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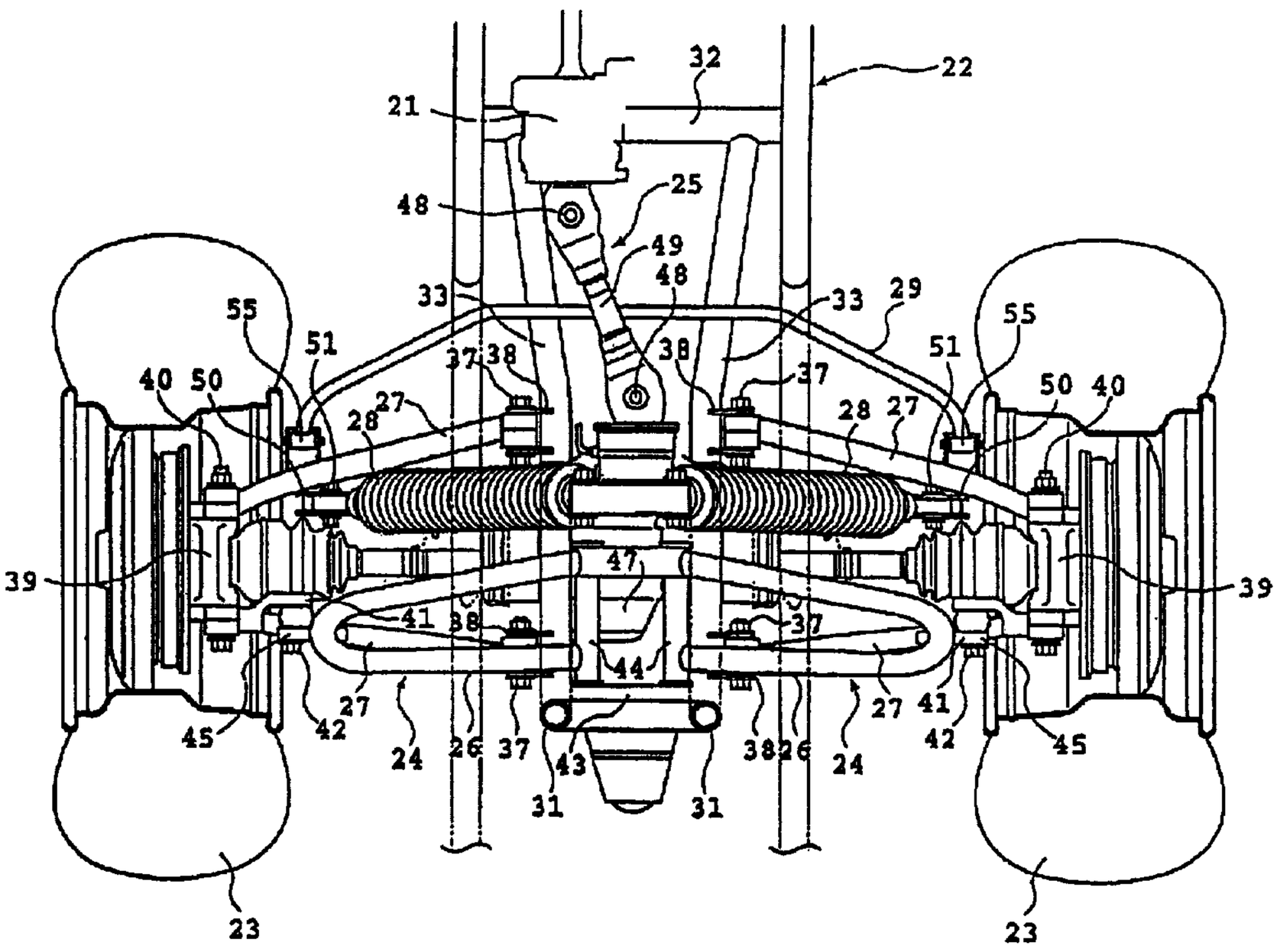
(54) Title: SADDLE TYPE VEHICLE



(57) Abrégé/Abstract:
The present invention aims at providing a saddle type vehicle capable of attaining an appropriate weight distribution and a low centroid position. Suspension mechanisms 24 are each composed of an upper arm 26 and lower arms 27, the upper and lower arms being disposed in vertically spaced positions, a shock absorber 28 interposed between the upper arm 26 and a body frame 22, and a stabilizer 29 disposed both suspension mechanisms 24. A lower end of the shock absorber 28 is connected pivotably to the front-side lower arm 27, while an upper end of the shock absorber 28 is connected pivotably to an inside position in the vehicular transverse direction of the body frame 22.

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ABSTRACT OF THE DISCLOSURE

The present invention aims at providing a saddle type vehicle capable of attaining an appropriate weight distribution and a low centroid position. Suspension mechanisms 24 are each composed of an upper arm 26 and lower arms 27, the upper and lower arms being disposed in vertically spaced positions, a shock absorber 28 interposed between the upper arm 26 and a body frame 22, and a stabilizer 29 disposed both suspension mechanisms 24. A lower end of the shock absorber 28 is connected pivotably to the front-side lower arm 27, while an upper end of the shock absorber 28 is connected pivotably to an inside position in the vehicular transverse direction of the body frame 22.

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TITLE: SADDLE TYPE VEHICLE

FIELD OF THE INVENTION

The present invention relates to a saddle type vehicle and particularly to a saddle type vehicle having four wheels constituted respectively by wide and low pressure tires, the four wheels being driven to let the vehicle run.

BACKGROUND OF THE INVENTION

Heretofore, as a saddle type vehicle there is known, for example, a vehicle having such a structure as shown in Fig. 4. In the figure, a saddle type vehicle indicated at 1 is roughly composed of a body frame 3 with an engine 2 mounted centrally thereon, four wheels 4 disposed on both sides of front and rear portions of the body frame 3, a steering bar handle 5 for steering the wheels 4, the bar handle 5 being connected to a front upper portion of the body frame 3, a fuel tank 6 mounted to the body frame 3 above the engine 2, and a seat 7 mounted behind the fuel tank 6.

For example, as shown in Fig. 5, each rear wheel 4 is supported by the body frame 3 vertically swingably through a suspension mechanism 8 which is secured to the body frame 3. As shown in Figs. 5 and 6, the suspension mechanism 8 is provided with an upper arm 10 secured swingably to brackets 9 which are projectingly provided on an outer side face of the rear portion of the body frame 3, a connecting rod 11 connected swingably to a lower portion of the body frame 3 and extending obliquely backward and outward, a knuckle 12 connected to swing ends of both upper arm 10 and connecting rod 11, with the wheel 4 being secured to the knuckle 12 rotatably, and a shock absorber 13 interposed between the body frame 3 and the upper arm 10.

The shock absorber 13, when seen in plan, is disposed along an axle of the wheel 4 and is connected to

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the body frame 3 swingably through a bracket 14 which is attached to an outer side portion of the body frame 3. In order that a difference in vertical movement between both right and left wheels may not become excessive, a stabilizer for suppressing their behavior is provided between both suspension mechanisms 8, though not shown. The stabilizer provides a connection between the upper arms 10 and is supported by the body frame 3.

SUMMARY OF THE INVENTION

For achieving the above-mentioned object, according to an aspect of the present invention there is provided a saddle type vehicle including a body frame with an engine mounted centrally thereon, a pair of suspension mechanisms mounted vertically swingably at both rear side portions of the body frame, with wheels being secured to the suspension mechanisms, and a power transfer mechanism for transmitting an output of the engine to the wheels, characterized in that the suspension mechanisms each comprise an upper arm and a lower arm which are formed in vertically spaced positions, a shock absorber interposed between the lower arm and the body frame, and a stabilizer positioned between both suspension mechanisms, a lower end of the shock absorber being connected pivotably to a vehicular front side of the lower arm, and an upper end portion of the shock absorber being connected pivotably to an inside position in the vehicular transverse direction of the body frame.

According to another aspect of the present invention there is provided, in combination with the above, a saddle type vehicle wherein a vehicular front-side portion of the upper arm is positioned on a vehicular rear side with respect to a vehicular front-side portion of the lower arm, and the shock absorber is disposed on the front side of the upper arm.

According to yet another aspect of the present invention there is provided, in combination with the above, a saddle type vehicle wherein the stabilizer is disposed

below the power transfer mechanism and is connected to the vehicular front-side portions of the right and left lower arms.

According to yet another aspect of the present invention there is provided, in combination with any of the above, a saddle type vehicle wherein the power transfer mechanism is provided with a final reduction gear for transmitting the output of the engine to the right and left wheels, the final reduction gear being mounted centrally in the transverse direction of the body frame.

According to yet another aspect of the present invention there is provided, in combination with the above, a saddle type vehicle wherein the power transfer mechanism is provided with a drive shaft which connects the engine and the final reduction gear with each other and which is connected to the engine and the final reduction gear through a universal joint.

According to yet another aspect of the present invention there is provided, in combination with any of the above, a saddle type vehicle wherein a connection of the upper arm to the body frame is provided inside in the transverse direction of the body frame.

BRIEF DESCRIPTION OF THE DRAWINGS

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

Figure 1 is a side view of principal portions of a saddle type vehicle according to an embodiment of the present invention;

Figure 2 is a plan view thereof;

Figure 3 illustrates the principal portions as seen from behind the vehicle;

Figure 4 is a side view showing a conventional saddle type vehicle;

Figure 5 is a side view showing a positional relation of components of the conventional vehicle; and

Figure 6 is a plan view thereof.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the present invention will be described hereinunder with reference to Figs. 1 to 3.

In the following description, other constructional points than principal portions are common to the prior art, so will be identified by the same reference numerals and explanations thereof will be omitted.

In those figures, the reference numeral 20 denotes a saddle type vehicle embodying the present invention. The saddle type vehicle 20 is provided with a body frame 22 with an engine 21 mounted centrally thereon, a pair of suspension mechanisms 24 mounted vertically swingably at both rear side portions of the body frame 22 with wheels 23 are secured, and a power transfer mechanism 25 for transmitting an output of the engine 21 to the wheels. The suspension mechanisms 24 are each roughly composed of an upper arm 26 and a lower arm 27 which are formed in vertically spaced positions, a shock absorber 28 interposed between the lower arm 27 and the body frame 22, and a stabilizer 29 disposed between both suspension mechanisms 24. A lower end portion of the shock absorber 28 is connected pivotably to a vehicular front side of the lower arm 27, while an upper end portion of the shock absorber 28 is connected pivotably to an inside position in the vehicular transverse direction of the body frame 22.

A description will now be given in more detail. The body frame 22 is made up of a pair of parallel under pipes 30 on which is mounted the engine 21, a pair of parallel seat pipes 31 disposed above the under pipes 30, and a plurality of cross pipes for connecting those pipes which are positioned right and left.

As shown in Fig. 1, rear end portions of the under pipes 30 are bent upward toward the seat pipes 31 and are connected to the seat pipes 31 respectively.

To a cross pipe 32 connected to rear bent portions of the under pipes 30 are connected a pair of parallel rear pipes 33 extending respectively along extension lines of the under pipes 30. Rear end portions

of the rear pipes 33 are bent upward and are connected respectively to the seat pipes 31 at positions close to rear end portions of the seat pipes 31.

Cross pipes 34 and 35 as connections between right and left under pipes 30 and between right and left rear pipes 33 are mounted respectively between nearly intermediate positions of the rear rising portions of the under pipes 30 and between nearly intermediate positions of the rear rising portions of the rear pipes 33.

A cross pipe 36 is mounted between the connections of the under pipes 30 with the seat pipes 31 to connect the right and left seat pipes 31 with each other.

As shown in Fig. 2, pivot shafts 37 each having an axis extending in the longitudinal direction of the vehicle body are secured to side portions of the rear pipes 33 respectively through brackets 38. On each of right and left sides of the vehicle body, two pivot shafts 37 and two brackets 38 are mounted in longitudinally spaced positions. A pair of lower arms 27 are disposed so as to be swingably connected at one end portions thereof to the pivot shafts 37 respectively.

A lower portion of a knuckle 39, which supports a wheel 23 rotatably, is connected to swing ends of the lower arms 27 pivotably through a pivot shaft 40.

As shown in Fig. 3, an upwardly extending connecting piece 41 is integral with a vehicular rear-side portion of the knuckle 39, and a swing end of the upper arm 26 is connected to an end portion of the connecting piece 41 pivotably through a pivot shaft 42.

On the other hand, a pair of parallel auxiliary pipes 31a are mounted between both cross pipes 34 and 35 and a cross pipe 31b is secured to nearly intermediate portions of the auxiliary pipes 31a.

As shown in Fig. 2, the upper arm 26 is formed in a generally U shape, and as shown in Fig. 1, both ends thereof are connected pivotably through pivot shafts 44 to brackets 43 which are mounted on the cross pipes 35 and 31b respectively.

As shown in Fig. 3, the pivot shafts 44 are positioned inside with respect to the seat pipes 31.

As shown in Fig. 2, a connecting plate 45 is integral with a swing end of the upper arm 26. The connecting plate 45 is connected pivotably to a pivot shaft 42 which is secured to the connecting piece 41 of the knuckle 39. In this way the upper arm 26 and the knuckle 39 are connected together pivotably.

A drive shaft 46 is mounted so as to transmit rotation to the wheel 23 secured to the knuckle 39 and one end of the drive shaft 46 is supported by the knuckle 39. The drive shaft 46, which is provided for each of the right and left wheels 23, is connected to a final reduction gear 47 which is constituted by a differential gear fixed to the rear pipes 33.

In this embodiment, as shown in Fig. 2, the final reduction gear 47 is positioned nearly centrally in the transverse direction of the vehicle body.

As shown in Fig. 2, the final reduction gear 47 is connected to the engine 21 through a pair of universal joints 48 and a propeller shaft 49. In this embodiment, the power transfer mechanism 25 is constituted by the universal joints 48, drive shafts 46, propeller shaft 49 and final reduction gear 47.

A vehicular front side of the upper arm 26 is positioned behind that of the lower arms 27, whereby an open space is ensured above the vehicular front side of the lower arms 27.

As shown in Figs. 2 and 3, a bracket 50 is attached to the front lower arm 27 at a longitudinally intermediate position, and the lower end of the shock absorber 28 is connected to the bracket 50 pivotably through a pivot shaft 51.

The upper end of the shock absorber 28 is connected a bracket 52 pivotably through a pivot shaft 53, the bracket 52 being mounted below the cross pipe 36 which is mounted between the seat pipes 31.

The upper end of the shock absorber 28 thus mounted is positioned inside the body frame 22 and in front of the upper arm 26.

As shown in Fig. 2, the stabilizer 29 extends across the body frame 22 and is projected to both sides of the body frame. As shown in Fig. 1, the stabilizer 29 is positioned below the propeller shaft 49 which connects the engine 21 and the final reduction gear 47 with each other.

As shown in Fig. 2, the stabilizer 29 is supported at an intermediate position thereof by a bracket 54 which is mounted bridgewise between the rear pipes 33 and both ends thereof are connected to the front sides of intermediate portions of the lower arms 27 pivotably through pivot shafts 55.

In the saddle type vehicle 20 of this embodiment thus constructed, the shock absorbers 28 are each positioned ahead of the upper arm 26, that is, ahead of the axle of the wheel 23.

Thus, since the shock absorber 28 is mounted at a position close to the engine 21 side, it is more approximated to the vehicular centroid position and the vehicular weight distribution is so much improved.

Besides, since the upper end of the shock absorber 28 is supported inside the seat pipes 31 and the lower end thereof is supported at a longitudinally intermediate position of the front-side lower arm 27, the space between the shock absorber 28 and the wheel 23 is expanded.

Consequently, the freedom of layout of a muffler 56 (see Fig. 3) extending backward of the vehicle body from the engine 21 is enhanced.

In this embodiment, moreover, since the final reduction gear 47 is mounted at an intermediate position in the transverse direction of the vehicle body, both drive shafts 46 which connect the final reduction gear with the wheels 23 become equal in length and also become equal in swing angle against vertical motions of the wheels 23.

Further, since the stabilizer 29 is positioned near the engine 21 and below the body frame 22 and, as noted previously, since the shock absorbers 28 are each secured to the associated lower arm 27 and is thus located at a low position, the centroid position of the vehicle can be made low.

The shapes and sizes of the components used in the above embodiment are only an example and may be changed in accordance with requests in design, etc.

Since the present invention is constructed as above, it is possible to approximate the shock absorbers to the vehicular centroid position and attain a more ideal vehicular weight distribution.

Moreover, since the space between each shock absorber and each wheel is expanded, it is possible to enhance the layout freedom of devices installed within the space.

Further, since the shock absorbers and the stabilizer are disposed at positions as low as possible of the vehicle body, it is possible to lower the vehicular centroid position.

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.

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

1. A saddle vehicle including a body frame with an engine mounted centrally thereon, a pair of right and left suspension mechanisms vertically swingably mounted at right and left rear side portions of said body frame, with right and left wheels being secured to said right and left suspension mechanisms, respectively, and a power transfer mechanism for transmitting an output of said engine to said wheels, comprising:

an upper arm and a lower arm formed in vertically spaced positions on each of said right and left suspension mechanisms, said upper arms being connected to said body frame under cross pipes of said frame;

right and left shock absorbers interposed between said lower arms and said body frame, lower end portions of said shock absorbers being pivotably connected to front sides of said lower arms, and upper end portions of said shock absorbers being pivotably connected upwardly and inwardly relative to said lower end portions to inside positions of said body frame; and

a stabilizer positioned between said right and left suspension mechanisms.

2. The saddle vehicle according to claim 1, wherein front sides of said upper arms are positioned rearwardly with respect to the front sides of said lower arms, said shock absorbers being disposed forwardly of the upper arms.

3. The saddle vehicle according to claim 2, wherein said stabilizer is disposed below said power transfer mechanism and is connected to the front sides of the lower arms.

4. The saddle vehicle according to claim 2, wherein said power transfer mechanism is provided with a final reduction gear for transmitting the output of the engine to

the right and left wheels, said final reduction gear being mounted centrally in said body frame.

5. The saddle vehicle according to claim 4, wherein said final reduction gear connects to said engine via a pair of universal joints and a propeller shaft.

6. The saddle vehicle according to claim 1, wherein said stabilizer is disposed below said power transfer mechanism and is connected to the front sides of the lower arms.

7. The saddle vehicle according to claim 6, wherein said power transfer mechanism is provided with a final reduction gear for transmitting the output of the engine to the right and left wheels, said final reduction gear being mounted centrally in said body frame.

8. The saddle vehicle according to claim 7, wherein said final reduction gear connects to said engine via a pair of universal joints and a propeller shaft.

9. The saddle vehicle according to claim 1, wherein said power transfer mechanism is provided with a final reduction gear for transmitting the output of the engine to the right and left wheels, said final reduction gear being mounted centrally in said body frame.

10. The saddle vehicle according to claim 9, wherein said final reduction gear connects to said engine via a pair of universal joints and a propeller shaft.

11. A suspension mechanism for a saddle vehicle comprising:

a first suspension mechanism including a first upper arm and a first lower arm, said first upper arm and said first lower arm being formed in vertically spaced positions;

a first shock absorber interposed between said first lower arm and a body frame;

a second suspension mechanism including a second upper arm and a second lower arm, said second upper arm and said second lower arm being formed in vertically spaced positions;

a second shock absorber interposed between said second lower arm and said body frame, lower end portions of said first and second shock absorbers being pivotably connected to front sides of said lower arms, and upper end portions of said first and second shock absorbers being pivotably connected to inside positions of said body frame;

a stabilizer positioned between both said first and second suspension mechanisms; and

a power transfer mechanism provided with a final reduction gear for transmitting an output of the engine to a pair of right and left wheels, said final reduction gear being mounted centrally in said body frame..

12. The suspension mechanism for a saddle vehicle according to claim 11, wherein front sides of said first and second upper arms are positioned rearwardly with respect to the front sides of said lower arms, and said first and second shock absorbers are disposed on the front sides of the first and second upper arms.

13. The suspension mechanism for a saddle vehicle according to claim 12, wherein said stabilizer is disposed below said power transfer mechanism and is connected to the front sides of the first and second lower arms.

14. The suspension mechanism for a saddle vehicle according to claim 11, wherein said stabilizer is disposed below said power transfer mechanism and is connected to the front sides of the first and second lower arms.

15. The saddle vehicle according to claim 11, wherein said power transfer mechanism is provided with a drive

shaft which connects said engine to said final reduction gear via a universal joint.

16. A saddle vehicle including a body frame with an engine mounted centrally thereon, a pair of right and left suspension mechanisms vertically swingably mounted at said right and left suspension mechanisms each right and left rear side portions of said body frame, with right and left wheels being secured to said right and left suspension mechanisms, and a power transfer mechanism for transmitting an output of said engine to said wheels, comprising:

an upper arm and a lower arm formed in vertically spaced positions on each of said right and left suspension mechanisms, each of said upper arms being connected to said body frame under cross pipes of said frame, and each of said lower arms including a pair of lower arms extending between a pivot shaft on the body frame and another pivot shaft attached to a knuckle, the pivot shafts having longitudinal directions which are parallel to a length of the body frame;

right and left shock absorbers interposed between said lower arms and said body frame, lower end portions of said shock absorbers being pivotably connected to front sides of said lower arms, and upper end portions of said shock absorbers extending inwardly and being pivotably connected to said body frame at positions under said cross pipe; and

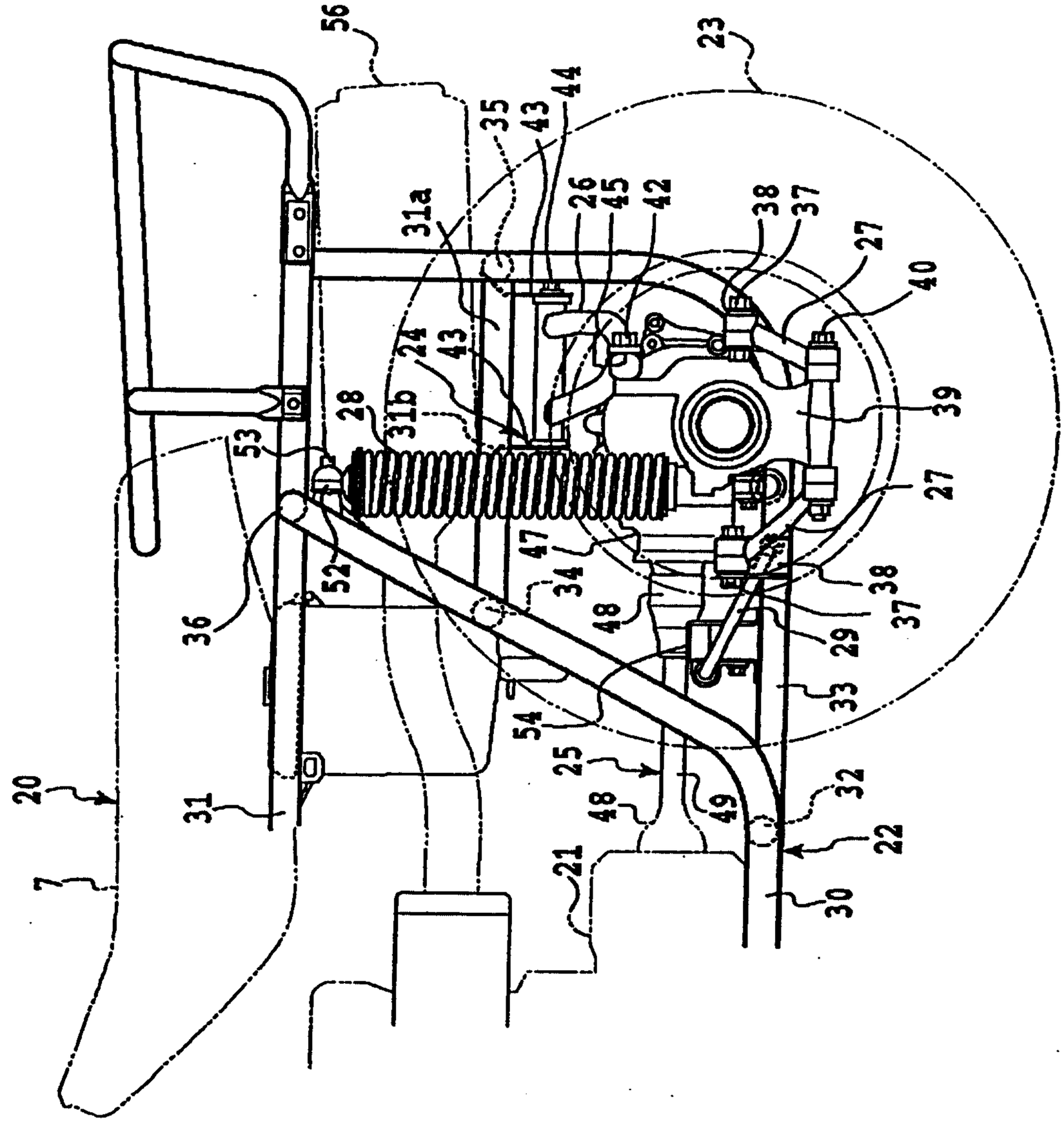
a stabilizer positioned between said right and left suspension mechanisms.

17. The saddle vehicle according to claim 16, wherein said stabilizer is disposed below said power transfer mechanism and is connected to the front sides of the lower arms.

18. The saddle vehicle according to claim 17, wherein said power transfer mechanism is provided with a final reduction gear for transmitting the output of the engine to

the right and left wheels, said final reduction gear being mounted centrally in said body frame.

[FIG. 1]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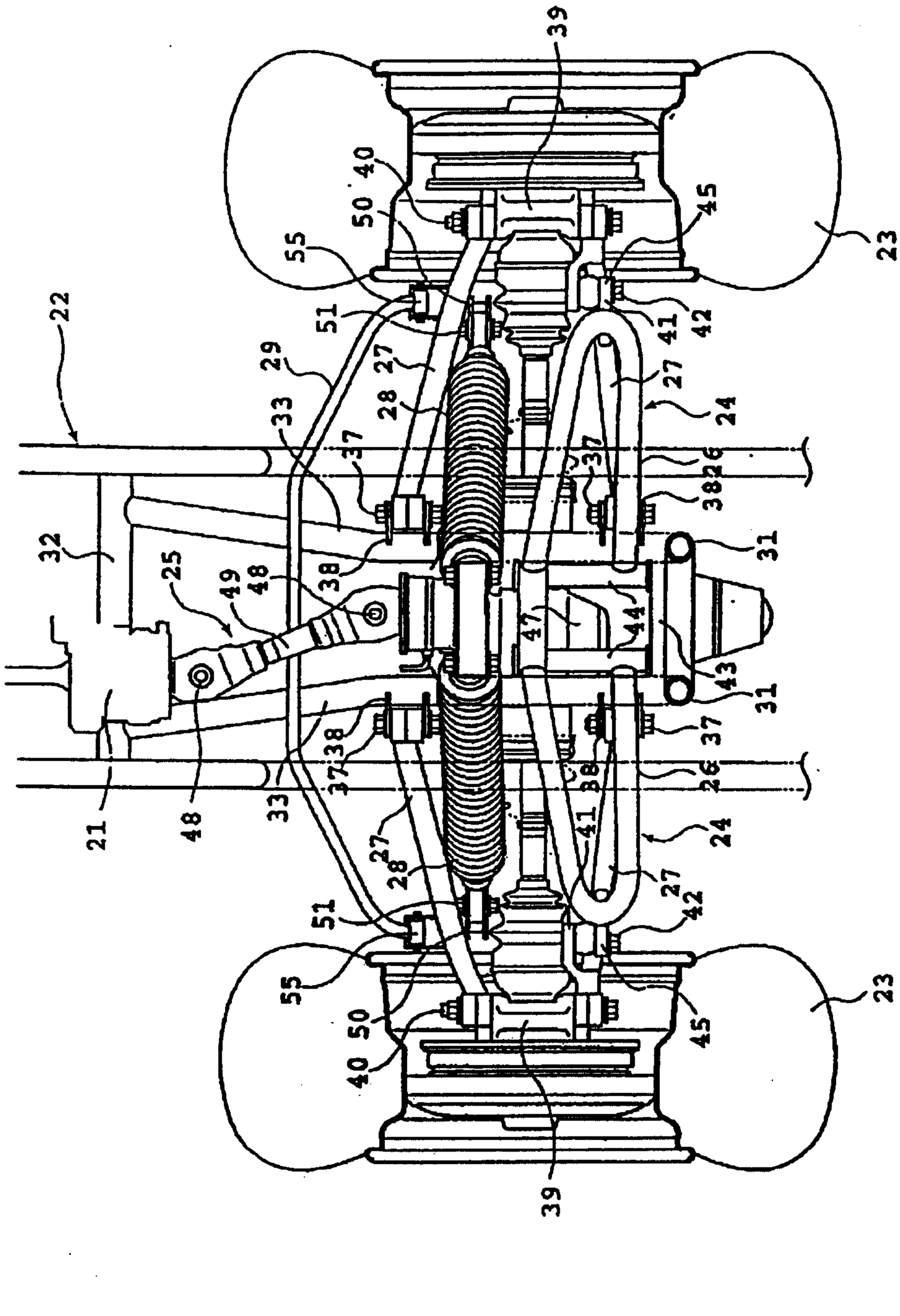
[FIG. 2]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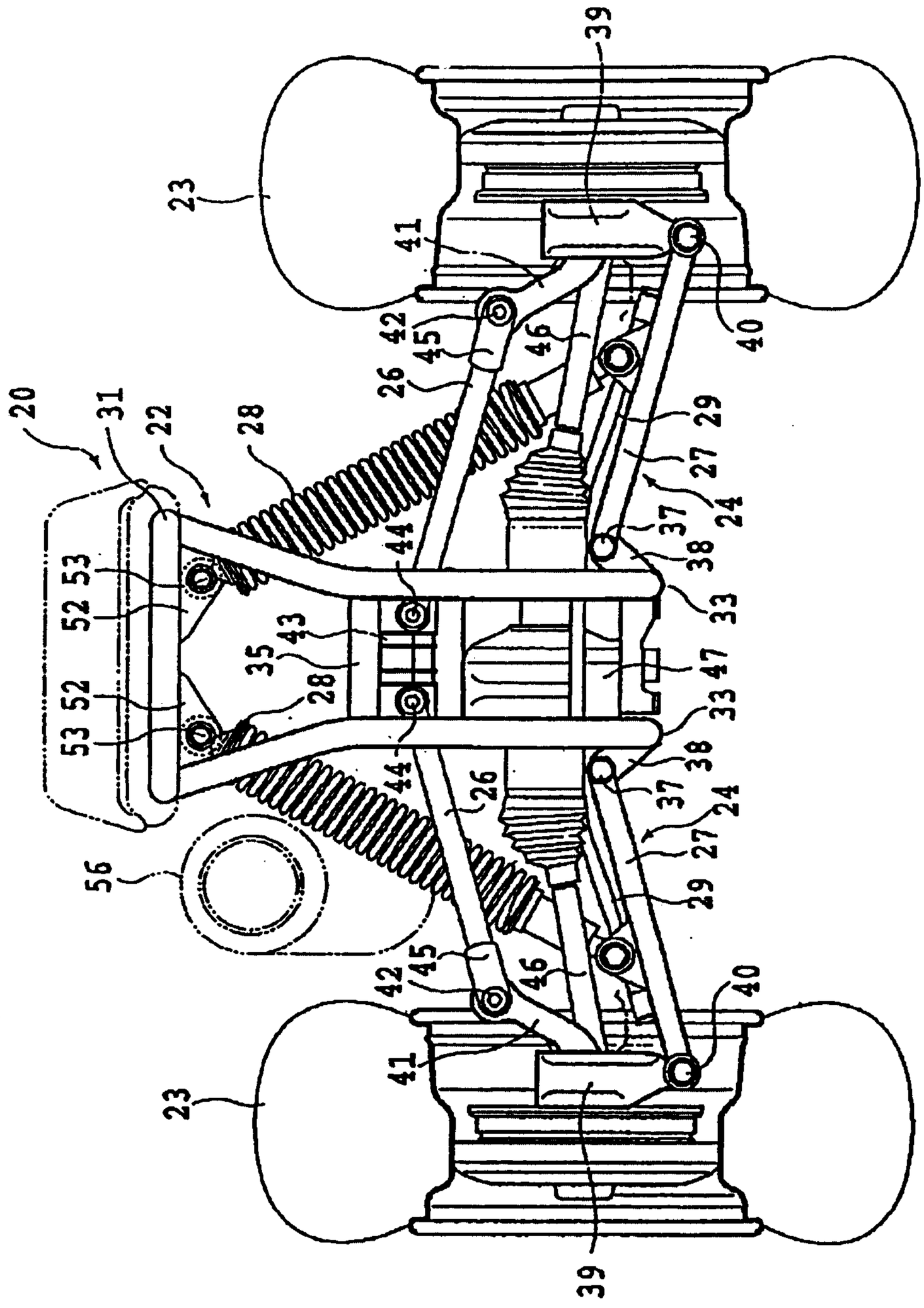
[FIG. 3]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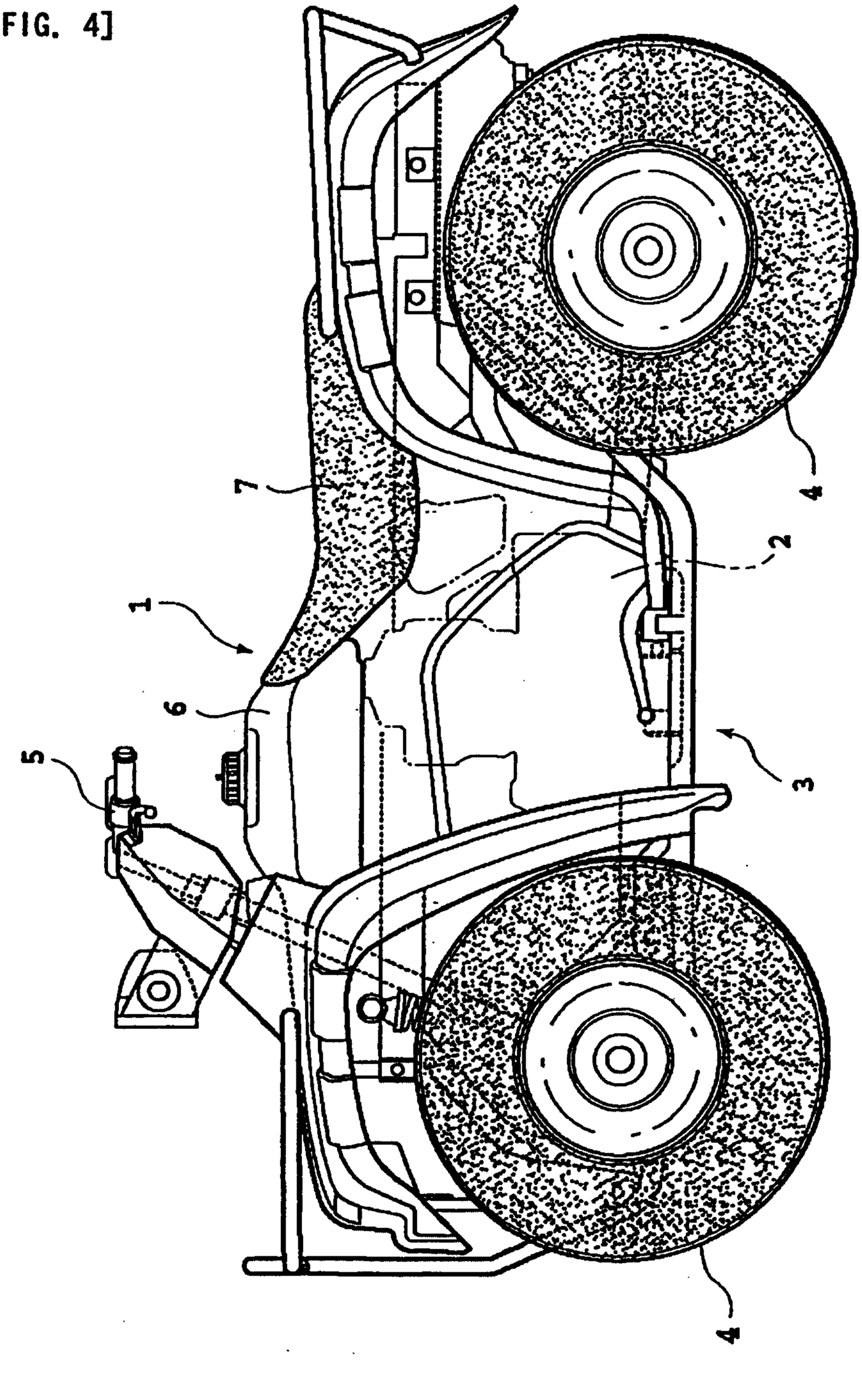
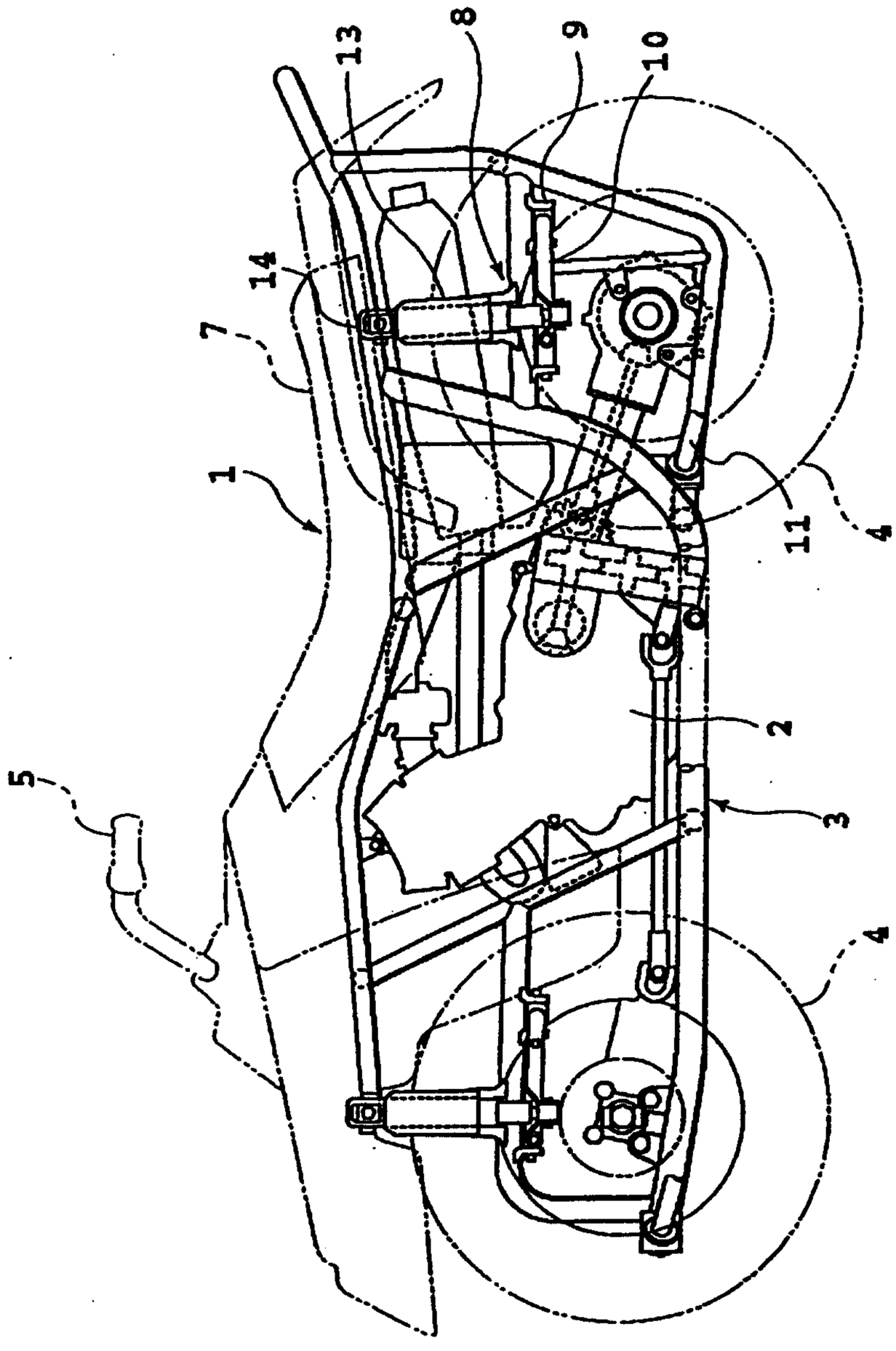
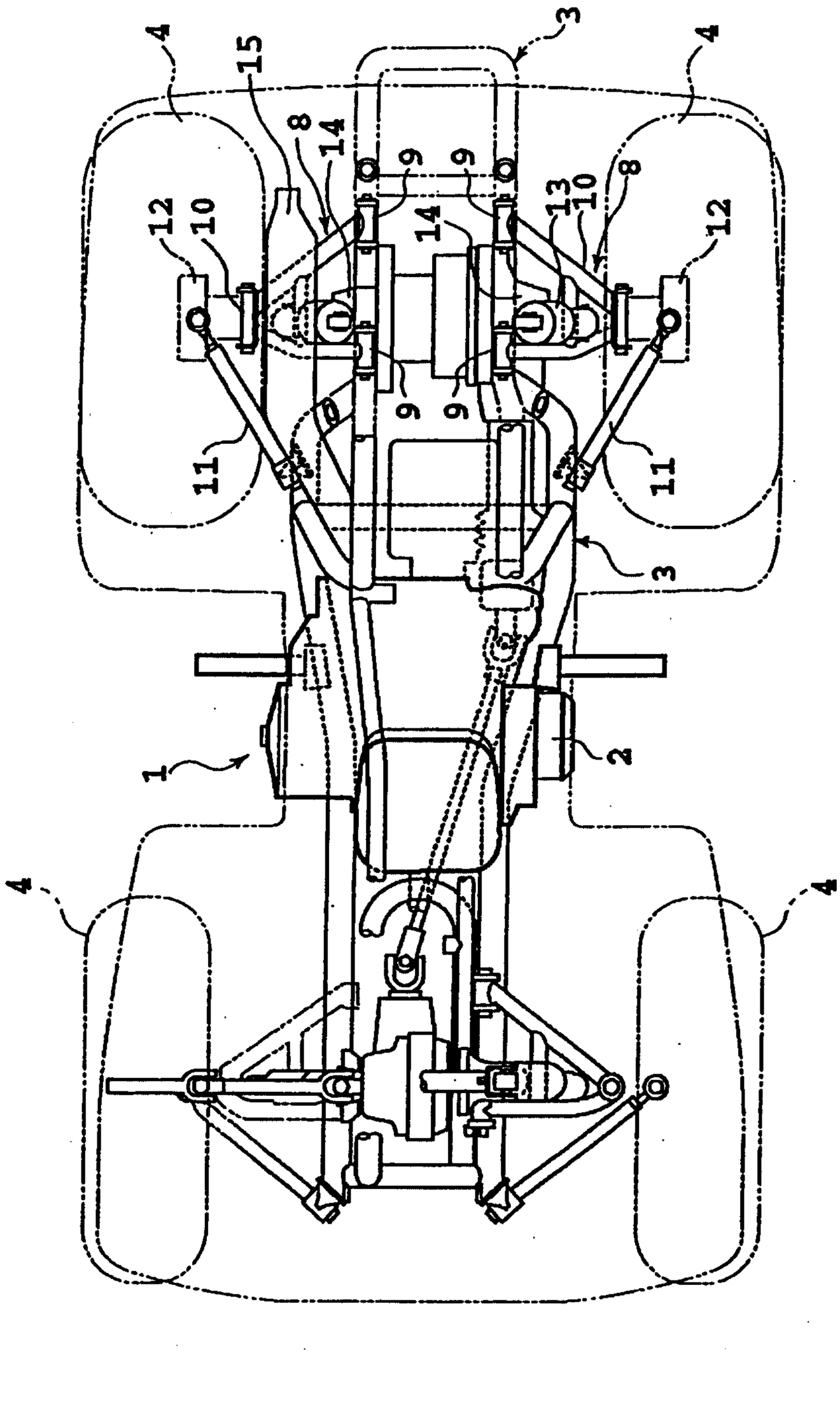
[FIG. 4]

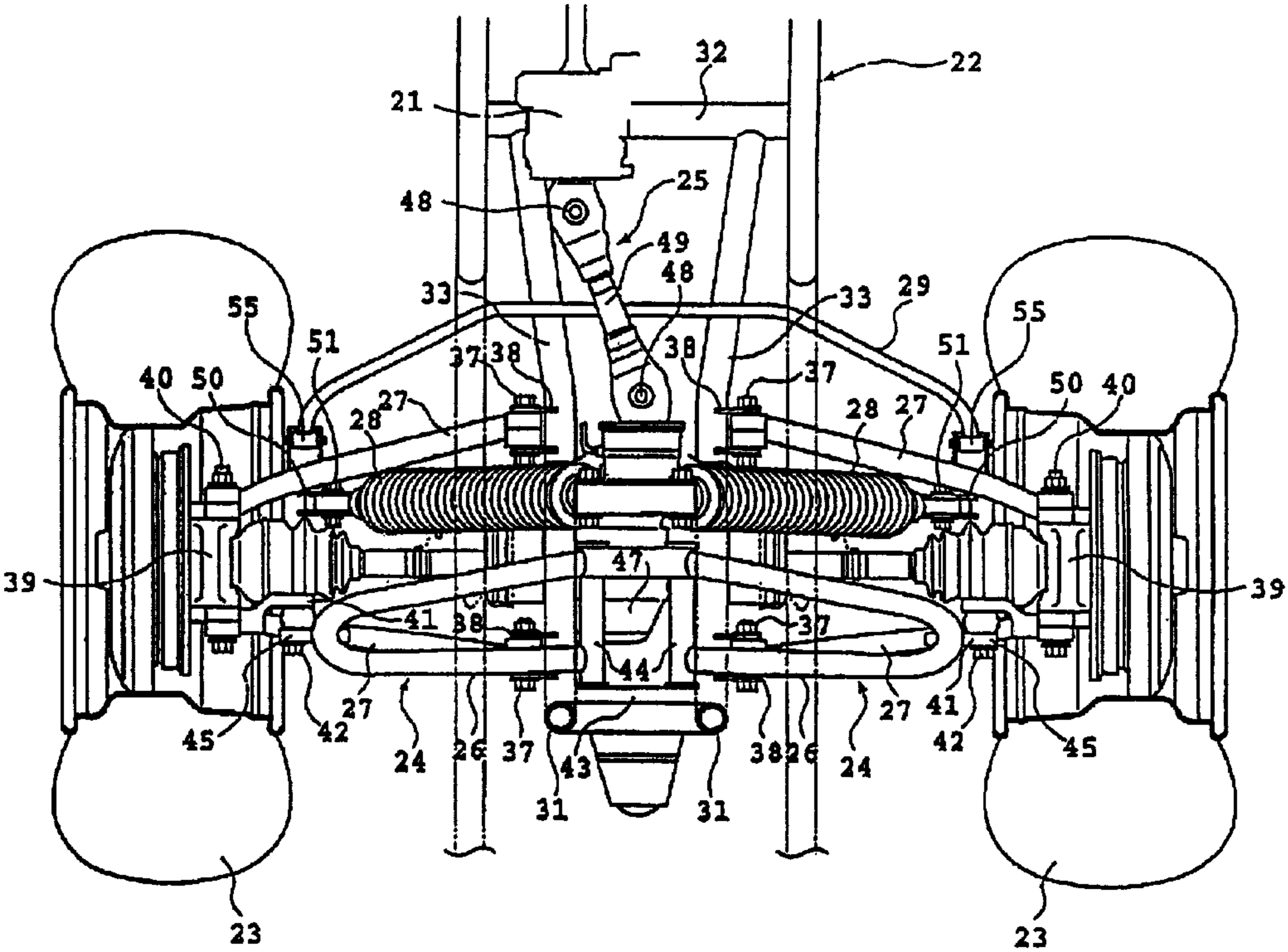


[FIG. 5]



[FIG. 6]

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