

No. 684,733.

Patented Oct. 15, 1901.

G. E. WARREN.
MOTOR VEHICLE.

(Application filed Sept. 29, 1900.)

(No Model.)

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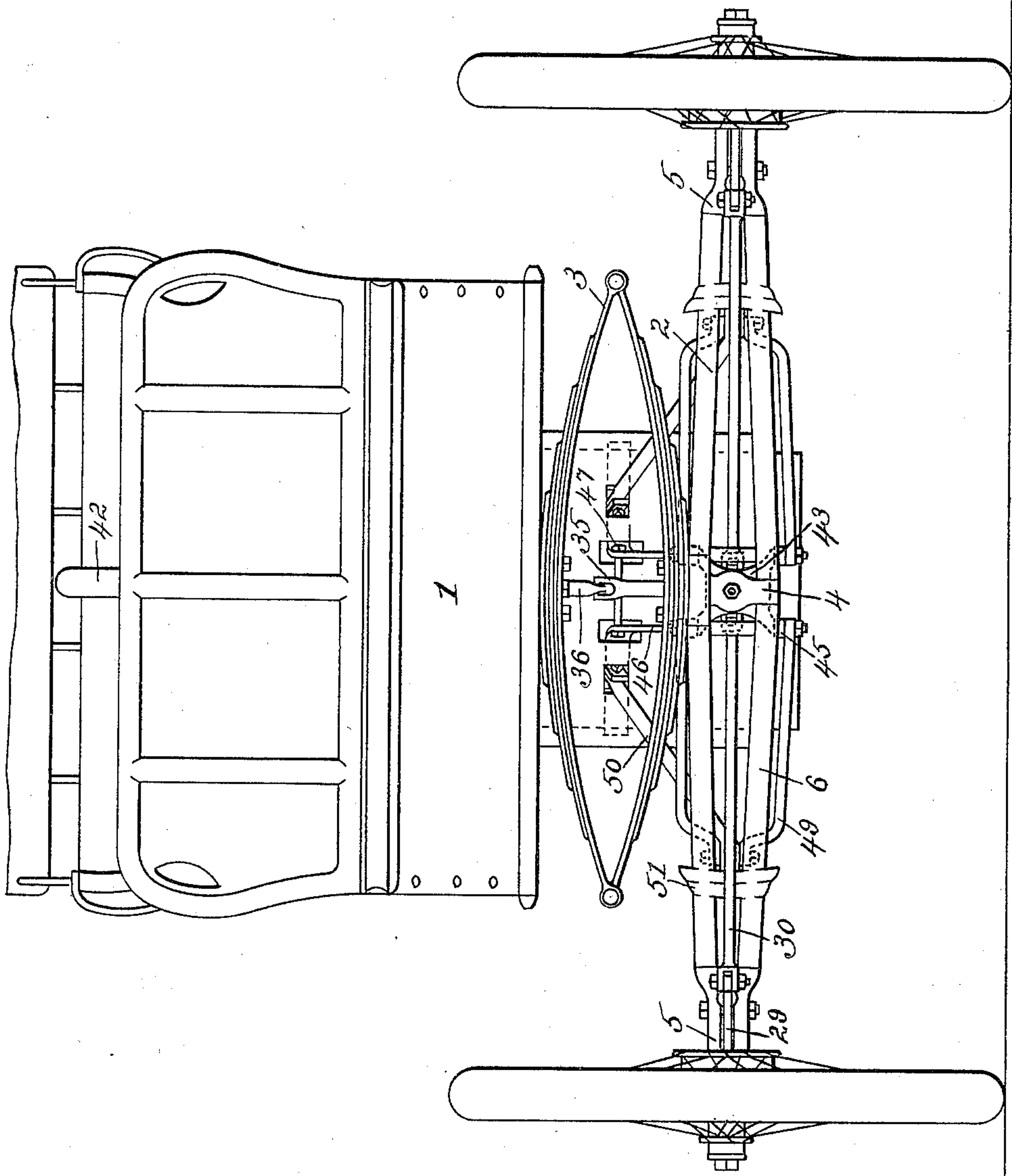


FIG. 1.

WITNESSES

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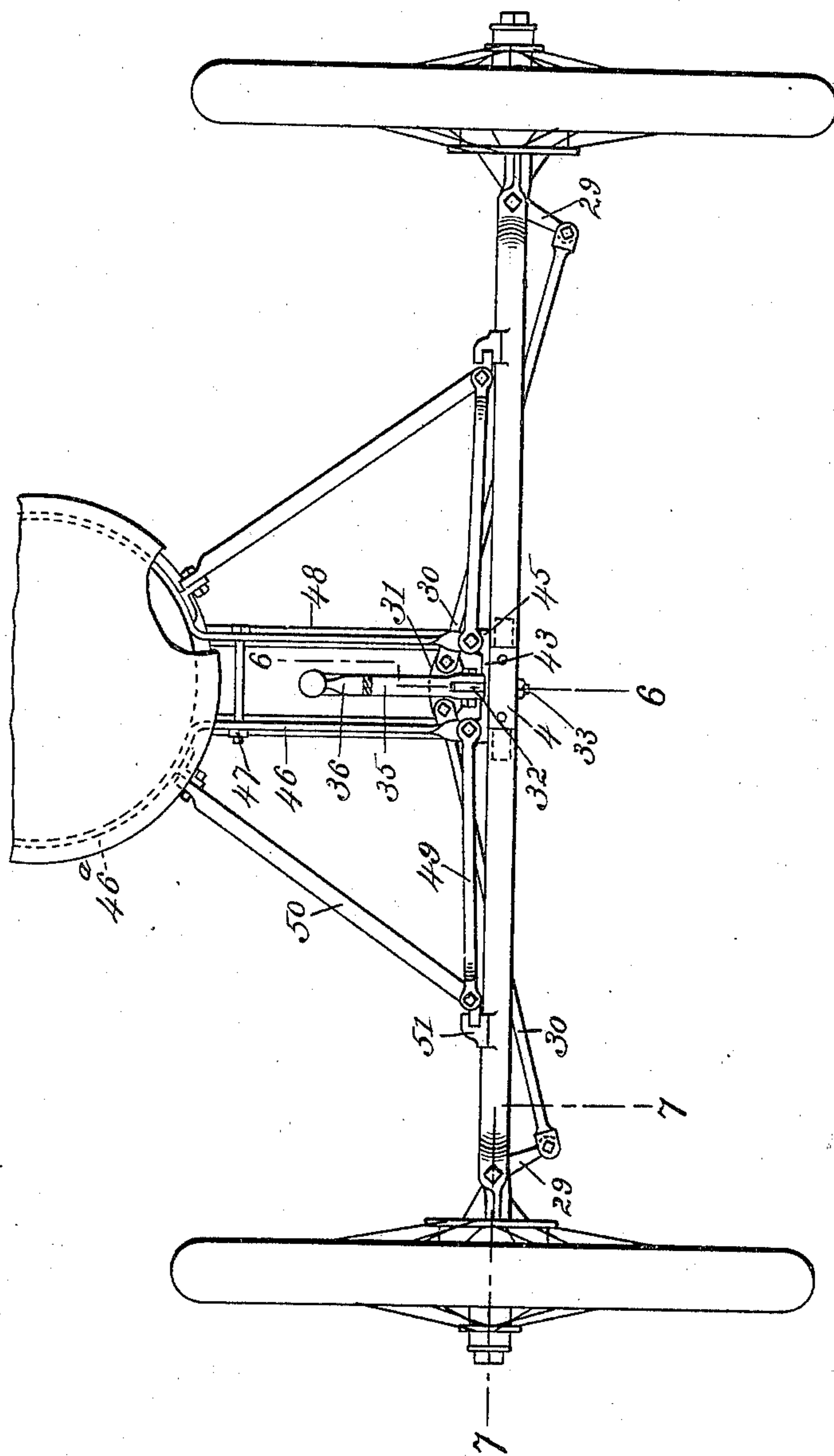


FIG. 2.

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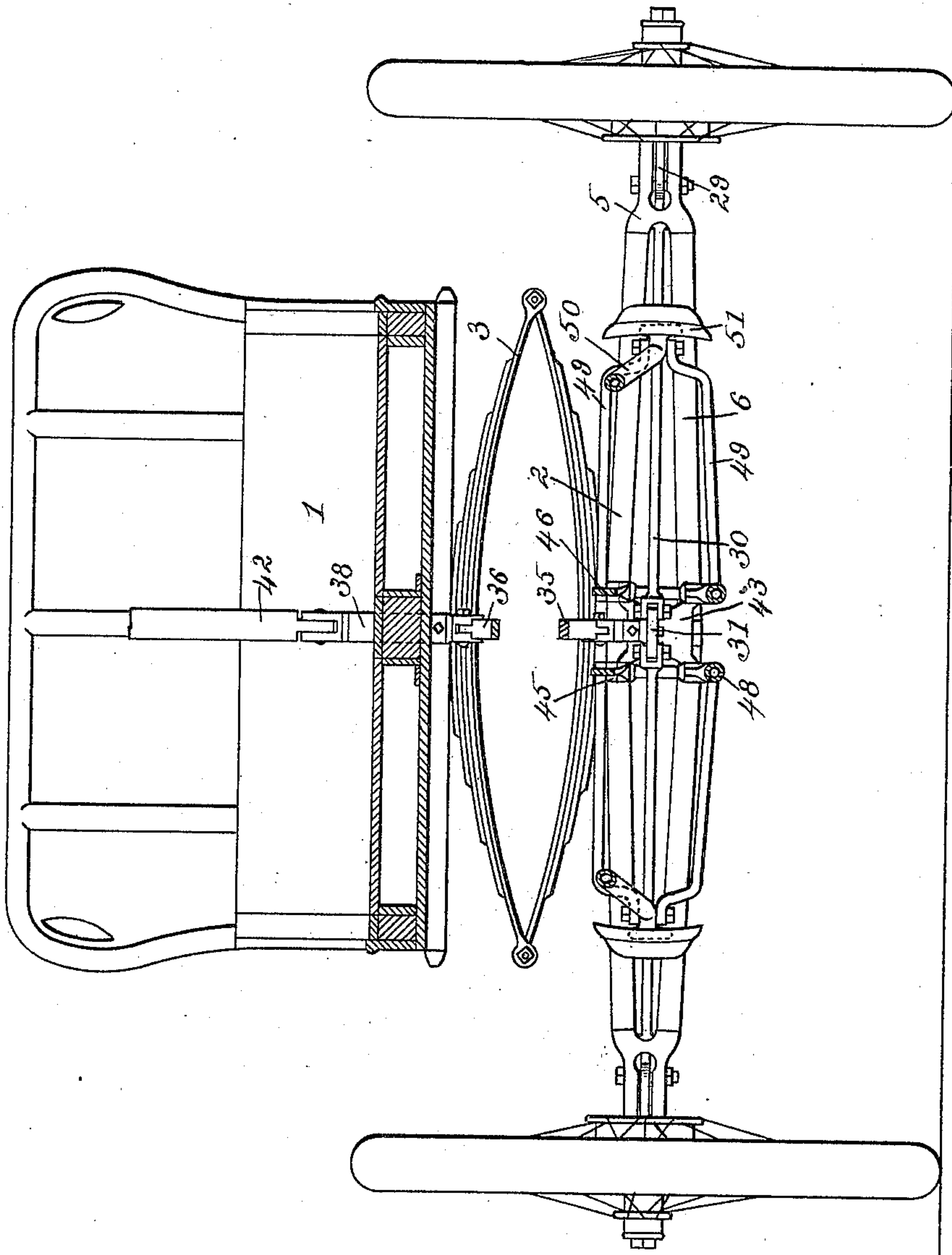


Fig. 3.

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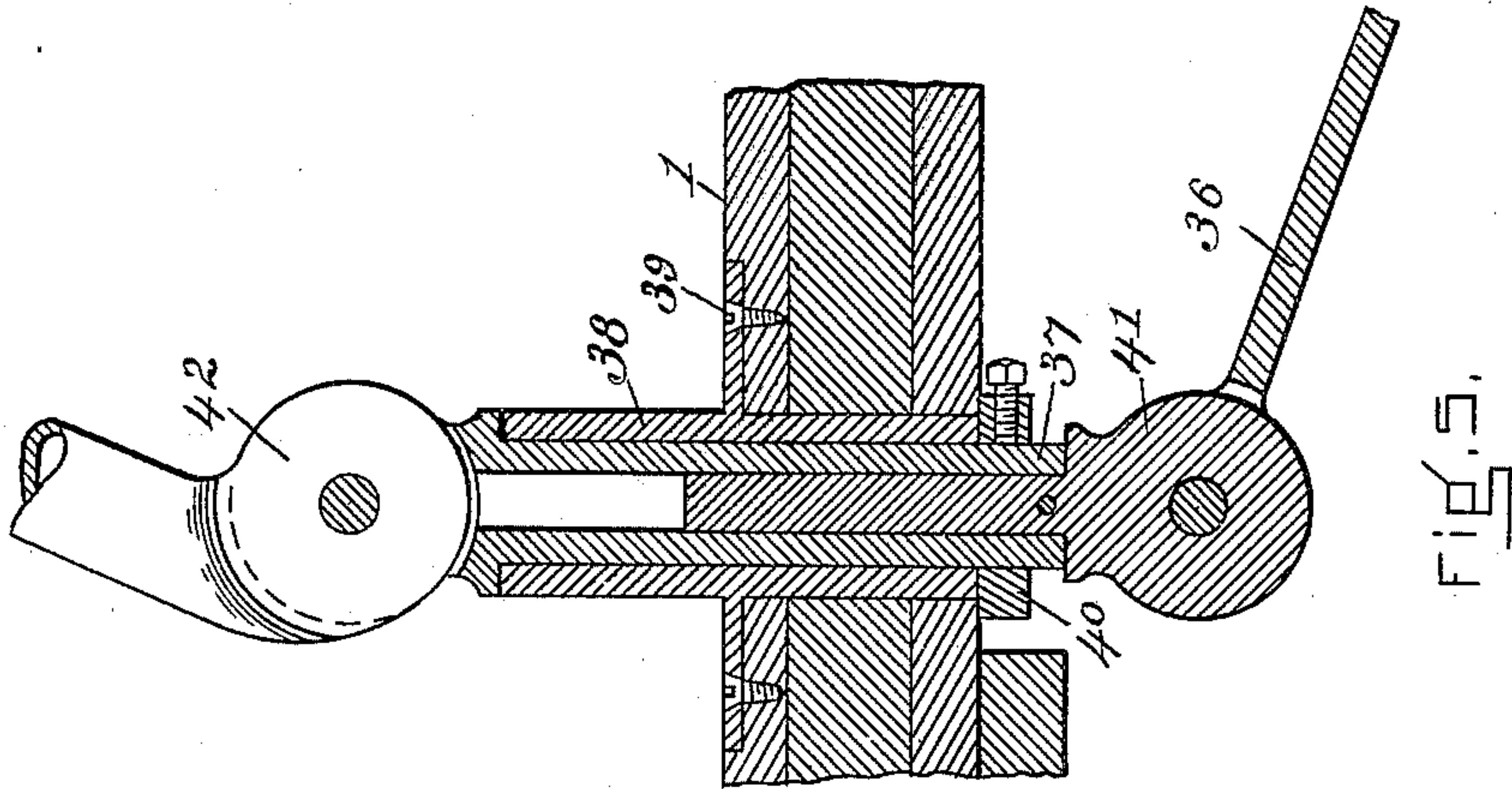


FIG. 5.

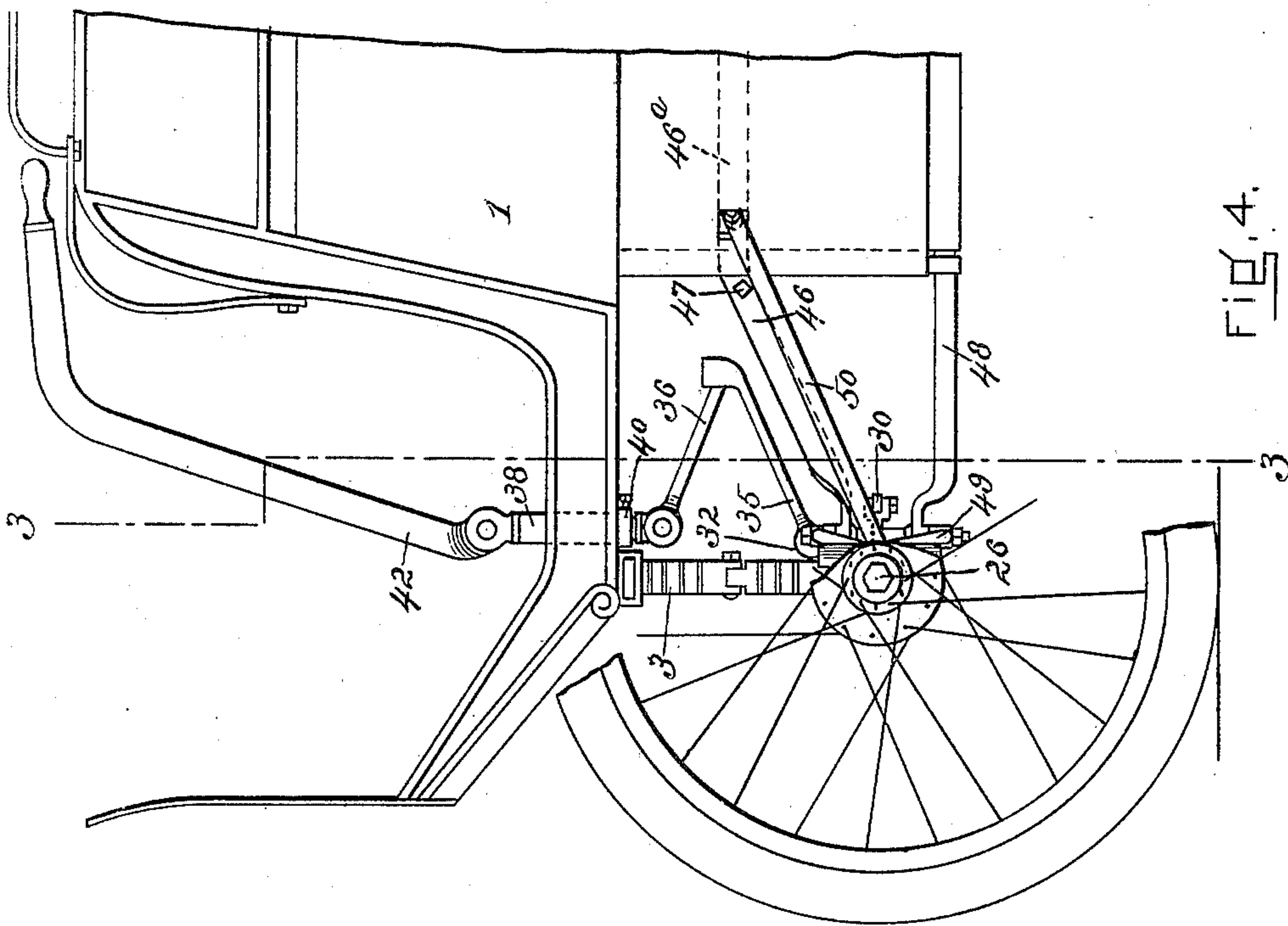


FIG. 4.

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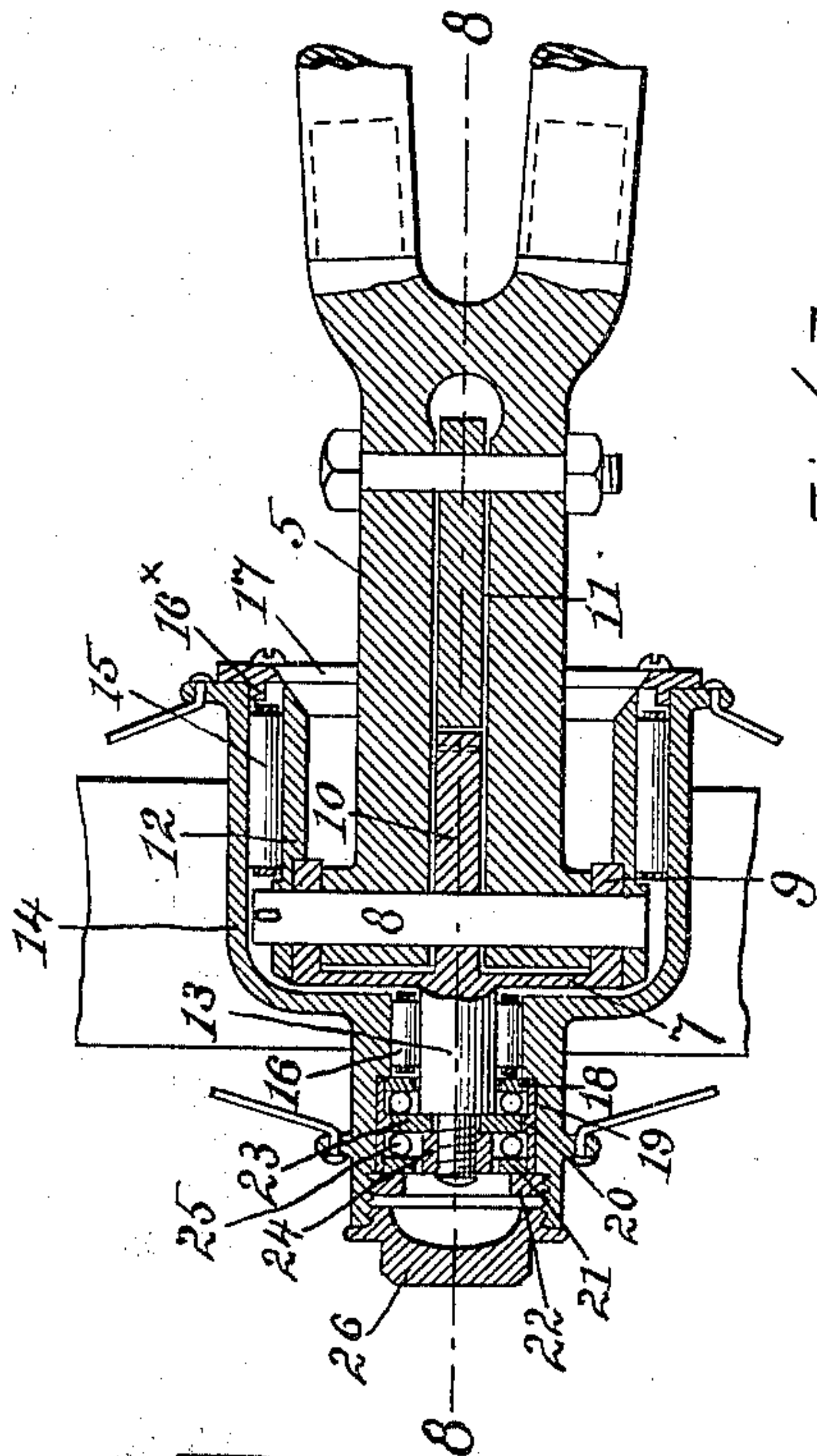


Fig. 7.

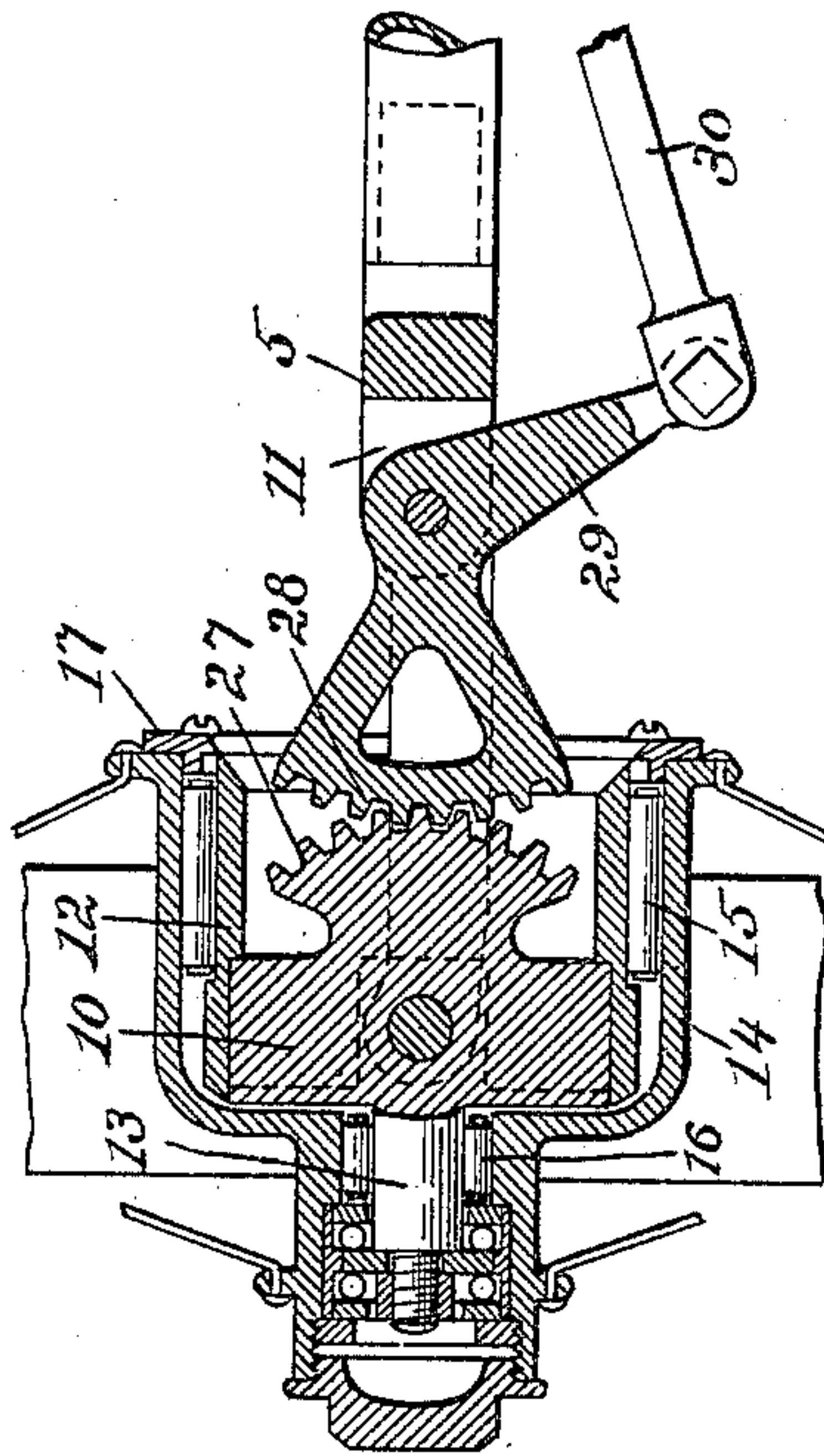


Fig. 8.

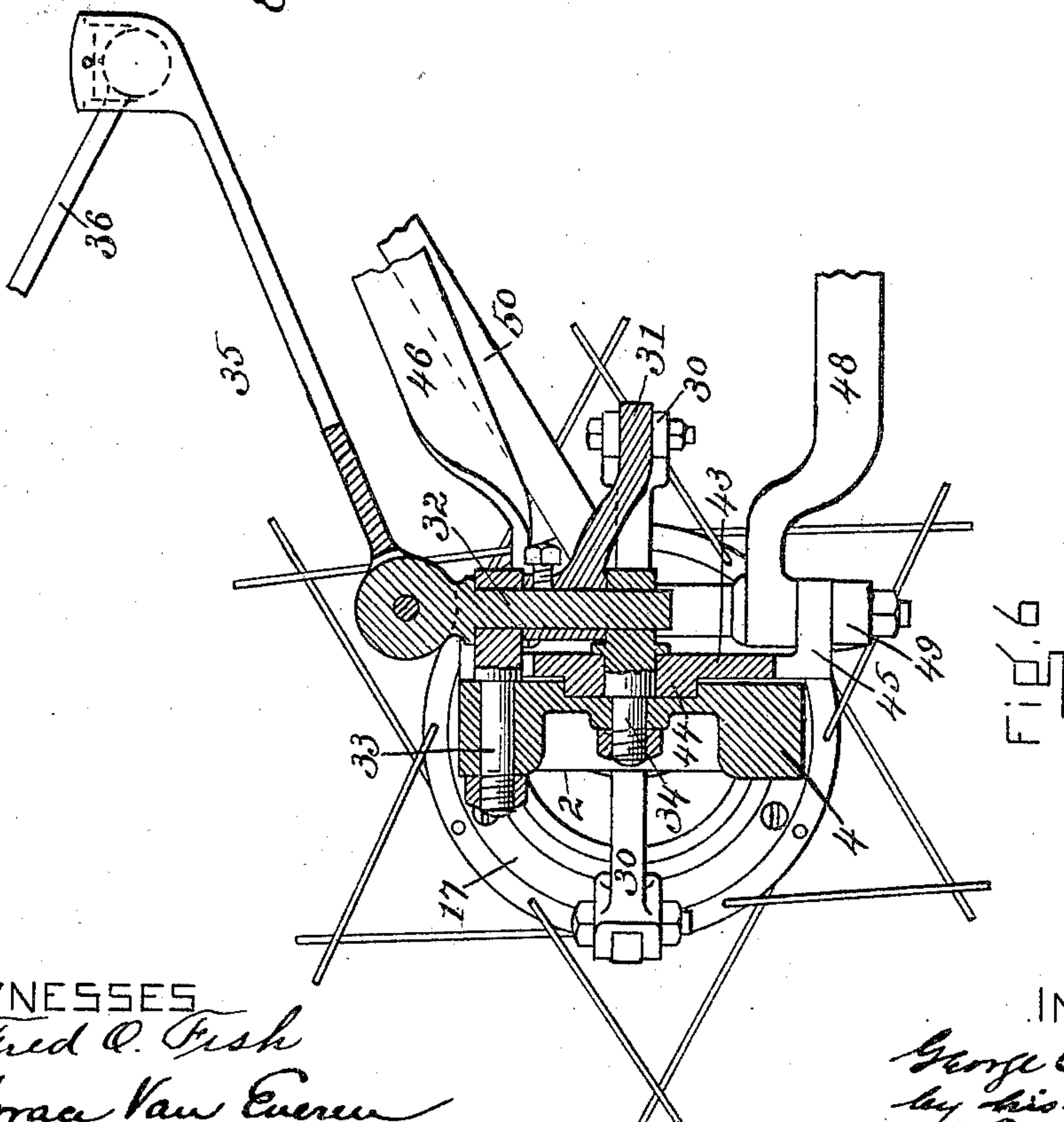


Fig. 9.

WITNESSES

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UNITED STATES PATENT OFFICE.

GEORGE E. WARREN, OF BOSTON, MASSACHUSETTS.

MOTOR-VEHICLE.

SPECIFICATION forming part of Letters Patent No. 684,733, dated October 15, 1901.

Application filed September 29, 1900. Serial No. 31,513. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. WARREN, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Motor-Vehicles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to motor-vehicles, and more particularly to the steering mechanism of such vehicles.

The object of my invention is to provide an improved mounting for the movable wheel-journals of a motor-vehicle and an improved mechanism for actuating the journals, whereby the vehicle can be easily guided and controlled.

It has heretofore been proposed to pivotally mount the journals of the front or rear wheels of a motor-vehicle upon their axle and to provide mechanism connecting with a steering handle or lever for turning the wheel-journals upon their pivots to control the direction of travel of the vehicle. In many of such motor-vehicles, however, the pivots of the wheel-journals have been situated at one side of the plane of the wheels, and the control of the vehicle has thereby been rendered difficult on account of the tendency of the wheel-journals to turn about their pivots when an obstruction is encountered. This tendency increases with the distance of the pivot from the medial plane of the wheel, as the force acting upon the wheel when an obstruction is encountered acts in the medial plane of the wheel, and the farther the pivot is removed from this plane the longer is the lever-arm through which the force acts on the wheel-journal. In vehicles so constructed it is found to be impossible to hold the wheel-journals from vibrating, and the vibrations being transmitted to the steering-handle render the guiding of the vehicle difficult and tiresome. Moreover, the strength required to hold the wheel-journals approximately steady is considerable.

In many motor-vehicles as heretofore constructed the steering-handle has been connected with the mechanism for actuating the wheel-journals, so that the vertical vibrations

of the axle have been transmitted to the steering-handle, thereby interfering with the proper manipulation of the handle and adding to the difficulty of guiding the vehicle.

For overcoming the above objections and providing a vehicle easily guided and controlled at all times my invention contemplates an improved mounting for the wheel-journals with the pivots arranged in the medial plane of the wheels and for actuating said journals a mechanism, part of which is supported by the axle and part by the vehicle body, with connections allowing a relative vertical movement of parts of such mechanism.

To the above ends my invention consists in the devices and combinations of devices hereinafter described and claimed.

In the drawings accompanying this application, wherein is illustrated a preferred form of my invention, Figure 1 is a view in front elevation of a motor-vehicle embodying the same. Fig. 2 is a plan view with the vehicle-body and supporting-spring removed. Fig. 3 is a sectional view on the line 3 3, Fig. 4. Fig. 4 is a view in side elevation of the front portion of the vehicle shown in Fig. 1, a portion of the wheel being broken away to show the underlying parts. Fig. 5 is a detail sectional view of that part of the steering mechanism which is supported by the vehicle-body. Fig. 6 is a sectional view on the line 6 6, Fig. 2. Fig. 7 is a detail sectional view on the line 7 7, Fig. 2, showing one of the wheel-journals and a portion of its actuating mechanism, and Fig. 8 is a sectional view on the line 8 8, Fig. 7.

Referring to the drawings, in which like characters of reference indicate like parts, 1 designates a vehicle-body supported at its front end from an axle 2 by means of a spring 3.

To form a light and strong axle adapted to support the parts to be hereinafter referred to, I preferably construct the axle 2 of a central casting 4 and two end castings 5, united by tubes 6. The ends of the tubes are seated over projections on the castings and brazed thereto, the whole forming a rigid truss-frame. On the castings 5, forming the ends of the axle 2, are pivotally mounted the wheel-journals, as will now be described. In the construction shown in Figs. 7 and 8, 7 designates a frame pivotally mounted upon the

casting 5 by means of a pivot-pin 8, passing through the end of the casting and through flanges 9 of the frame, extending above and below the casting and also passing through a flange or web 10 of the frame extending into a slot 11, formed in the casting. The wheel-journal is formed by a sleeve 12, secured to or formed integral with the frame 7, and by a cylindrical stud 13, concentric with the sleeve 12 and extending from the frame 7 in the opposite direction, the pivot-pin being situated between the two parts of the journal. The sleeve 12 extends inwardly over the casting 5, being separated therefrom a sufficient distance to allow the frame 7 and the journal carried thereby to be moved on the pivot-pin 8.

14 designates the wheel-hub, provided with suitable bearing-surfaces, rollers 15 and 16, supported in suitable cages, being interposed between such surfaces and the sleeve 12 and stud 13. The cage for the rollers 15 is held in position between a shoulder on the sleeve 12 and a circular flange 16^x of an annular plate 17, secured to the inner end of the hub and projecting inwardly to the end of the sleeve 12 to form a dust-guard for the bearing. The cage for the rollers 16 is held in position between the frame 7 and a washer 18, forming a part of the bearing for taking up the end thrust to be described.

As a means for taking up the end thrust I provide a roller-bearing conveniently constructed as follows: The outer end of the hub 14 is bored out to form a seat of greater diameter than the bearing cooperating with the stud 13, and in said seat are positioned the washer 18, the sleeve 19, provided with the central flange 20, and the washer 21, the washers and sleeve being held in position by an externally-threaded ring 22, engaging a thread cut in the outer end of the bore of the hub. A washer 23, secured to the outer end of the stud 13 by means of a nut 24, extends between the washers 18 and 21, balls 25, held in suitable cages, being interposed between the washers. The cages for the balls are held between the washers 18 and 21 and the flange 20 of the sleeve 19. The cages for the balls are not shown on the drawings, but it is believed that the manner in which they are supported will be readily understood, and as the specific construction of this bearing forms no part of my present invention the illustration contained in Figs. 7 and 8 is deemed sufficient. A cap 26, screwed into the end of the hub 14, serves as a dust-guard for the bearing and imparts a finished appearance to the hub.

It will be seen that the pivot-pin is situated in the medial plane of the wheel, and is thus in the line of the force acting upon the wheel when an obstruction is encountered. All tendency of the wheel-journal to turn on its pivot due to this cause is therefore avoided.

All constructions heretofore devised, so far as I am advised as to the state of the art, in which the pivot-pin has been situated within

the hub of the wheel have been defective in that the pin often breaks or is sheared off when the wheel passes over an obstruction. This defect is overcome in the construction above described by the engagement of the flange or web 10 with the slot 11 in the end of the axle, the thrust tending to break or shear off the pin being taken by the flange and slotted end of the axle instead of by the pin, as in prior constructions. The casting 5, forming the end of the axle, can be made wide enough in a vertical direction to give the necessary strength and narrow enough in a horizontal direction to allow the wheel-journal to turn without unduly enlarging the wheel-hub.

As a convenient means for actuating the wheel-journals I provide the webs of the frames 7 with segmental gears 27, meshing with segmental gears 28, carried by bell-cranks 29, pivoted in the slots in the castings 5. As shown, the ends of the sleeves 12 and inner edges of the plates 17 are beveled to avoid contact with the racks 28. Links 30 connect the bell-cranks 29 with an arm 31, secured to a short vertical shaft 32, mounted in bearings formed in the outer ends of two studs 33 and 34, secured to the central casting of the axle 2. The links 30 pass through the axle 2 from one side to the other, as is clearly shown in Fig. 2. By rotating the shaft 32 it will be evident that the wheel-journals will be simultaneously turned in the same direction through the connections above described. The connections of the links 30 to the arm 31 are such that the inside wheel is turned through a greater angle than the outside wheel to bring each wheel normal to the radius of the curve on which it travels. This construction is clearly shown in Fig. 2, in which it will be seen that the links 30 are separately pivoted to the arm 31 at equal distances from the shaft 32. If the shaft 32 is actuated to swing the arm 31 to the right, as viewed in the figure, the pivot at the left will move in a line substantially parallel with the axle while the pivot at the right will move in a line at an angle to the axle. A greater longitudinal movement will thus be given to the link 30 at the left, and the wheel at the left, which is the inside wheel in this case, will be turned through a greater angle. As a means for rotating the shaft 32 I pivot to the upper end of the shaft a crank-arm 35 and pivotally connect this crank-arm with a crank-arm 36, pivoted to the lower end of a shaft 37, journaled in the bottom of the vehicle 1. The bearing for the shaft 37 (see Fig. 5) consists of a sleeve-bushing 38, provided with a flange secured to the bottom of the vehicle by screws 39. The shaft is held in the bushing by means of a shoulder engaging the upper end of the bushing and a collar 40, secured to the shaft, engaging the lower end of the bushing. The shaft is hollow and the connection between the shaft and the crank-arm 36 is formed by a block 41, to which the crank-

arm is pivoted, provided with a stem seated in the hollow shaft and pinned thereto. A steering-lever 42 is pivoted to the upper end of the shaft 37.

5 In the construction above described it will be seen that the pivotally-connected crank-arms 35 and 36 serve as a means for transmitting the rotary movements of the shaft 37 to the shaft 32 and at the same time permit a relative vertical movement of the shafts. 10 The vibratory movements of the axle are taken up by the pivotal connection of the crank-arms and all vibration of steering-lever 42 due to this cause avoided.

15 The vehicle which I have illustrated in the drawings is provided with a steam-boiler supported upon bars connecting the front and rear axles, these bars being supported from the front axle by means of a frame pivoted thereto. The boiler is held firmly in position on the supporting-bars by braces connecting the boiler and pivoted frame, as will be described.

43 designates a plate or block pivotally supported on the central casting 4 of the axle by means of a projecting cylindrical portion 44, engaging a correspondingly-shaped seat in the casting 4, and by means of the stud 34, passing through a hole in the block concentric with the cylindrical portion. The plate 43 is substantially rectangular and is provided at each corner with a lug or projection 45. Bolted to the upper projections and extending upwardly to the boiler are braces 46, these 25 braces being joined to and forming part of a band 46^a, surrounding the boiler and clamped thereto by a bolt 47. Bolted to the lower projections and extending horizontally beneath the bottom of the boiler to the rear axle are bars 48. A bar 49 is also bolted to each of the projections 45, said bars extending parallel with the axle on each side of the central casting 4. The ends of the two bars on each side are bolted together and to a 40 brace 50, extending upwardly to the boiler and secured to the band 46^a. The ends of the braces 50, to which the bars 49 are bolted, are turned into a plane parallel with the axle and engage guideways 51 on the axle. The 45 plate 43 and bars 49 constitute a frame mounted on a horizontal pivot extending transversely to the axle, to which the braces 46, bars 49, and braces 50 are attached. By the construction described the lower end of the 50 boiler is firmly braced and supported from the axle and at the same time the axle is allowed to tip without moving the boiler.

The operation of the different portions of the apparatus has been indicated in the description of their construction and will be readily understood without a separate description thereof.

The specific construction illustrated in the drawings and above described embodies my 65 invention in its preferred form; but it is to be understood that it is not limited thereto,

but that many changes may be made in the form and arrangements of the parts without departing from the spirit thereof.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A motor-vehicle, having, in combination, an axle, a wheel-journal comprising a frame pivotally mounted thereon, the pivot of said 75 frame being in the medial plane of the wheel, a flange on said frame entering a slot in the axle, and means for actuating the wheel-journal, substantially as described.

2. A motor-vehicle, having, in combination, 80 an axle, a wheel-journal comprising a frame pivotally mounted thereon, the pivot for the frame being in the medial plane of the wheel, a flange on said frame entering a slot in the axle and provided with a segmental gear, a 85 bell-crank mounted in said slot provided with a segmental gear meshing with the first-mentioned gear, and a steering-handle and intermediate connections for actuating the bell-crank, substantially as described. 90

3. A motor-vehicle, having, in combination, a wheel-journal comprising a frame pivoted thereto, the pivot for the frame being in the medial plane of the wheel, a flange on said frame entering a slot in the axle, a lever 95 mounted in said slot, connections between the flange and the lever and a steering-handle and intermediate connections for actuating the lever, substantially as described.

4. A motor-vehicle, having, in combination, 100 an axle, wheel-journals pivotally mounted thereon, bell-crank levers pivotally mounted on the axle, connections between the levers and wheel-journals, a shaft journaled on the axle, an arm secured thereto, links connecting the arm and levers, a shaft mounted on the vehicle-body, and connections allowing a 105 relative vertical movement of the shafts without rotation for rotating said first-mentioned shaft from said last-mentioned shaft, substantially as described. 110

5. A motor-vehicle, having, in combination, an axle, wheel-journals pivotally mounted thereon, bell-crank levers pivotally mounted on the axle, connections between the levers 115 and wheel-journals, a shaft journaled on the axle, an arm secured thereto, links connecting the arm and levers, a shaft mounted on the vehicle-body, means for actuating said shaft and crank-arms pivotally connected to 120 said shafts and to each other, substantially as described.

6. A motor-vehicle, having, in combination, an axle, comprising central and end castings and connecting-tubes forming a truss-frame, 125 wheel-journals pivoted in slots in the end castings, bell-crank levers pivoted in said slots engaging the journals, an arm pivoted to the central casting, links passing through the axle connecting the arm and levers, and 130 means for actuating the arm, substantially as described.

7. A motor-vehicle, having, in combination, an axle, a frame mounted on a horizontal pivot extending transversely to the axle, a boiler, supporting-bars extending from said frame beneath the boiler and braces connect-
5 ing the boiler and frame, substantially as described.

8. A motor-vehicle, having, in combination, an axle, a frame mounted on a horizontal pivot extending transversely to the axle, guides for said frame carried by the axle, a boiler, supporting-bars extending from said frame beneath the boiler, and braces connecting the boiler and frame, substantially
15 as described.

9. A motor-vehicle, having, in combination, an axle, a block mounted on a horizontal pivot extending transversely to the axle, a boiler, supporting-bars extending from the block beneath the boiler, braces connecting
20 the boiler and frame, bars extending laterally on each side of the block, braces connecting the boiler and the ends of said bars,

and guides for the ends of said braces carried by the axle, substantially as described. 25

10. A motor-vehicle, having, in combination, an axle, wheel-journals, each comprising a frame pivotally mounted thereon, the pivot for the frame being in the medial plane of the wheel, a flange on each frame entering a slot in the axle and provided with a segmental gear, a bell-crank mounted in each slot provided with a segmental gear meshing with the first-mentioned gear, a shaft journaled on the axle, an arm secured thereto, links connecting the arm and bell-cranks, a shaft mounted on the vehicle-body, means for actuating said shaft and crank-arms pivotally connected to said shafts and to each other, substantially as described. 35 40

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE E. WARREN.

Witnesses:

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