No. 675,379. Patented June 4, 1901.

R. B. FAGEOL.

AUTOMOBILE.

(Application filed Sept. 11, 1900.)

(No Model.) 4 Sheets—Sheet 1.

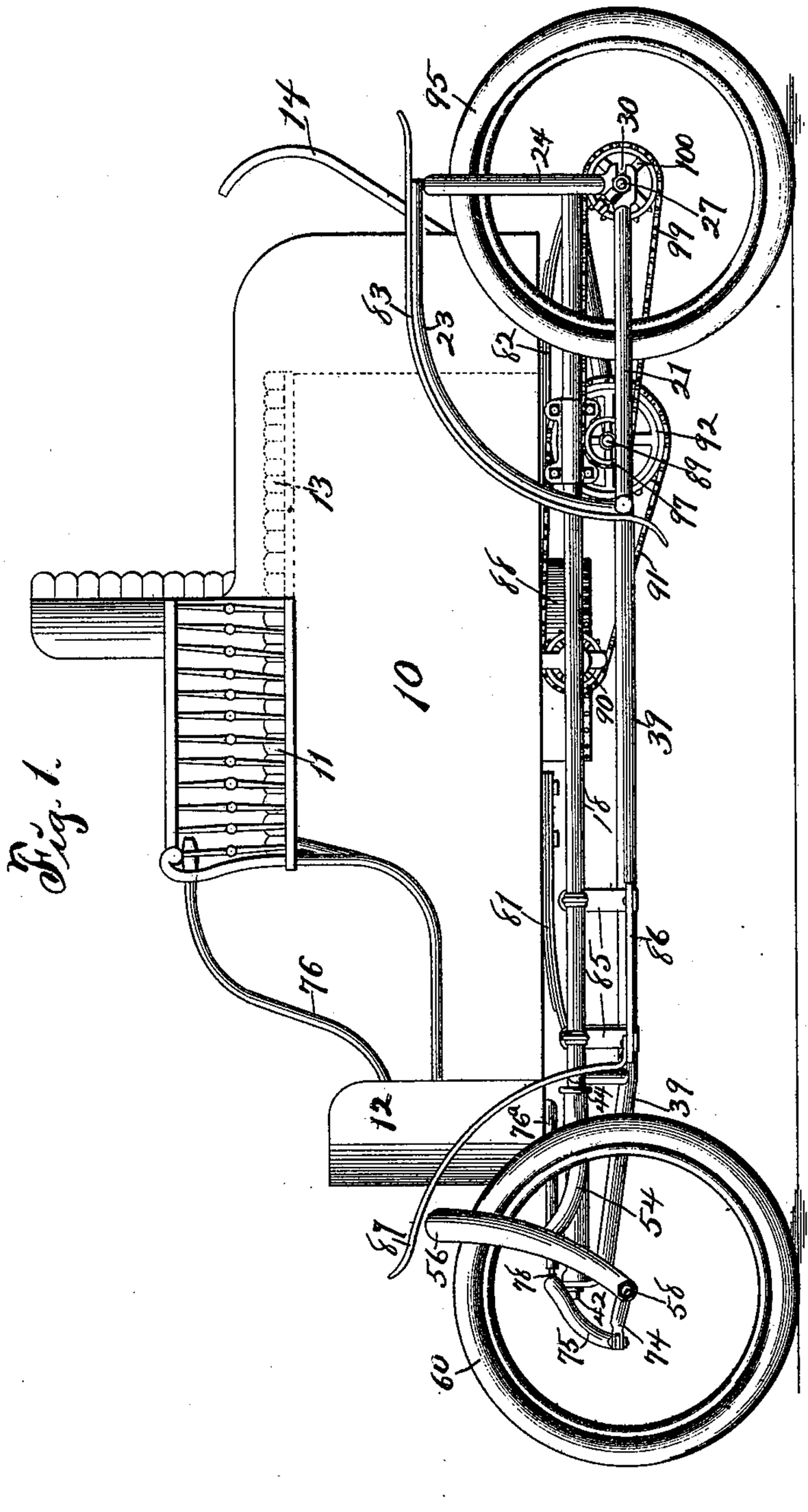

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

Fig. 2.

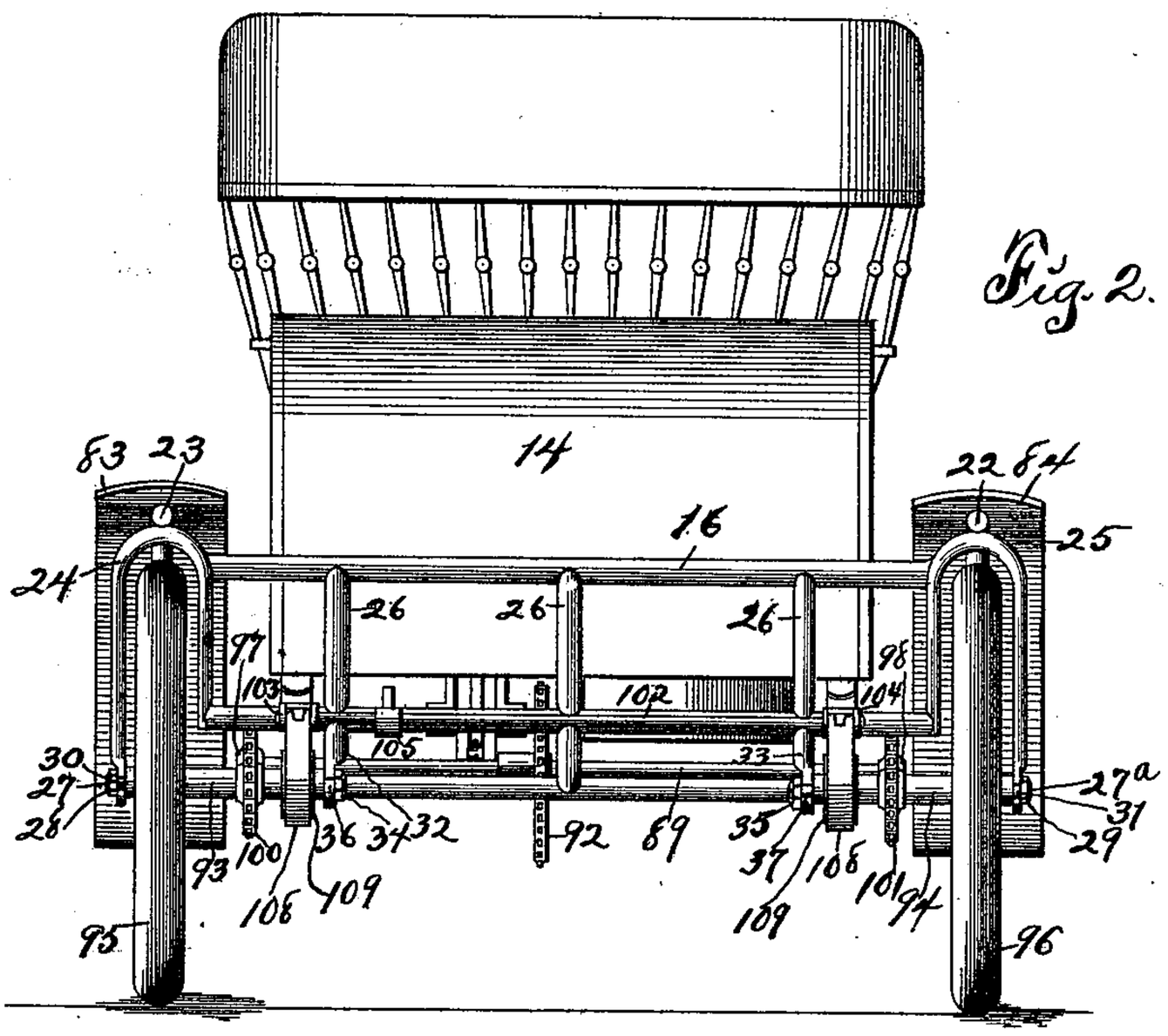
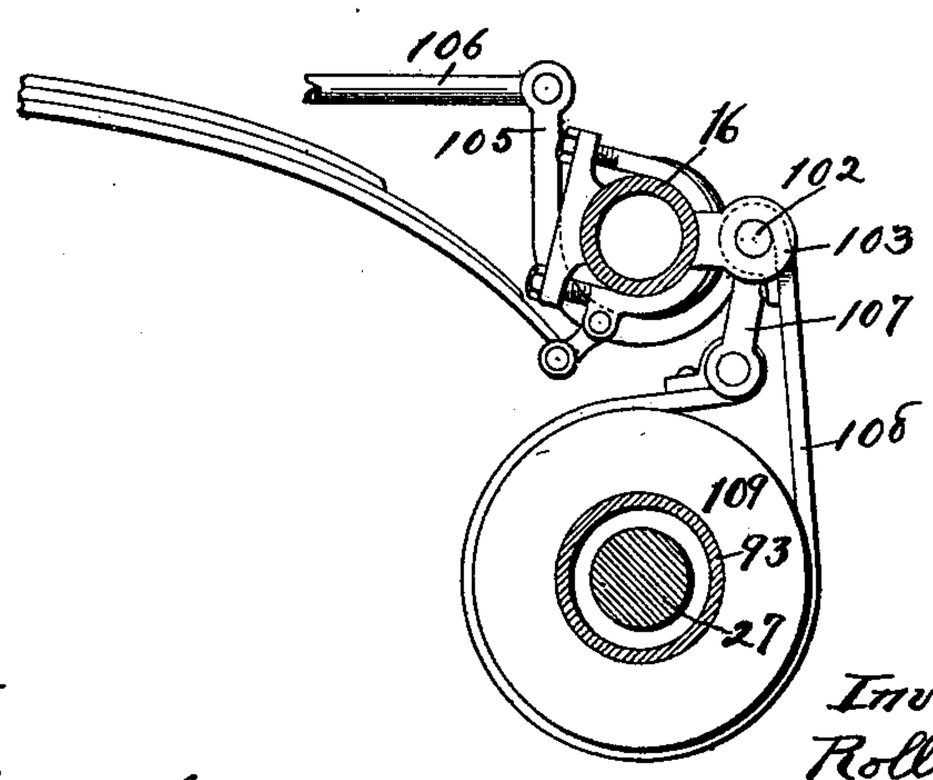


Fig. 7.



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(No Model.) 4 Sheets—Sheet 3.

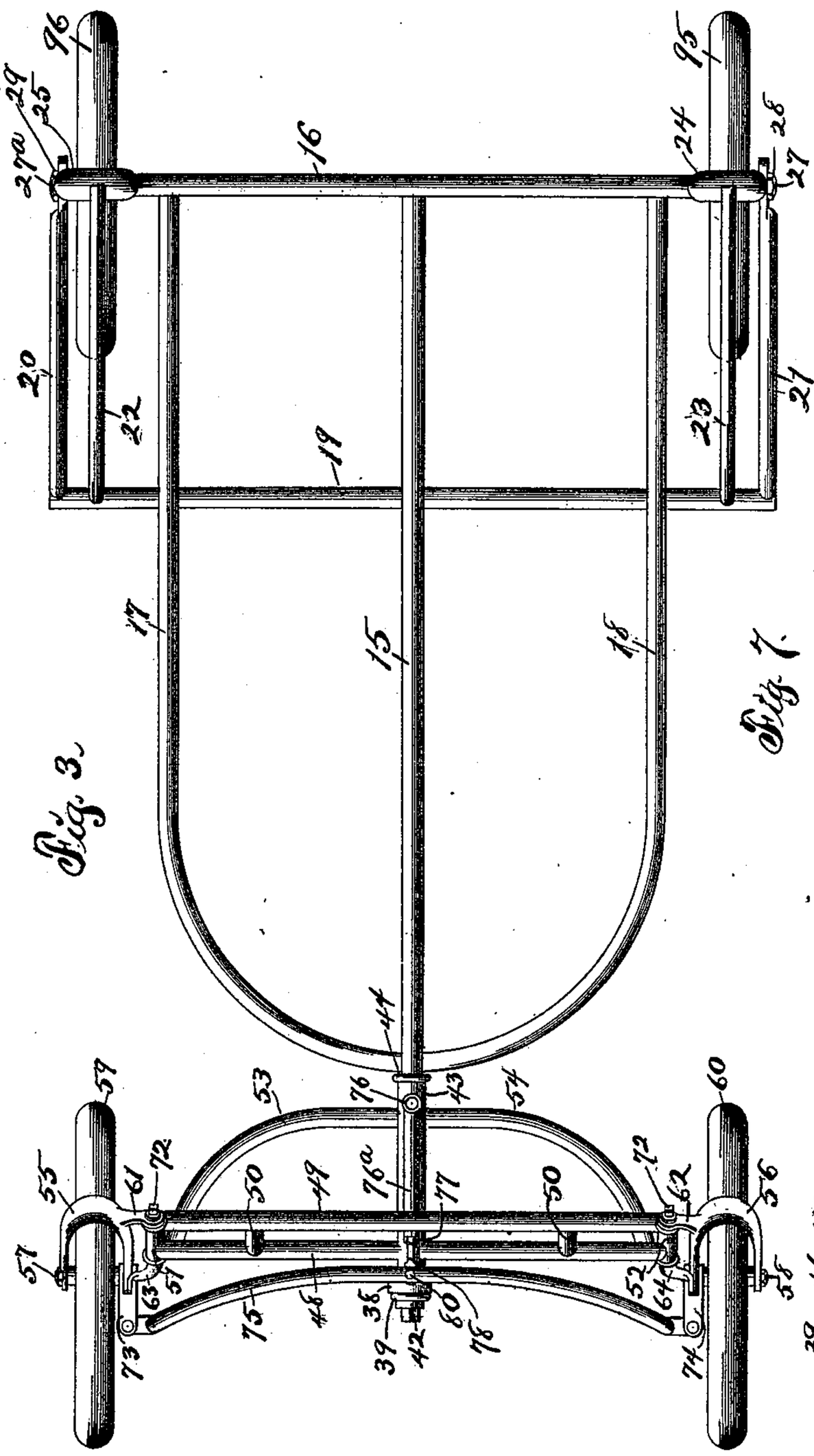

Fig. 7.

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(No Model.) 4 Sheets—Sheet 4.

Fig. 5.

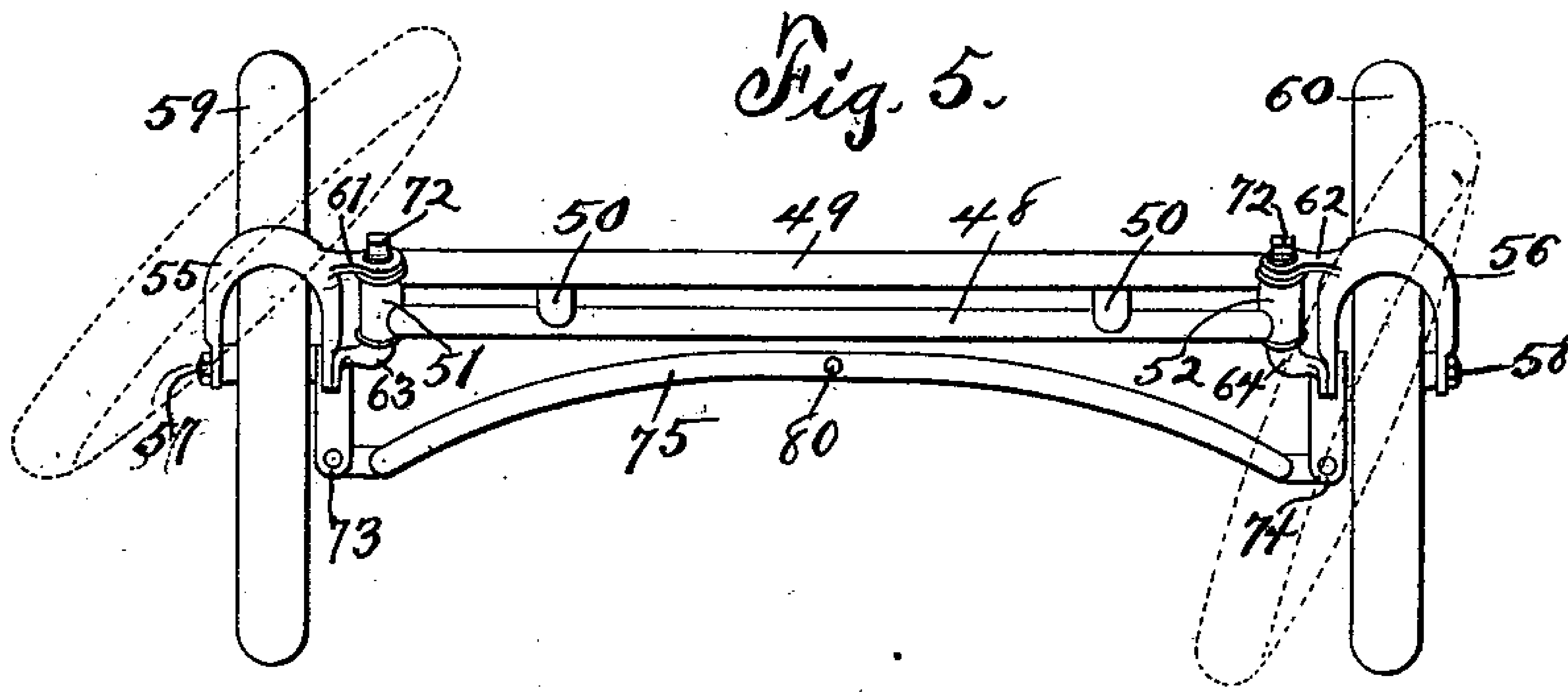


Fig. 4

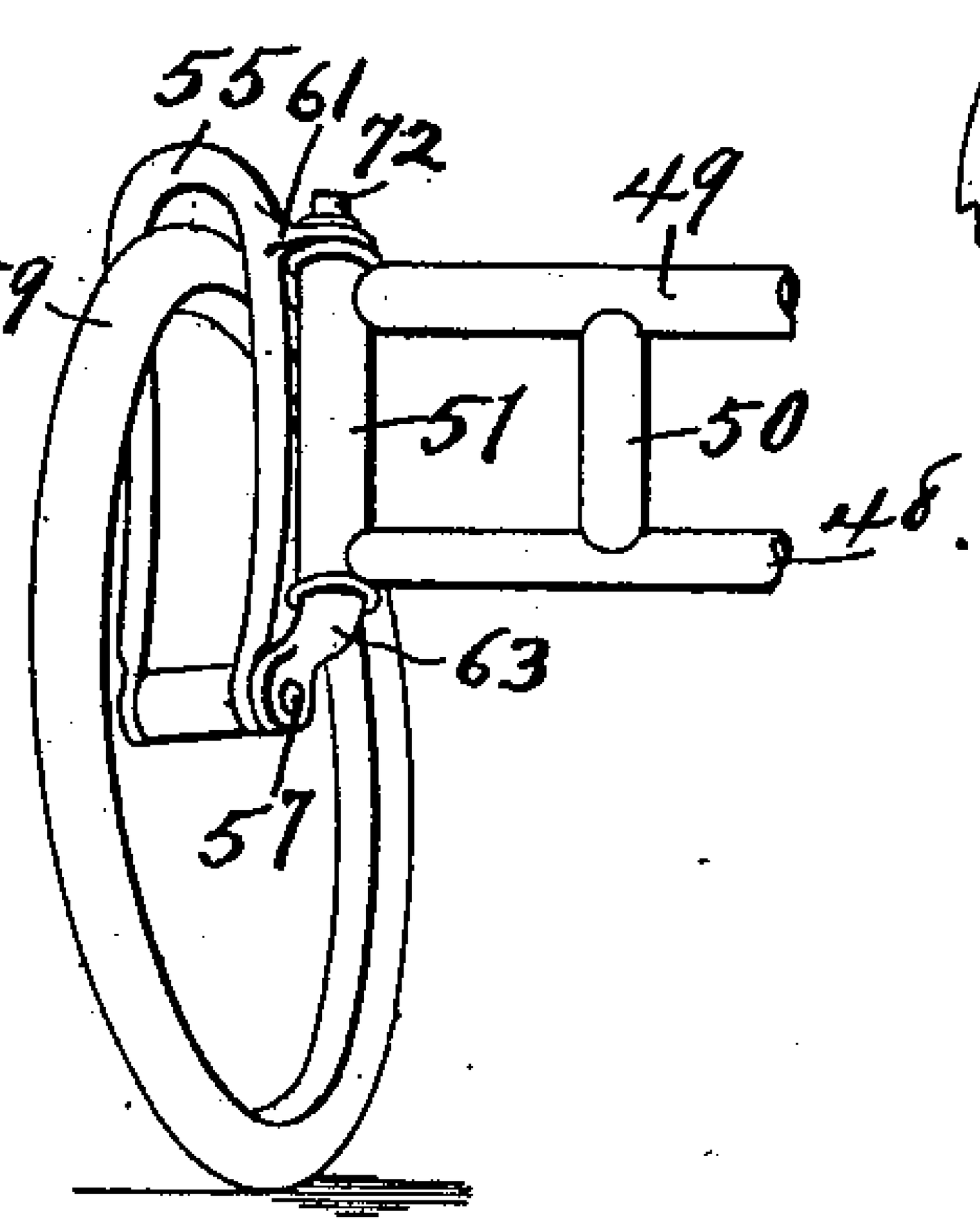


Fig. 6.

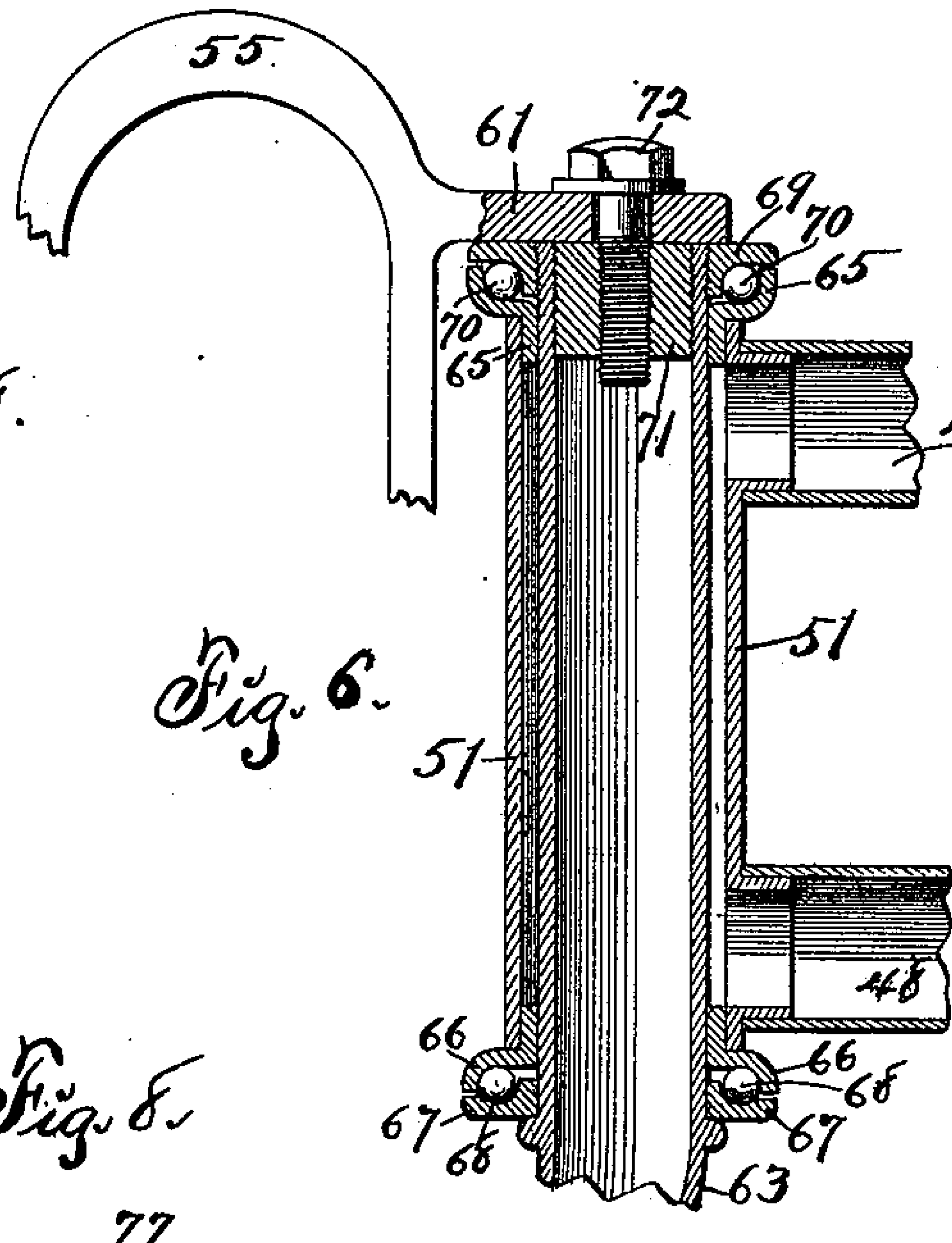
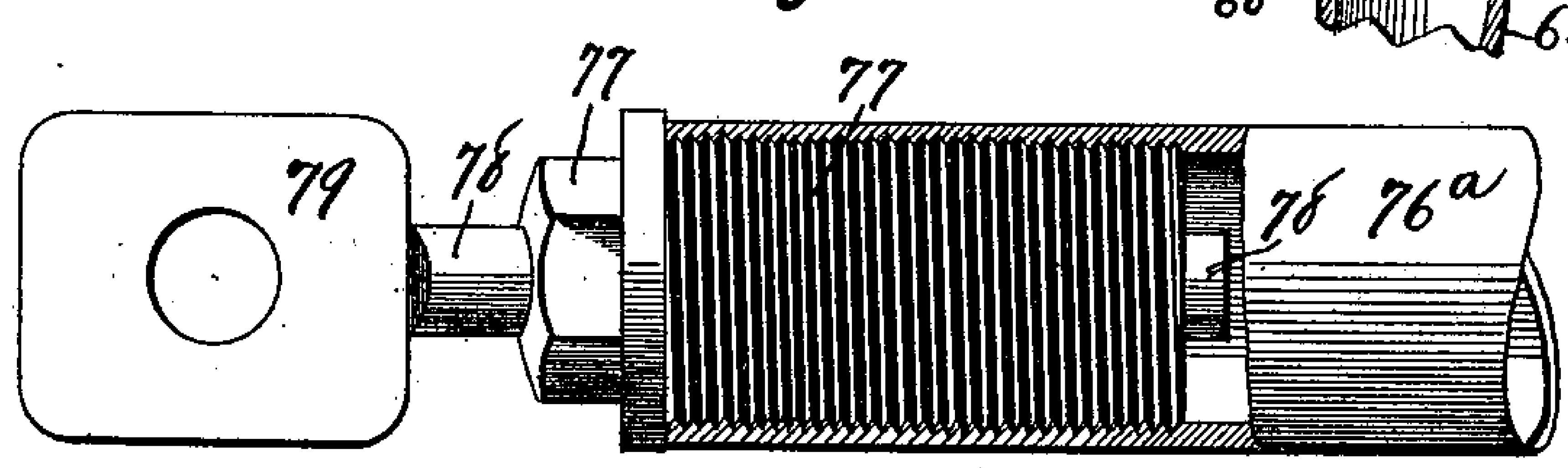


Fig. 8.



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Inventor:
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UNITED STATES PATENT OFFICE.

ROLLIE B. FAGEOL, OF DES MOINES, IOWA.

AUTOMOBILE.

SPECIFICATION forming part of Letters Patent No. 675,379, dated June 4, 1901.

Application filed September 11, 1900. Serial No. 29,662. (No model.)

To all whom it may concern:

Be it known that I, ROLLIE B. FAGEOL, a citizen of the United States of America, and a resident of Des Moines, Polk county, Iowa, have invented certain new and useful Improvements in Automobiles, of which the following is a specification.

One object of this invention is to provide means for mounting and steering an automobile, motor-carriage, or similar vehicle in which the steering-wheel will be so braced as to safely override an ordinary obstruction or roughness on the roadway without material defection from the desired course and when turning the axles of said wheels will occupy upright planes on lines that, if projected, will converge at the point about which the machine is turning, thereby preventing lateral sliding of the steering-wheels and at the same time providing for a rearward inclination of the steering-wheels at the same angle and in a direction with their tops toward that side to which the machine is turned, thereby supporting the load on the wheels on a straight line through the transverse centers of the wheel-hubs and the contacting points of the tires upon the ground-surface, thereby avoiding undue lateral strains on the wheels and minimizing the tendency of said wheels to crush over, as contradistinguished to a construction in which the steering-wheels retain their vertical positions when turning or incline in divergent planes.

A further object of this invention is to provide a steering device for automobiles, motor-carriages, and the like in which a minimum of power is required in turning the steering-wheels and a maximum degree of angularity of said wheels to the line of travel is attained.

A further object of this invention is to provide means for pivotally connecting the steering-wheels with a steering-head and pivoting said steering-head for oscillation on a horizontal axis on the frame of the body-portion to the end that the wheels may rise and fall independently of each other without laterally tilting the vehicle-body.

A further object of this invention is to be found in the provision of means whereby the steering-handle may be operated freely and effectively during an elevation of either of the steering-wheels.

A further object of this invention is to be found in the provision of means for so mounting the vehicle-body on the rear wheels as that said rear wheels may revolve independently of each other and be driven separately or conjunctively.

A further object of this invention is to be found in the provision of means for applying brakes independently or conjunctively to the axles of the traction-wheels of the vehicle.

A further object of this invention is to be found in the provision of means for supporting both ends of all the wheel-axles and at the same time giving to the front or steering wheels the desired inclinations in operation.

My invention consists in the construction, arrangement, and combination of elements hereinafter set forth, pointed out in my claims, and illustrated by the accompanying drawings, in which—

Figure 1 is a side elevation of my complete vehicle. Fig. 2 is a rear elevation of my complete vehicle. Fig. 3 is a plan of the running-gear of my vehicle, from which the body, motor, and driving-gear are removed. Fig. 4 is a front elevation of a part of the steering-head and one of the steering-wheels therein in diagrammatic form, illustrating the inclination of said wheels in turning to the right. Fig. 5 is a plan of the steering-head and both steering-wheels, the parts being positioned for advancement in a straight line, the dotted lines indicating the positions assumed by said steering-wheels in making a short turn to the right. Fig. 6 is a detail elevation, partly in section, of portions of the steering-head and one of the forks for a steering-wheel. Fig. 7 is a detail elevation, partly in section, illustrating the forward portion of the reach of my improved running-gear. Fig. 8 is a detail plan, partly in section, illustrating the forward portion of the steering-lever and the means of attaching the same to the connecting-rod of the steering mechanism. Fig. 9 is a detail elevation, partly in section, illustrating the means employed to brake one of the traction-wheels.

In the construction of the vehicle, as shown, the numeral 10 designates the body portion and may be of any desired or suitable construction. I have illustrated the body portion 10 with a front seat 11 facing the dash

12 and a seat 13 back-to-back with the front seat and provided with a rear dash or guard 14; but this construction may be altered to suit the taste or convenience of the user.

A running-gear is provided and constructed as follows: A reach 15 is connected with its rear ends to a frame-head 16, and braces 17 18 are connected at their rear ends to said frame-head, extended forwardly therefrom parallel with the reach 15, and at their forward ends are curved inwardly and converged to points of attachment to the reach 15. A cross-brace 19 is positioned at right angles to and across the central portions of the reach 15 and side braces 17 18 and is rigidly connected thereto. The end portions of the cross-brace 19 project beyond the side braces 17 18, and arms 20 21 are fixed to the extremities thereof and extend rearwardly therefrom parallel with the reach. Arms 22 23 are fixed to the end portions of the cross-brace 19, adjacent to the arms 20 21, and extend upwardly and rearwardly from said cross-brace to points of attachment at their rear ends to forks 24 25 in the end portions of the machine-heads 16. The machine-head 16 is formed of upper and lower members rigidly connected by stays 26 and also rigidly connected at their ends to the inner arms of the forks 24 25. The outer arms of the forks 24 25 are of greater length than the inner arms of said forks, and hence extend to a lower horizontal plane than the lower member of the frame-head 16. Axle-shafts 27 27^a are mounted in a horizontal plane parallel with the upper and lower members of the frame-head 16, and the outer end portions of said axle-shafts extend through coincident apertures in the lower extremities of the outer arms of the forks 24 25 and in the rear extremities of the arms 20 21 and are secured thereto by nuts 28 29. The apertures in the rear extremities of the arms 20 21 open rearwardly to form notches 30 31, by means of which the axle-shafts 27 27^a may be adjusted. Braces 32 33 extend rearwardly and downwardly from the lower member of the frame-head 16 and are apertured in their extremities. The inner end portions of the axle-shafts 27 27^a are mounted in the apertures in the extremities of the braces 32 33 and secured by nuts 34 35. The apertures in the extremities of the braces 32 33 open rearwardly and form slots or notches 36 37, by means of which the inner end portions of the axle-shafts 27 27^a may be adjusted conjunctively with or independently of the outer end portions of said shafts. The lower extremities of the outer arms of the yokes 24 25 and the rear extremities of the braces 20 21 may be rigidly connected by forged plates, as illustrated in Figs. 1 and 2. The reach 15 extends forwardly beyond the point of jointure with the side braces 17 18, and a cone 38 is screw-seated therein and projects forwardly therefrom. A truss 39 is positioned below and approximately parallel with the reach 15 and is connected thereto by stays 40. The rear end portion of the truss 39 is attached rigidly to the central portion of the frame-head 16, and the forward portion of said truss is bent upward, flattened, and apertured in its flattened portion in alinement with an aperture 41 in the center of the cone 38. A screw 42 extends through the aperture of the flattened portion of the truss 39 and is screw-seated in the aperture of the cone, thus rigidly yet detachably connecting the truss to the cone and providing a stay or support for the cone and for the forward end portion of the reach 15. A sleeve 43 is mounted on the reach 15 between the forward stay 40 and the cone 38, and a ball-bearing (indicated at 44) is interposed between the rear ends of said sleeve and the reach. A cup 45 is mounted rigidly in and extends forwardly from the forward end portion of the sleeve 43, and bearing-balls 46 are interposed between the inner face of the cup and the wear-face of the cone 38. A peripheral flange 47 is formed on the cone 38 and overlaps and incloses the forward end of the cup 45.

A steering-head is provided and comprises two horizontal members 48 49, connected by stays 50 intermediate of their ends and fork-bearings 51 52 at their ends. The lower member 48 of the steering-head is formed in two sections, the inner and adjacent ends of which are fixed to opposite sides of the forward end portion of the sleeve 43. The extremities of the lower member 48 of the steering-head are rigidly connected to the forward outer ends of braces 53 54, and the inner rear ends of said braces are rigidly connected to opposite sides of the rear end portion of the sleeve 43. Thus is the steering-head rigidly attached to and carried by the sleeve, and by reason of the construction and mounting of the sleeve, as hereinbefore described, the steering-head may oscillate freely on the reach without disturbing materially the positioning of said reach relative to the ground-surface on which the vehicle is operated. The principal members of the frame of the running-gear are made of tubing, and the joints thereof are brazed or otherwise rigidly connected and may be reinforced or strengthened by forgings or in any desired manner.

Wheel-forks 55 56 are provided, and the lower extremities of the arms of said forks are apertured for the reception of axles 57 58. Wheels 59 60, hereinafter designated as "steering-wheels," are mounted for revolution on the axles 57 58 and contained within the forks 55 56. Ears 61 62 are formed on and extend laterally from the upper portions of the forks 55 56 inwardly and overlap the upper portions of the fork-bearings 51 52. The ears 61 62 are apertured, and stems 63 64 are connected at their lower ends to the axles 57 58 and extend through the fork-bearings 51 52 and through the apertures of said ears. The stems are rigidly connected to the axles by nuts employed to retain the axles against longitudinal movement in the forks. Cups

65 are mounted in and open upwardly from the upper end portions of the fork-bearings 51 52, and cups 66 are mounted in and open downwardly from the lower end portions of said fork-bearings. Cones 67 are mounted on the stems 63 64 in opposition to the cups 66, and bearing-balls 68 are interposed between them. Cones 69 are mounted adjustably or screw-seated on the upper end portions of the stems 63 64 in opposition to the cups 65, and bearing-balls 70 are mounted between said cones and cups. A plug 71 is screw-seated in the upper end portion of each of the stems 63 64, and screws 72 72 traverse the apertures of the ears 61 62 and are screw-seated in the central portions of the plugs. Thus are the stems mounted for rotation in the fork-bearings and the forks rigidly connected thereto.

It will be observed that the fork-bearings 51 52 and the stems therein are canted or tilted rearwardly relative to a vertical plane and yet are parallel with each other in respect of a vertical plane between them. It will be observed, further, that the forks 55 56 cross and inclose the steering-wheels and support both ends of the axles rigidly and that the axes of oscillation of the stems of said forks are laterally removed from and between the points of contact of the wheels with the ground-surface and are canted or inclined rearwardly. This construction and relative positioning of the parts provides a rake for each of the wheels and insures that when the wheels are turning to turn the vehicle both wheels are inclined from the vertical in the same direction and to the same degree of inclination and with their tops toward or nearer to the center of the circle being formed.

Arms 73 74 are provided and forked at their rear ends to embrace the lower extremities of the inner arms of the forks 55 56 and the stems 63 64. The arms 73 74 are apertured to receive the inner end portions of the axles 57 58, and said arms extend forwardly at a slight upward inclination and at right angles to said axles. The outer end portions or extremities of the arms 73 74 are pivotally connected to the ends of a steering-bar 75. The end portions of the steering-bar 75 are in a transverse plane materially in advance of the axles of the steering-wheels and in advance of a vertical plane of the points of contact of the steering-wheels with the ground-surface; but the central portion of said steering-bar is curved rearwardly to such a degree that the exact center is in a horizontal plane parallel with and immediately above the axial plane of the axles. A steering-lever 76 is provided and extends from a point above the front edge of the seat 11 to and through the bottom of the body 10, adjacent to the dash 12, and is fulcrumed in said bottom. The lower portion of the steering-lever 76 is bent at right angles to the upright portion thereof and extended horizontally forward nearly to the central portion of the steering-bar 75. The forward extremity of the lower portion 76ª of the steering-lever is screw-threaded interiorly, and a plug 77 is screw-seated therein and projects forwardly therefrom. The plug 77 is formed with a central longitudinal bore or aperture, and a stem 78 is mounted loosely in and fitted snugly to said bore. The bore in the plug 77 is circular in cross-section, and the stem 78 also is circular in cross-section and may oscillate rotatably or reciprocate rectilinearly in said bore. A plate 79 is formed on the forward end portion of the stem 78 and extends within a slot in the central portion of the steering-bar 75. A bolt 80 is mounted in coinciding apertures in the central portions of the steering-bar 75 and the plate 79 and pivotally connects said bar to the stem 78. By this means provision is made for the free oscillation of the steering-bar 75 on the axis of the stem 78 without materially affecting the positioning of the steering-lever relative to the body, the reach, or the ground-surface on which the vehicle is operated.

It will be observed that the arms 73 74 extend forwardly beyond the wheel-bases, that the steering-bar 75 is pivotally connected thereto and curved rearwardly into the vertical plane of the wheel-bases, and that the connection between the center of said bar and the steering-lever is flexible and expansible. A movement of the rear upper end of the steering-lever 76 to the left will effect a movement of the lower forward end 76ª of the said lever to the right and a corresponding movement of the steering-bar 75 to the right. In the movement of the steering-bar 75 to the right said bar exerts a pushing force on the arm 73 and a pulling force on the arm 74, and said arms acting through the forks and axles turn the steering-wheels to the right, and in so doing the right end of the steering-bar moves on an outward curve and slightly farther from the longitudinal center of the member 48 of the steering-head, while the left end of the said steering-bar moves in an inward curve slightly closer to the longitudinal center of said member of the steering-head. This fact, taken in connection with the location of the axles or wheel-bases in the transverse plane of the center of the bar and parallel with and in front of the longitudinal center of the steering-head, insures a greater movement of angularity on the part of the right wheel 59 as compared with the movement of angularity of the left wheel 60 and provides that the right wheel will turn in a smaller circle than the left wheel. This construction and operation insures the turning of the vehicle without lateral slipping of either of the steering-wheels, and since said wheels are mounted for independent revolution they may travel through differential arcs without slipping in the path of travel. The construction and operation just described, taken in conjunction with the canting of the forks and the locations of the axes of oscillation of the forks between the wheels, insures the turning of the vehicle without a tendency

of the wheels to crush over, inasmuch as the wheel-bases are at all times located in the line of the strain or load. A reverse movement of the lever 76 will result in a reverse movement of the steering-bar, steering-arms, steering-wheels, and the entire vehicle.

The body 10 is suspended on leaf-springs 81 82, arranged in pairs and connected at their inner ends to the bottom of the body and at their outer ends to the side braces 17 18 and the frame-head 16.

Mud-guards 83 84 are fixed to and supported by and above the braces 20 21 over the traction-wheels of the vehicle.

Brackets 85 are attached to and depend from the side braces 17 18 below the spaces between the ends of the dash and the arms of the seat 11, and steps 86 are suspended by the lower end portions of said brackets immediately in the rear of the steering-wheels. Mud-guards 87 are fixed to the steps 86 and extend forwardly and upwardly therefrom over the normal positions of the steering-wheels.

A motor 88 of any desired and suitable construction, having a horizontal shaft, is mounted on and depends from the central portion of the bottom of the body 10 with its shaft transversely of said bottom. A counter-shaft 89 is mounted in bearings fixed to the running-gear frame and is arranged for rotation in a horizontal plane parallel with the main shaft of the motor transversely of the vehicle. A sprocket-wheel 90 is mounted on the main shaft of the motor and is connected by a sprocket-chain 91 to a sprocket-wheel 92, of materially greater diameter, on the counter-shaft 89. Sleeves 93 94 are mounted for revolution on the axle-shafts 27 27ª, and traction-wheels 95 96 are mounted rigidly on the outer end portions of said sleeves within the yokes 24 25 or rear forks. Sprocket-wheels 97 98 are mounted rigidly on the extremities of the counter-shaft 89 and are connected, by means of sprocket-chains 99 99, (one only of which is shown,) to sprocket-wheels 100 101, rigidly mounted on the central portions of the sleeves 93 94. By means of the gearing from the motor-shaft to the counter-shaft said counter-shaft is driven continuously and in turn drives the sleeves and traction-wheels thereon continuously.

A rock-shaft 102 is mounted for oscillation in bearings 103 104, projecting rearwardly from the lower member of the frame-head 16. A crank 105 is fixed to the rock-shaft 102, and a brake-rod 106 is pivotally connected at its rear ends to the extremity of said crank and extends forwardly therefrom to some desirable point of access in the vehicle.

A crank 107 is fixed to and depends from each end portion of the rock-shaft 102, and a brake-band 108 has its upper portion wrapped loosely around the rock-shaft adjacent to said crank. Brake-drums 109 are mounted on the end portions of the sleeves 93 94, and the intermediate portions of the brake-bands 108 extend around the peripheries of said drums. The opposite end portions of the brake-bands are pivotally connected to the extremities of the cranks 107. Draft applied to the brake-rod 106 will oscillate the crank 105, rock-shaft 102, and cranks 107, and apply a pulling strain on the extremities of the brake-bands 108. In the application of the pulling strain to the brake-bands 108 said brake-bands contract upon and frictionally engage the drums 109 with a force sufficient to materially limit, retard, or completely stop the revolution of the sleeves 93 94 and traction-wheels.

I claim as my invention—

1. In an automobile, traction-engine or motor-carriage, a steering-head, stems journaled in the end portions of said steering-head, steering-wheels connected with said stems, arms connected with said stems, a steering-bar connecting said arms, a stem pivoted to the central portion of said bar and a steering-lever slidably and rotatably connected with said stem.

2. In an apparatus of the class described, a steering-head, stems journaled in the ends of said steering-head and inclined rearwardly, forks rigidly connected with said stems, steering-wheels in said forks, arms connected with said forks and extended forwardly therefrom, a steering-bar pivoted at its ends to the extremities of said arms, the central portion of said steering-bar being curved rearwardly into the transverse plane of the bases of the steering-wheels and a steering-lever connected with the rearmost and central portion of said steering-bar.

3. In a steering apparatus for motor-vehicles and the like, the combination of a vehicle-frame, a steering-wheel frame or head, axles connected with the steering-wheel head and arranged to oscillate thereon, arms connected with said axles, a steering-bar pivoted to both arms, a stem pivoted to the central portion of the steering-bar and formed with a round shank, a steering-lever mounted for oscillation and formed with a tubular forward end portion interiorly screw-threaded and a plug screwed into the tubular end of said lever and formed with a central longitudinal bore arranged and shaped to receive the round shank of the stem.

4. In an apparatus of the class described, a steering apparatus comprising a steering-head mounted for oscillation on a horizontal axis, stems journaled in the ends of said steering-head and inclined rearwardly, arms connected with the stems and projected beyond a line through said stems, axles fixed to said stems in advance of the axes of oscillation of the stems, a steering-bar pivotally connecting said arms, a stem pivotally connected to the central portion of said steering-bar and a steering-lever slidably and rotatably connected with said stems.

5. In an apparatus of the class described a steering apparatus comprising a steering-

head, stems journaled in the ends of said steering-head and inclined rearwardly, forks rigidly connected with said stems and laterally removed therefrom, steering-wheels in said forks, the axes of revolution of said steering-wheels being in advance of the axes of oscillation of said stems, arms connected with said forks, a steering-bar connecting said arms and means for reciprocating said steering-bar.

6. In an apparatus of the class described, a steering apparatus comprising a steering-head, stems journaled in the ends of said steering-head and inclined rearwardly, forks laterally removed from and rigidly connected with said stems, steering-wheels mounted for revolution in said forks, the axes of revolution of said steering-wheels being in advance of the axes of oscillation of said stems, arms connected with said forks and extending forwardly therefrom beyond the wheel-bases, a steering-bar pivotally connected to the extremities of said arms and means for reciprocating said steering-bar.

7. In an apparatus of the class described, a steering apparatus comprising a steering-head, stems journaled in the ends of said steering-head and inclined rearwardly, forks outside of and rigidly connected to said stems, steering-wheels mounted for revolution in said forks, the axes of revolution of said steering-wheels being in advance of the transverse plane of the axes of oscillation of said stems, arms connected with said forks and extending forwardly therefrom beyond the wheel-bases, a steering-bar pivotally connected at its ends to the extremities of said arms, the central portion of said steering-bar being curved rearwardly into the transverse plane of the axes of revolution of the steering-wheels and means for reciprocating said steering-bar.

8. In an apparatus of the class described, the combination of a reach, a sleeve loosely mounted on the forward end portion of said reach, a steering-head fixed to said sleeve at right angles to the reach, a truss fixed to the reach at the rear of the sleeve and detachably connected to the forward end of the reach in front of the sleeve, stems journaled in the ends of the steering-head and inclined rearwardly, the lower end portions of said stems extending beyond the axes of oscillation thereof, forks outside of and fixed to said stems, axles in the extremities of said forks and stems, arms connected to said stems and forks and extending forwardly therefrom beyond the wheel-bases, a steering-bar pivotally connected at its ends to the extremities of said arms, a stem pivotally connected to the central portion of said steering-bar and a steering-lever slidably and rotatably connected with said stem, whereby the steering head and stem may be detached from the reach and the steering-lever by releasing the means of attachment of the forward ends of the truss from the forward end of the reach.

9. In an apparatus of the class described, the combination of the reach, a steering-head pivotally mounted at its central portion on said reach, a steering-lever mounted for oscillation, a stem slidably and rotatably mounted in the forward ends of said lever, a steering-bar pivotally connected with said stem, arms pivotally connected to the outer ends of said steering-bar and projected at right angles to the steering-bar when the vehicle is arranged for travel in a straight line, stems journaled in the ends of said steering-head and connected with said arms, axles connected with said stems and arms and projecting outwardly therefrom at right angles to the arms and wheels on said axles.

10. In a vehicle of the class described, the combination of a reach, a sleeve loosely mounted on the forward end of said reach, a steering-head fixed to said sleeve and arranged at right angles to the reach, a truss fixed to the reach at the rear of the sleeve and means for detachably connecting the forward ends of the truss to the forward end of the reach, whereby the sleeve and steering-head may be removed from the reach.

11. In an apparatus of the class described, the combination of the steering-lever pivotally mounted in the body and formed with an arm projecting in front of the body, a stem mounted in the forwardly-projecting arm of the lever and arranged for rectilinear reciprocation or rotary oscillation therein, a steering-bar pivotally connecting with said stem and arranged to be reciprocated by said stem in a horizontal plane, arms pivotally connected to the ends of said steering-bar and steering-wheels connected to said arms.

12. In a machine of the class described, the steering-head formed of parallel members, stays connecting the intermediate portions of said members, the fork-bearings connecting the end portions of said members, stems mounted for oscillation in said fork-bearings, the forks removably and replaceably attached to said stems, the axles in said forks, the wheels mounted for revolution on said axles and means for oscillating said forks.

13. In an apparatus of the class described, the steering-head formed with fork-bearings in its ends, the forks laterally removed from the ends of said steering-heads and pivotally connected thereto, the wheels in said forks and arranged with their points of contact with the ground surface in advance of the axes of oscillation of the forks, and means for oscillating said forks.

14. In an apparatus of the class described, the running-gear comprising the reach, the steering-head, the steering-wheels, the frame-head fixed to the rear portion of the reach and braced to the forward portion of said reach, the forks on the ends of said frame-head and the supporting and traction wheels in said forks.

15. In a machine of the class described, the combination of the frame, the axle-shafts in said frame, the sleeves on said axle-shafts, the

traction-wheels on said sleeves, the motor, the counter-shaft, driving connections between the motor and counter-shaft and driving connection between the counter-shaft and the sleeves of the traction-wheels.

16. In a machine of the class described, the combination of the frame, the axle-shafts in said frame, the sleeves on said axle-shafts, traction-wheels rigidly mounted on said sleeves, the motor, the counter-shaft, driving connections between the motor and counter-shaft, driving connections between the counter-shaft and the sleeves of the traction-wheels, brake-drums on said sleeves and brake-bands mounted about the peripheries of the brake-drums and arranged for manual operation.

Signed at Des Moines, Iowa, this 13th day of August, 1900.

ROLLIE B. FAGEOL.

Witnesses:
S. C. SWEET,
C. E. BYSKIT.