condition shown in Fig. 3), the first arm member 65 and the second arm member 66 of the lower arm 62 are disposed to form the substantially vertically shallow V-shape in the view as viewed in the direction of the oscillation shaft. On the other hand, in a condition in which the front wheel load increases, so that the lower arm 62 oscillates upwardly about the oscillation shaft (the condition shown in Fig. 5), the first arm member 65 and the second arm member 66 that form the V-shape oscillate mutually about the oscillation shaft to enlarge the angle formed therebetween (so that the first arm member 65 and the second arm member 66 extend linearly in the view as viewed in the direction of the oscillation shaft).

As the lower arm 62 oscillates vertically, the distance between the proximal end and the distal end thereof increases or decreases, if not largely, as described above. This allows the angle of the knuckle 63 in the view as viewed in the

direction of the oscillation shaft to be varied to any angle, so that a camber angle of the front wheels 2 can be varied as required.

In addition, the second arm member 66 oscillates relative to the first arm member 65. This allows the extension/contraction amount of the cushion unit 58 relative to a vertical movement of the front wheel 2 to be varied also as required. The stroke ratio (the ratio of the extension/contraction amount of the cushion unit 58 relative to the vertical movement of the front wheel 2) of the front suspension 57 can therefore be varied as required.

As described heretofore, the vehicle suspension system according to the embodiment of the present invention (front suspension 57) includes the vehicle body frame 4 that constitutes the vehicle body; the suspension arm (lower arm 62) that has the first end disposed oscillatably on the vehicle body frame 4 and the second end supporting the front wheel 2; and the cushion unit 58 that has the first end connected to the side of the vehicle body frame 4 and the second end connected to the side of the suspension arm. In this vehicle suspension system, the suspension arm includes the first arm member 65, the second arm member 66, and the third arm member 67. Each of the first, second, and third arm members 65, 66, 67 is oscillatably connected to each other via the joints 68, 70 and operatively associated with each other according to the vertical movement of the front wheel 2 to thereby cause the cushion unit 58 to make a stroke motion.

According to the foregoing arrangements, a linkage mechanism can be formed from the lower arm 62 that includes the first, second, and third arm members 65, 66, 67 without having a linkage mechanism separately, so that the number of parts used and weight of the suspension system can be minimized to thereby enhance the degree of freedom in layout and the degree of freedom in setting the stroke ratio of the suspension system.

Additionally, in the vehicle suspension system, the lower arm 62 includes: the first arm member 65 that has the first end oscillatably disposed on the vehicle body frame 4; the second arm member 66 that has the first end oscillatably connected to the second end of the first arm member 65 and the second end

supporting the front wheel 2; and the third arm member 67 that has the first end oscillatably disposed on the vehicle body frame 4 and the second end disposed on the second arm member 66. The first arm member 65 and the second arm member 66 are disposed so as to form substantially a V-shape as viewed along the oscillation shaft thereof. The second end of the cushion unit 58 is connected, together with the second end of the third arm member 67, to the second arm member 66.

According to the foregoing arrangements, the distal end side of the cushion unit 58 can be connected near the bottom portion of the lower arm 62 that is substantially formed into a V-shape in the view as viewed in the direction of the oscillation shaft. The cushion unit 58 can be disposed at a lower level for a lower center of gravity and the stroke amount of the cushion unit 58 can be increased.

Additionally, in the vehicle suspension system, the lower arm 62 includes, in the front suspension 57 having the knuckle 63 supported on the distal ends of the upper arm 61 and the lower arm 62, the first, second, and third arm members 65, 66, 67.

According to the foregoing arrangements, the cushion unit 58 can be disposed at an even lower level for an even lower center of gravity and the stroke amount of the cushion unit 58 can be further increased. This is particularly effective in applying the present invention to a suspension system for a rough terrain vehicle.

It should be noted that the present invention is not limited to the above-described embodiment. For example, the present invention may be applied to a rigid axle (swing arm type) rear suspension 75 in which the oscillation shaft of the suspension arm and the axle extend in parallel with each other. Alternatively, the upper arm 61 of the front suspension 57 may be configured to include a plurality of arm members.

While the present invention has been particularly shown and described with reference to a preferred embodiment, it will be understood by those skilled in the

art that the present invention may be applied to a vehicle having an independent rear suspension and various changes in form and detail may be made therein without departing from the spirit and scope of the invention.

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

1. A vehicle suspension system comprising: a vehicle body frame constituting a vehicle body; a suspension arm having a first end disposed oscillatably on the vehicle body frame and a second end supporting a wheel; and a shock absorber having a first end connected to a side of the vehicle body frame and a second end connected to a side of the suspension arm, wherein the suspension arm includes a first arm member having a first end oscillatably disposed on the vehicle body frame, a second arm member having a first end oscillatably connected to a second end of the first arm member and a second end supporting a wheel, and a third arm member having a first end oscillatably disposed on the vehicle body frame and a second end disposed on the second arm member, and each of the first, second, and third arm members is oscillatably connected to each other via a joint and operatively associated with each other according to a vertical movement of the wheel to thereby cause the shock absorber to make a stroke motion.

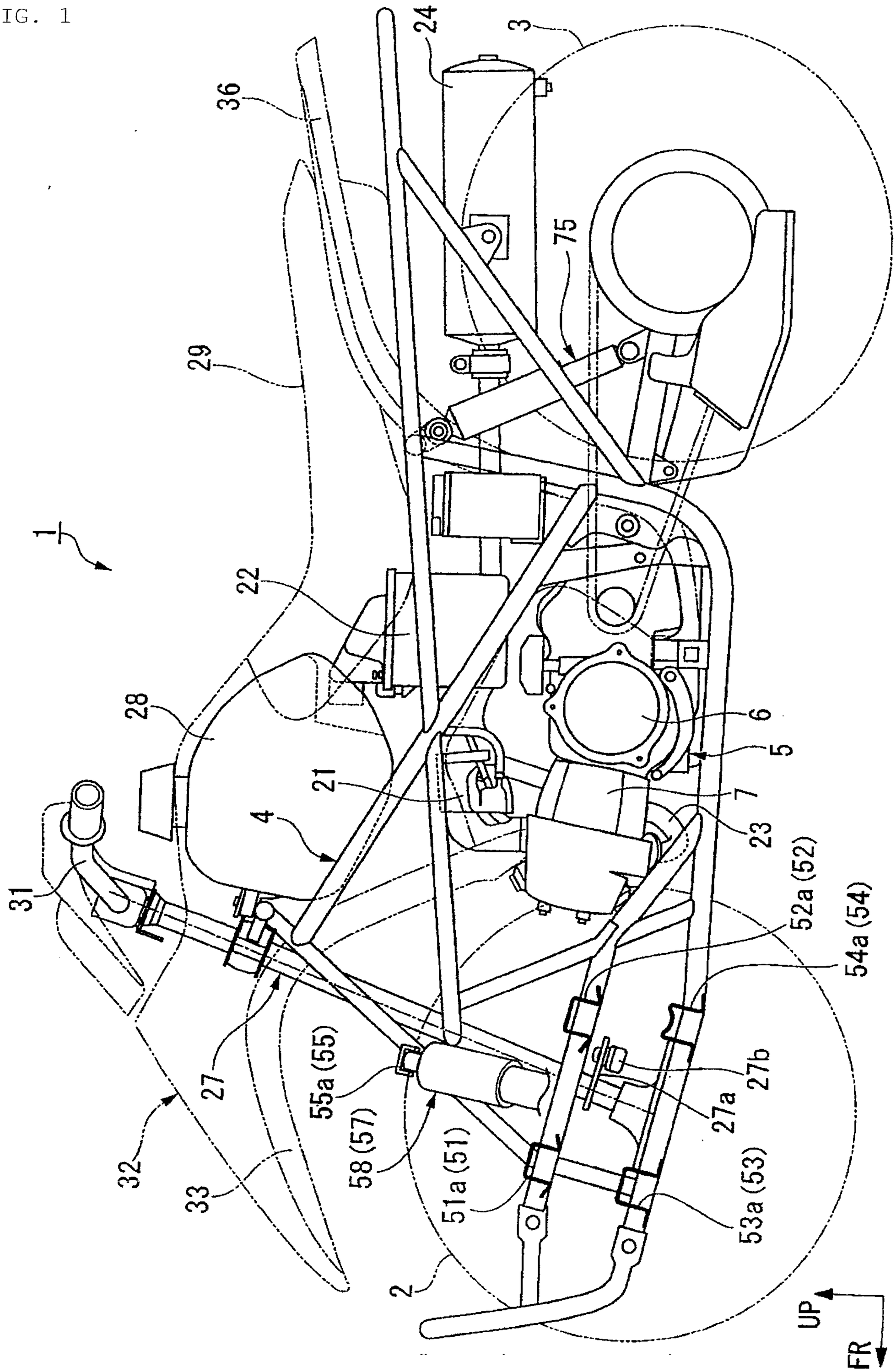
2. The vehicle suspension system according to claim 1, wherein: the first arm member and the second arm member are disposed so as to form substantially a V-shape as viewed along an oscillation shaft thereof.

3. The vehicle suspension system according to claim 1 or 2, wherein: the second end of the shock absorber is connected, together with the second end of the third arm member, to the second arm member.

4. The vehicle suspension system according to any one of claims 1 to 3, wherein: the suspension arm is, in an independent suspension type suspension having a knuckle supported on distal ends of an upper arm and a lower arm, the lower arm.

5. The vehicle suspension system according to claim 4, wherein: the suspension system is a double wishbone type suspension for a front wheel in a rear-two-wheel-drive rough terrain vehicle.

FIG. 1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27b
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FIG. 2

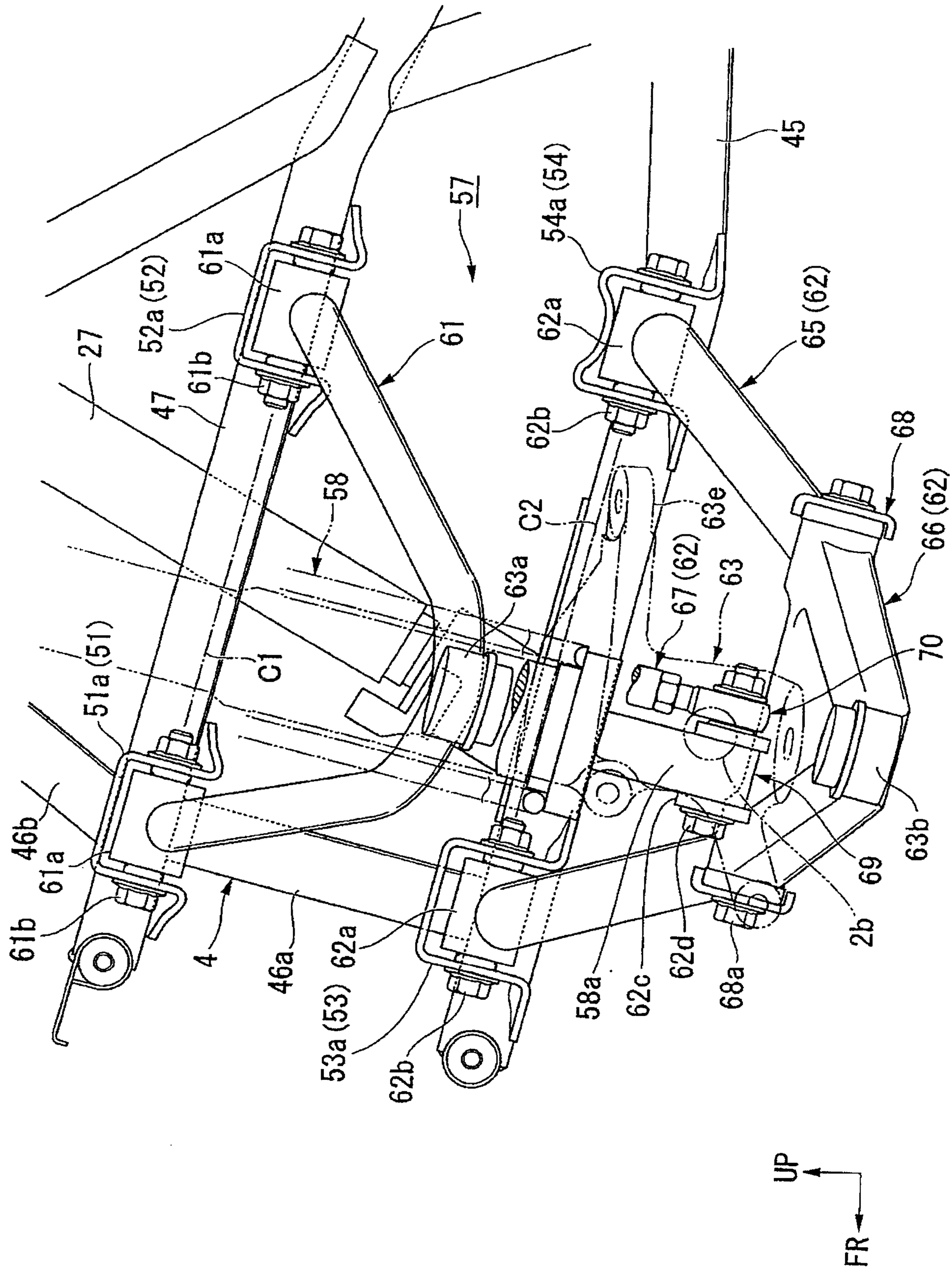
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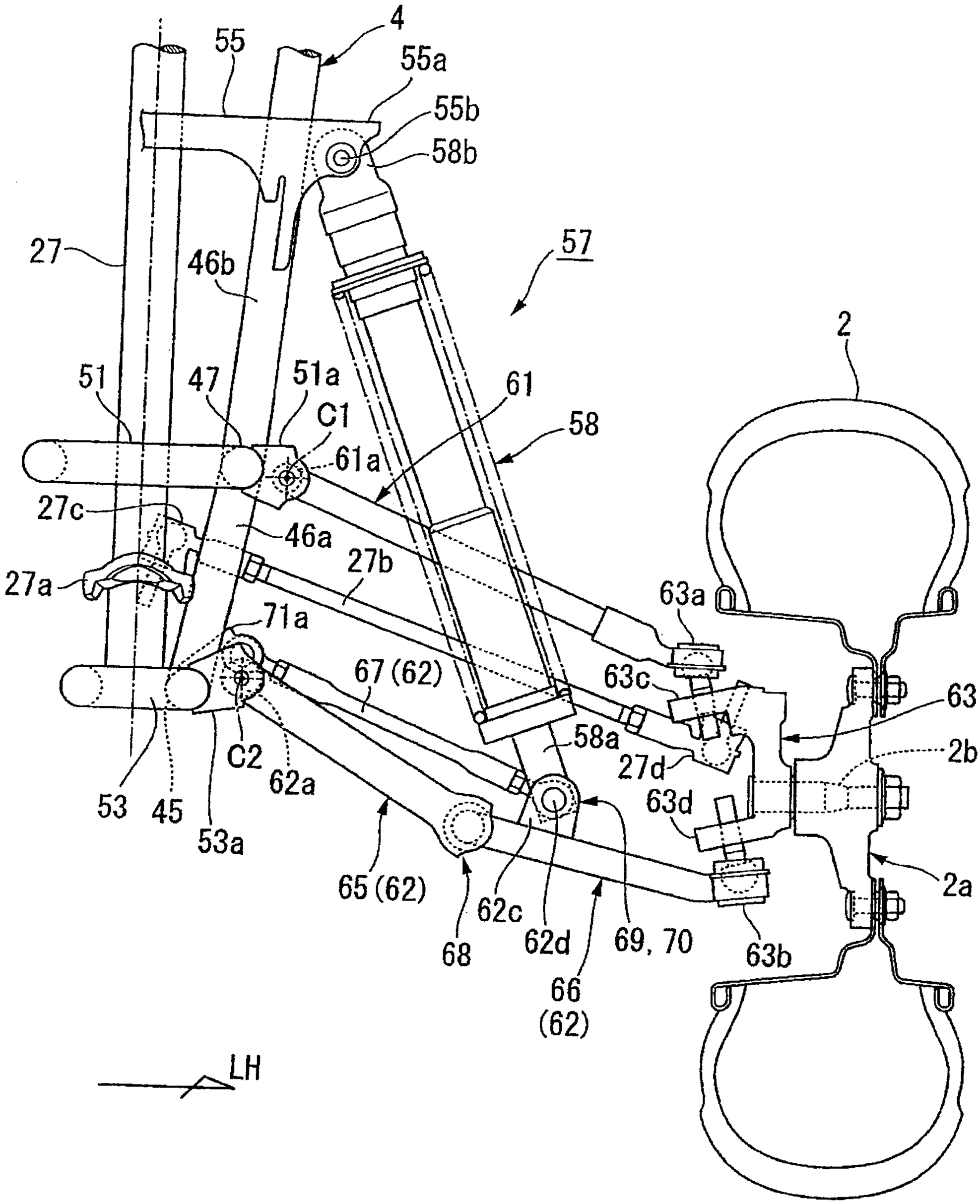
FIG. 3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71a
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63d
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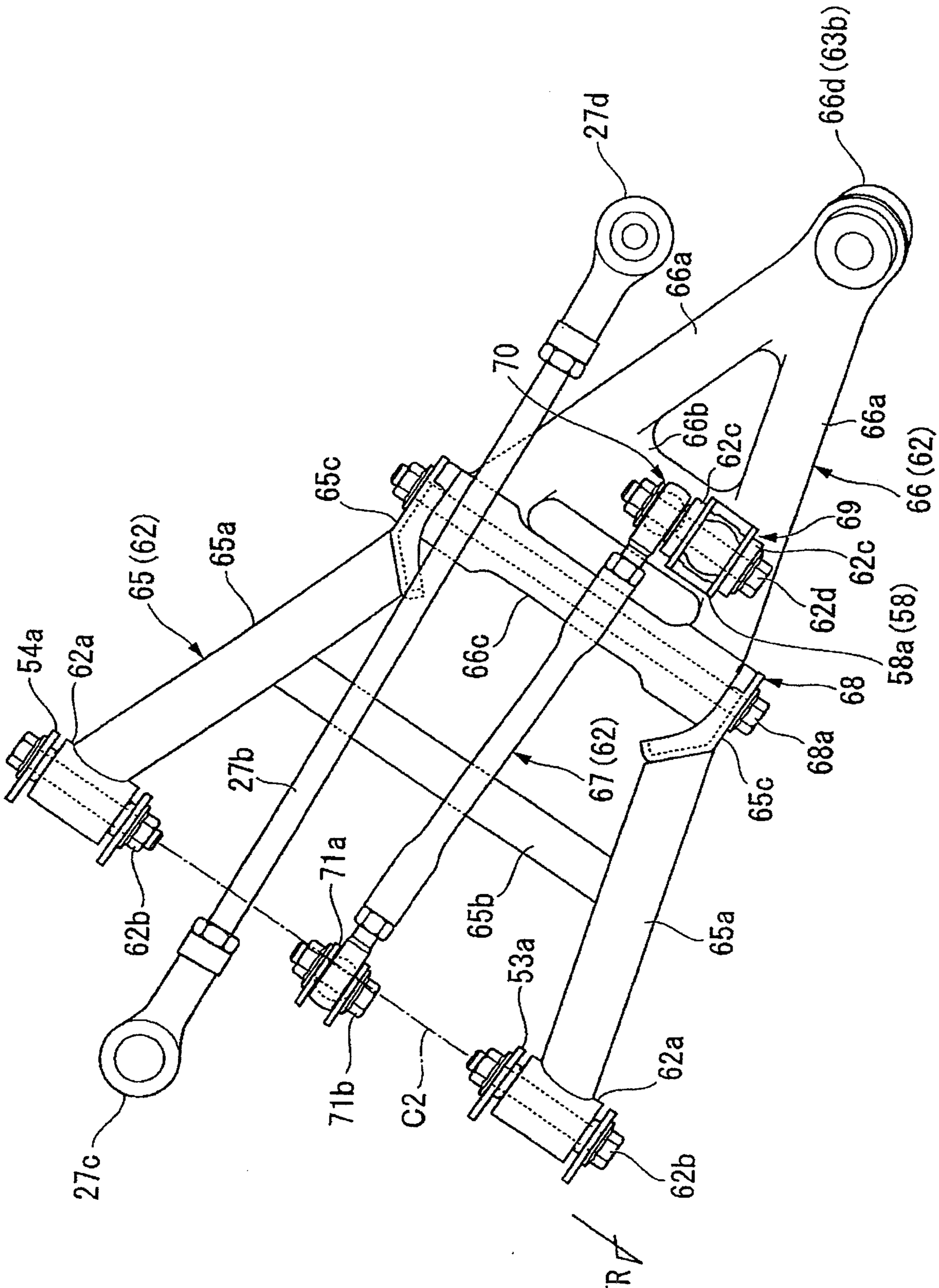
(62)
LH

FIG. 4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66c
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62a
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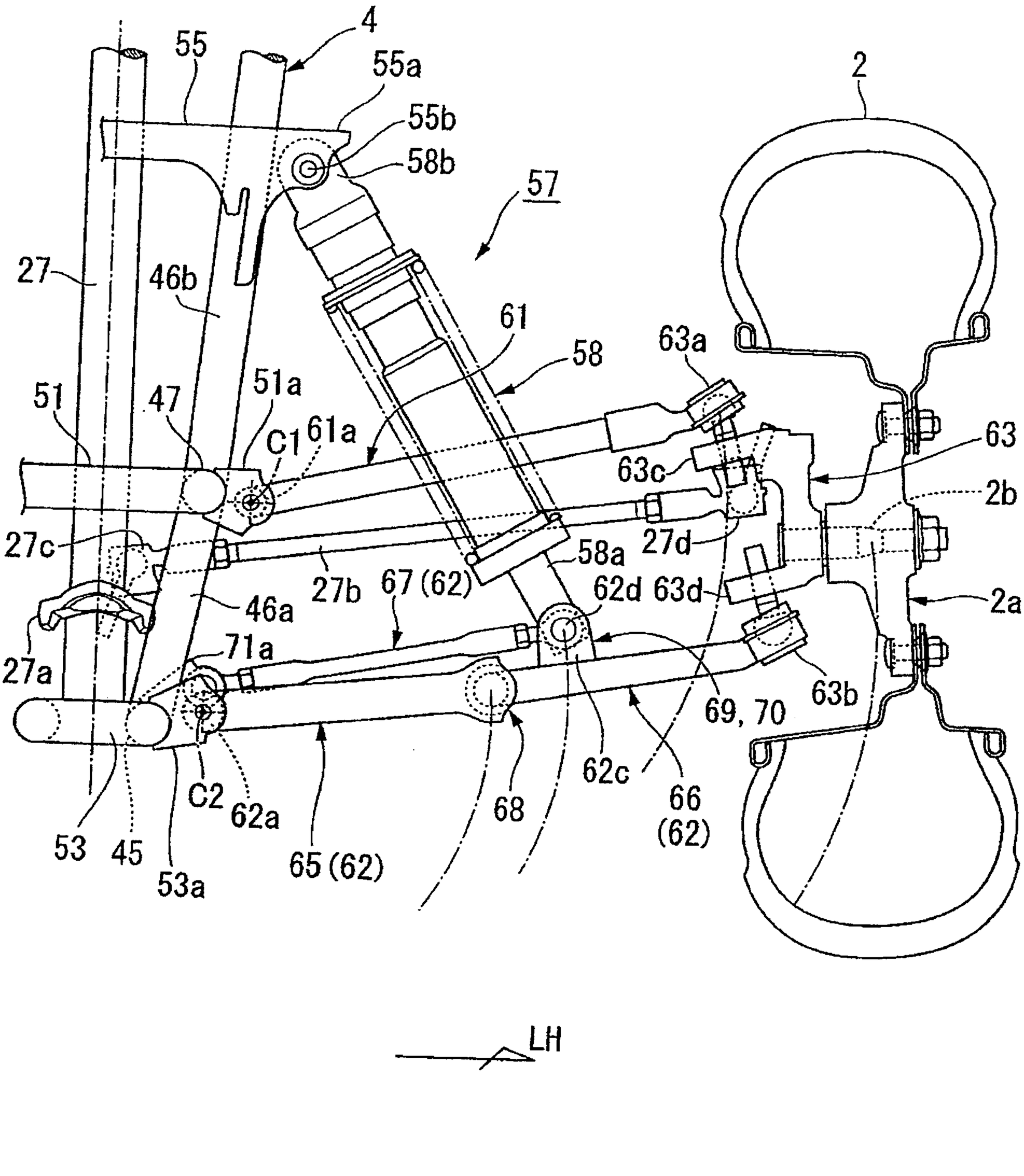
FIG. 5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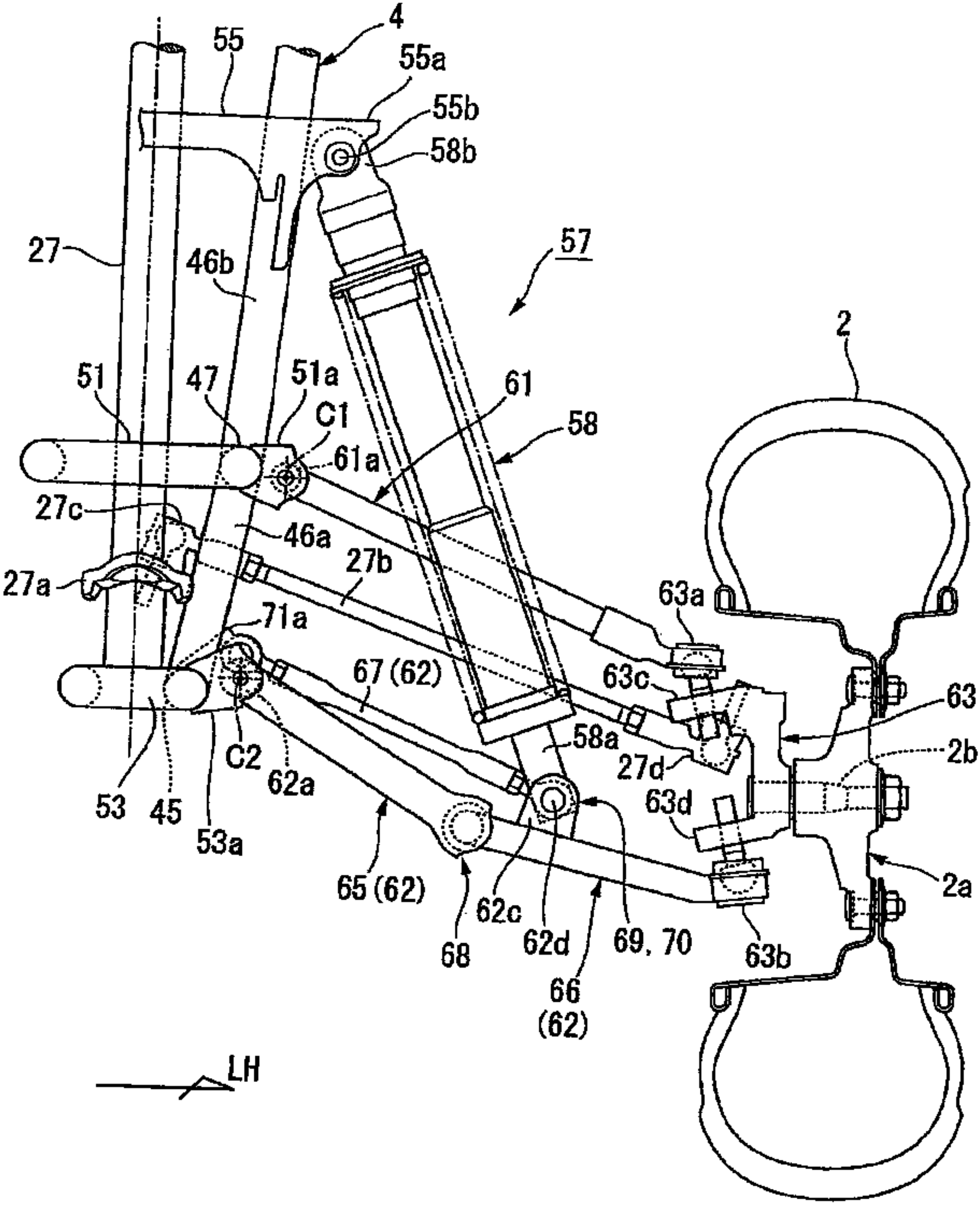
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