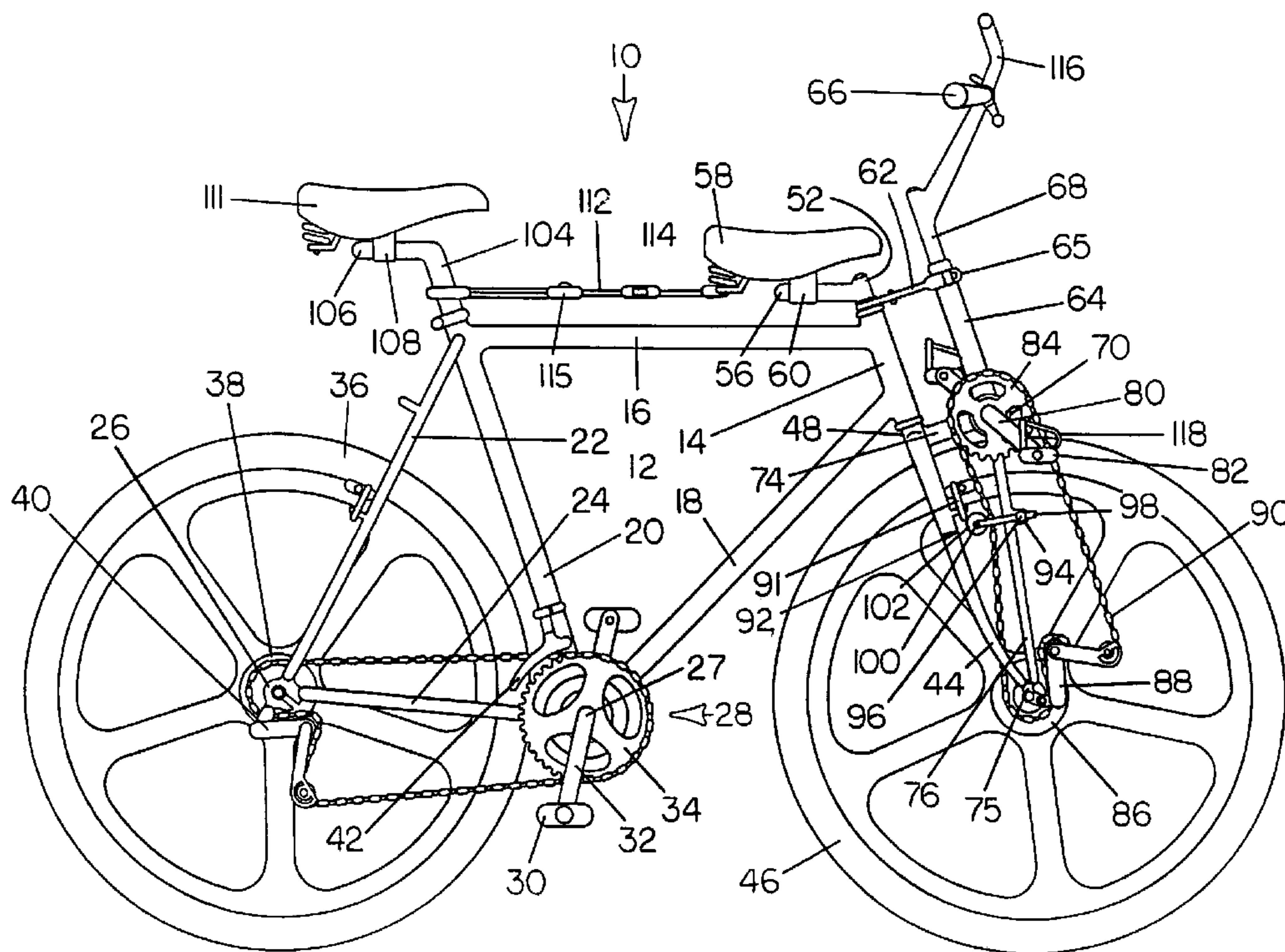




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(54) Title: DUAL SEAT TWO WHEEL DRIVE BICYCLE



(57) Abrégé/Abstract:

A standard bicycle is modified by the addition of an auxiliary child's seat. The front fork of the bicycle is replaced with a specialized front fork mounting a seat, pedals and a drive wheel. The auxiliary front seat is mounted to the stem of the fork above the head tube. The auxiliary pedals are mounted on the front fork immediately below the head tube. They carry a sprocket that is engaged with a chain to a sprocket set on the front wheel. A derailleur on the front fork allows the adjustment of the drive ratio between the front pedals and the wheel speed.

ABSTRACT

A standard bicycle is modified by the addition of an auxiliary child's seat. The front fork of the bicycle is replaced with a specialized front fork mounting a seat, pedals and a drive wheel. The auxiliary front seat is mounted to the stem of the
5 fork above the head tube. The auxiliary pedals are mounted on the front fork immediately below the head tube. They carry a sprocket that is engaged with a chain to a sprocket set on the front wheel. A derailleur on the front fork allows the adjustment of the drive ratio between the front pedals and the wheel speed.

DUAL SEAT TWO WHEEL DRIVE BICYCLE

The present invention relates to bicycles, and more particularly to bicycles for two riders.

Various multiple-rider bicycles have been proposed. The most well-known is the "tandem" bicycle, which is a stretched version of t conventional bicycle with an extra set of handlebars, pedals and seat at the centre of the bicycle. A number of different variations on this type of bicycle are known, including those described in Stanfield United States patent 3,414,288 issued 3 December 1968; Kennedy United States patent 3,717,360, issued 20 February 1973; and Hartmann
5 United States patent 4,666,172, issued 19 May 1987. The Stanfield patent discloses a dual propulsion tricycle with a chain drive for the rear wheel and a direct pedal and crank drive for the front wheel. Kennedy discloses a dual propulsion, three-rider velocipede with outrigger wheels. Hartmann is an articulated frame bicycle with two riders riding the respective frame components. The patent is concerned with
10 planetary transmissions in the front and rear wheel hubs to provide a dual direct drive.

All of these earlier bicycles require specially constructed frames. They are not, in practice, useful as single-rider bicycles.

The present invention is concerned with a system that is useful for
20 modifying a standard bicycle to include an auxiliary seat for carrying a child.

According to a first aspect of the invention there is provided an auxiliary seat system for a bicycle, the bicycle having a frame with a head tube, a rear wheel mounted on the frame to rotate about a transverse rear wheel axis, a steerable front fork with a stem rotatably mounted in the head tube, a front wheel
25 mounted on a the front fork to rotate about a front wheel axis in front of the head tube and a main seat mounted on the frame between the rear wheel axis and the

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head tube, the auxiliary seat system comprising:

an auxiliary seat; and

means for mounting the auxiliary seat on the stem of the front fork, at a position above the head tube, for rotation with the stem.

5 With the seat mounted on the stem of the front fork, the child using the seat will rotate as the bicycle is steered. This does not allow the child to take part in or interfere with steering of the bicycle. With the front of the seat located above the stem, the child's legs are so positioned with respect to the head tube and the front fork that there is no interference with the steering range of the bicycle.

10 The handlebar is preferably mounted in front of the head tube so that the child may comfortably grip the handlebar. Standard bar ends may be mounted on the handlebar as auxiliary hand grips for the child.

The child's feet may rest on foot pedals carried by the front fork. In preferred embodiments, the pedals are mounted on a crank and drive the front
15 wheel through a chain drive with a derailleur.

Both the front and rear seats may be equipped with mounts that allow the forward and rearward adjustment of the seats for the comfort of both riders.

According to a second aspect of the invention there is provided an auxiliary seat system in combination with a bicycle, the bicycle having a frame with a
20 head tube, a rear wheel mounted on the frame to rotate about a transverse rear wheel axis, a steerable front fork with a stem rotatably mounted in the head tube, a front wheel mounted on a the front fork to rotate about a front wheel axis in front of the head tube and a main seat mounted on the frame between the rear wheel axis and the head tube, the auxiliary seat system comprising:

25 an auxiliary seat; and

means mounting the auxiliary seat on the stem of the front fork, at a

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position above the head tube, for rotation with the stem.

According to a third aspect of the invention, there is provided in a bicycle having a frame with a head tube, a rear wheel mounted on the frame to rotate about a transverse rear wheel axis, a steerable front fork with a stem rotatably
5 mounted in the head tube, a front wheel mounted on a the front fork to rotate about a front wheel axis in front of the head tube and a main seat mounted on the frame between the rear wheel axis and the head tube, an auxiliary seat system comprising:

an auxiliary seat; and

means mounting the auxiliary seat on the stem of the front fork, at a
10 position above the head tube, for rotation with the stem.

In the accompanying drawings, which illustrate an exemplary embodiment of the present invention:

Figure 1 is a side elevation view of a bicycle equipped with the system of the present invention;

15 Figure 2 is a partial plan view showing the front end of the bicycle of Figure 1;

Figure 3 is a front view of the bicycle with the chain omitted for clarity;
and

Figure 4 is a side view of the front fork.

20 In the drawings, the control cables have been omitted for clarity.

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Referring to the accompanying drawings, there is illustrated a bicycle 10 with a conventional frame 12. The frame includes a head tube 14. A crossbar 16, a down tube 18 and a seat tube 20 form a triangular main frame structure supporting the head tube at the front. Two seat stays 22 slope downwardly from the junction of the crossbar and the seat tube. Two chain stays project to the rear from the junction of the seat tube 20 and the down tube 18. The seat stays 22 are connected to the chain stays 24 by spaced gusset plates 26. At the juncture of the seat tube 20 and the down tube 18 is a hub 27 carrying a pedal assembly 28 including two pedals 30 mounted on a crank 32. The crank carries a sprocket assembly 34. The rear gusset plates 26 carry a rear wheel 36 rotatable about a transverse rear axle. A sprocket set 38 is fixed to the hub of the rear wheel. A rear derailleur 40 is mounted on one of the gusset plates 26 while a front derailleur 42 is mounted on the frame adjacent the front sprocket assembly 34. A chain engages the front sprocket assembly 34, the rear sprocket set 38 and the two derailleurs 40 and 42. The derailleurs serve to shift the chain from sprocket to sprocket to vary the drive ratio between the pedal crank 32 and the rear wheel.

At the front of the bicycle is a front fork 44. This carries a front wheel 46 rotatable on a transverse front axis. The fork has an upright stem 48 that is mounted rotatably in bearings in the head tube 14.

At the top of the front fork stem is a saddle support 50. This includes a stem tube 52 that fits into the top of the stem 48 and is anchored in place using an internal clamp of the type conventionally used for mounting handlebars on the front fork of a bicycle. A seat tube 56 projects rearwardly from the stem tube and carries an auxiliary bicycle seat 58. This is a conventional bicycle seat with the clamp 60 usually used for clamping the seat to the seat post of a bicycle turned to a horizontal orientation to clamp onto the seat tube. The position of the auxiliary seat on the seat

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tube may be adjusted by loosening the clamp 60, adjusting the seat and then re-tightening the clamp.

Attached to the top of the stem 48 is a tie bar 62 that projects from the front of the stem, in a direction opposite the seat tube 56 and is secured using
5 standard bicycle hardware normally used at this location. The tie bar includes a clamp 65 at the front end, which clamps onto an upright handlebar tube 64. The clamp is adjustable along the handlebar tube to accommodate different lengths of head tube 14. The handlebar tube 64 carries a conventional handlebar 66 with a stem 68 that clamps into the tube 64 as it would normally clamp into the top end of the
10 fork stem. The handlebar is fixed to the tube 64 but may be adjusted vertically in the tube as can be done with conventional handlebars mounted in the top of the fork stem. The bottom end of the tube 64 is connected to a transverse hub 70. The tie bar 62 carries a lug 69 to which the front brake cable (not shown) is adjustably attached.

15 Above the front wheel 46, the front fork carries a forwardly projecting tube 74. This is rigidly attached to the fork below the head tube of the bicycle frame. The forward end of the tube is connected to the hub 70. The hub is coupled to a gusset plate 75 at the bottom end of the front fork 44 on opposite sides of the front wheel by two pedal stays 76. The hub 70 carries a sprocket 84 and a pedal crank 80
20 with two pedals 82 on opposite sides of the front wheel. The hub of the front wheel carries a sprocket set 86 and a derailleur 88 on the same side of the front fork as the sprocket 84. A chain 90 engages the pedal sprocket 84 with the front sprocket set 86 and the derailleur 88 to drive the front wheel using the pedals 82. The drive ratio is selected using derailleur 88.

25 To avoid any interference between the chain 90 and the front brake 91, an idler assembly 92 is used to draw the chain away from the brake. The idler

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assembly includes a lug 94 projecting from the pedal stay 76 on the chain side of the bicycle and a clamp 96 that clamps a rod 98 onto the lug. A transverse shaft 100 projects horizontally inward from the rear end of the rod 98 and carries an idler sprocket 102 that engages the back side of the chain. The idler sprocket may slide
5 transversely along the shaft to accommodate lateral movements of the chain.

At the top of the seat tube 20 is a stem tube 104 that extends into the seat tube and is clamped in place in the usual way.

Attached to the stem tube 104 is a seat tube 106 that projects horizontally to the rear of the stem tube 104. The rear seat 111 of the bicycle is mounted on the seat tube
10 106 and may be adjusted forwardly and rearwardly on the seat tube by releasing a clamp 108 and re-tightening the clamp once the seat is in the desired position.

For mounting and parking purposes, a tether 112 extends between the rear stem tube 104 and the back of the auxiliary seat 58. The tether is a webbing strap with a quick-release buckle 114. The length of the tether is adjustable using a
15 buckle 115. The tether will hold the front fork in place while a child is mounting the auxiliary seat at the front of the bicycle.

The system is completed with two auxiliary handgrips 116 mounted on the handlebar 66. These are conventional bar ends mounted inwardly from the handlebar end grips and project outwardly to provide a child in the auxiliary seat with
20 handgrips that do not interfere with the normal use of the bicycle. Standard toe clips 118 ensure that the child's feet are retained on the front pedals 82.

As will be understood from the foregoing, the bicycle described in the foregoing is based on a standard bicycle with the front forks replaced with a specialized front fork mounting a seat, pedals and a drive wheel. The auxiliary seat is
25 a conventional seat of dual spring construction to absorb shocks. The tube assembly mounting this seat is mounted into the stem of the front fork that normally receives the

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handlebars. With the described seat mounting arrangement, the seat is mounted above the head tube and can be adjusted forwardly and rearwardly with respect to the head tube. The child moves in rotation with the steering of the bicycle. This does not allow the child to take part in or interfere with the steering either with the feet or
5 hands. The child's legs are clear of the main bicycle frame so that a full range of travel of the bicycle steering is available.

The child has access to a shift lever 120 which controls the front derailleur 88 so that this derailleur can be adjusted to the child's preference.

The present system may be provided as a retrofit kit that will fit a wide
10 variety of bicycles. Where desired, it may also be provided as an integrated part of a bicycle. Many of the parts are standard bicycle parts, so that maintenance and repair may be done readily and at reasonable cost.

Although this system can be mounted on most styles of bicycles, it is intended for all terrain bicycles (ATB) with a strong frame. Cycling should be no more
15 challenging than light off road touring.

While one particular embodiment of the present invention has been described in the foregoing, it is to be understood that other embodiments are possible. It is of particular importance to note that while the standard bicycle frame described in the foregoing has a horizontal crossbar, other styles with sloping crossbars or stays
20 that extend from the head tube to the rear wheel gusset plate will also accept the auxiliary seat of the present invention. The embodiment described above has an auxiliary pedal and front wheel drive system that may be omitted in other embodiments. In such embodiments, stationary pedals may be used on the front fork. Other embodiments use a disc brake on the front wheel. This eliminates
25 the need for the idler assembly 92 on the front wheel drive. These and other embodiments are included within the scope of the appended claims.

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CLAIMS

1. An auxiliary seat system for a bicycle, the bicycle having a frame with a head tube, a rear wheel mounted on the frame to rotate about a transverse rear wheel axis, a steerable front fork with a stem rotatably mounted in the head tube, a
5 front wheel mounted on a the front fork to rotate about a front wheel axis in front of the head tube and a main seat mounted on the frame between the rear wheel axis and the head tube, the auxiliary seat system comprising:
an auxiliary seat; and
means for mounting the auxiliary seat on the stem of the front fork, at a
10 position above the head tube, for rotation with the stem.
2. An auxiliary seat system according to claim 1 for a bicycle including a handlebar for steering the front wheel, wherein the auxiliary seat system includes handlebar mounting means for mounting the handlebar on the stem above the head tube and in front of the auxiliary seat.
- 15 3. An auxiliary seat system according to claim 2 including auxiliary handgrips for mounting on the handlebar.
4. An auxiliary seat system according to any one of claims 1 to 3 wherein the auxiliary seat mounting means comprise means for adjusting the position of the auxiliary seat towards and away from the stem.
- 20 5. An auxiliary seat system according to any one of claims 1 to 4 including auxiliary foot pedals for support on the front fork, forward of the head tube.
6. An auxiliary seat system according to claim 5 wherein the auxiliary foot pedals include a crank and including front drive means for coupling the crank to the front wheel to drive the front wheel in response to rotation of the crank.
- 25 7. An auxiliary seat system according to claim 6 wherein the front drive means include a drive sprocket on the crank, a driven sprocket for mounting on the

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front wheel and a chain engaged with the drive sprocket and the driven sprocket for driving the driven sprocket from the drive sprocket.

8. An auxiliary seat system according to claim 7 wherein the driven sprocket comprises a plurality of driven sprockets for mounting on the front wheel and a derailleur for selectively engaging the chain with respective ones of the driven sprockets.

9. An auxiliary seat system according to any one of claims 1 to 8 including main seat mounting means for mounting the main seat on the frame and including means for adjusting the position of the main seat forwardly and rearwardly along the frame.

10. An auxiliary seat system in combination with a bicycle, the bicycle having a frame with a head tube, a rear wheel mounted on the frame to rotate about a transverse rear wheel axis, a steerable front fork with a stem rotatably mounted in the head tube, a front wheel mounted on a the front fork to rotate about a front wheel axis in front of the head tube and a main seat mounted on the frame between the rear wheel axis and the head tube, the auxiliary seat system comprising:

an auxiliary seat; and

means mounting the auxiliary seat on the stem of the front fork, at a position above the head tube, for rotation with the stem.

11. The combination according to claim 10 wherein the bicycle includes a handlebar for steering the front wheel and the auxiliary seat system includes handlebar mounting means mounting the handlebar on the stem above the head tube and in front of the auxiliary seat.

12. The combination according to claim 11 wherein the auxiliary seat system includes auxiliary handgrips mounted on the handlebar.

13. The combination according to any one of claims 10 to 12 wherein the

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auxiliary seat mounting means comprise means for adjusting the position of the auxiliary seat towards and away from the stem.

14. The combination according to any one of claims 10 to 13 wherein the auxiliary seat system includes auxiliary foot pedals supported on the front fork,
5 forwardly of the head tube.

15. The combination according to claim 14 wherein the auxiliary foot pedals include a crank and including front drive means coupling the crank to the front wheel for driving the front wheel in response to rotation of the crank.

16. The combination according to claim 15 wherein the front drive means
10 include a drive sprocket on the crank, a driven sprocket on the front wheel and a chain engaged with the drive sprocket and the driven sprocket for driving the driven sprocket from the drive sprocket.

17. The combination according to claim 16 wherein the driven sprocket
15 comprises a plurality of driven sprockets on the front wheel and a derailleur for selectively engaging the chain with respective ones of the driven sprockets.

18. The combination according to any one of claims 10 to 17 wherein the auxiliary seat system includes main seat mounting means mounting the main seat on the frame and including means for adjusting the position of the main seat forwardly and rearwardly along the frame.

20 19. In a bicycle having a frame with a head tube, a rear wheel mounted on the frame to rotate about a transverse rear wheel axis, a steerable front fork with a stem rotatably mounted in the head tube, a front wheel mounted on a the front fork to rotate about a front wheel axis in front of the head tube and a main seat mounted on the frame between the rear wheel axis and the head tube, an auxiliary seat
25 system comprising:

an auxiliary seat; and

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means mounting the auxiliary seat on the stem of the front fork, at a position above the head tube, for rotation with the stem.

20. The bicycle according to claim 19 wherein the bicycle includes a handlebar for steering the front wheel and the auxiliary seat system includes
5 handlebar mounting means mounting the handlebar on the stem above the head tube and in front of the auxiliary seat.

21. The bicycle according to claim 20 wherein the auxiliary seat system includes auxiliary handgrips mounted on the handlebar.

22. The bicycle according to any one of claims 19 to 21 wherein the
10 auxiliary seat mounting means comprise means for adjusting the position of the auxiliary seat towards and away from the stem.

23. The bicycle according to any one of claims 19 to 22 wherein the auxiliary seat system includes auxiliary foot pedals supported on the front fork, forwardly of the head tube.

15 24. The bicycle according to claim 23 wherein the auxiliary foot pedals include a crank and including front drive means coupling the crank to the front wheel for driving the front wheel in response to rotation of the crank.

25. The bicycle according to claim 24 wherein the front drive means include a drive sprocket on the crank, a driven sprocket on the front wheel and a
20 chain engaged with the drive sprocket and the driven sprocket for driving the driven sprocket from the drive sprocket.

26. The bicycle according to claim 25 wherein the driven sprocket comprises a plurality of driven sprockets on the front wheel and a derailleur for selectively engaging the chain with respective ones of the driven sprockets.

25 27. The bicycle according to any one of claims 19 to 26 wherein the auxiliary seat system includes main seat mounting means mounting the main seat

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on the frame and including means for adjusting the position of the main seat forwardly and rearwardly along the frame.

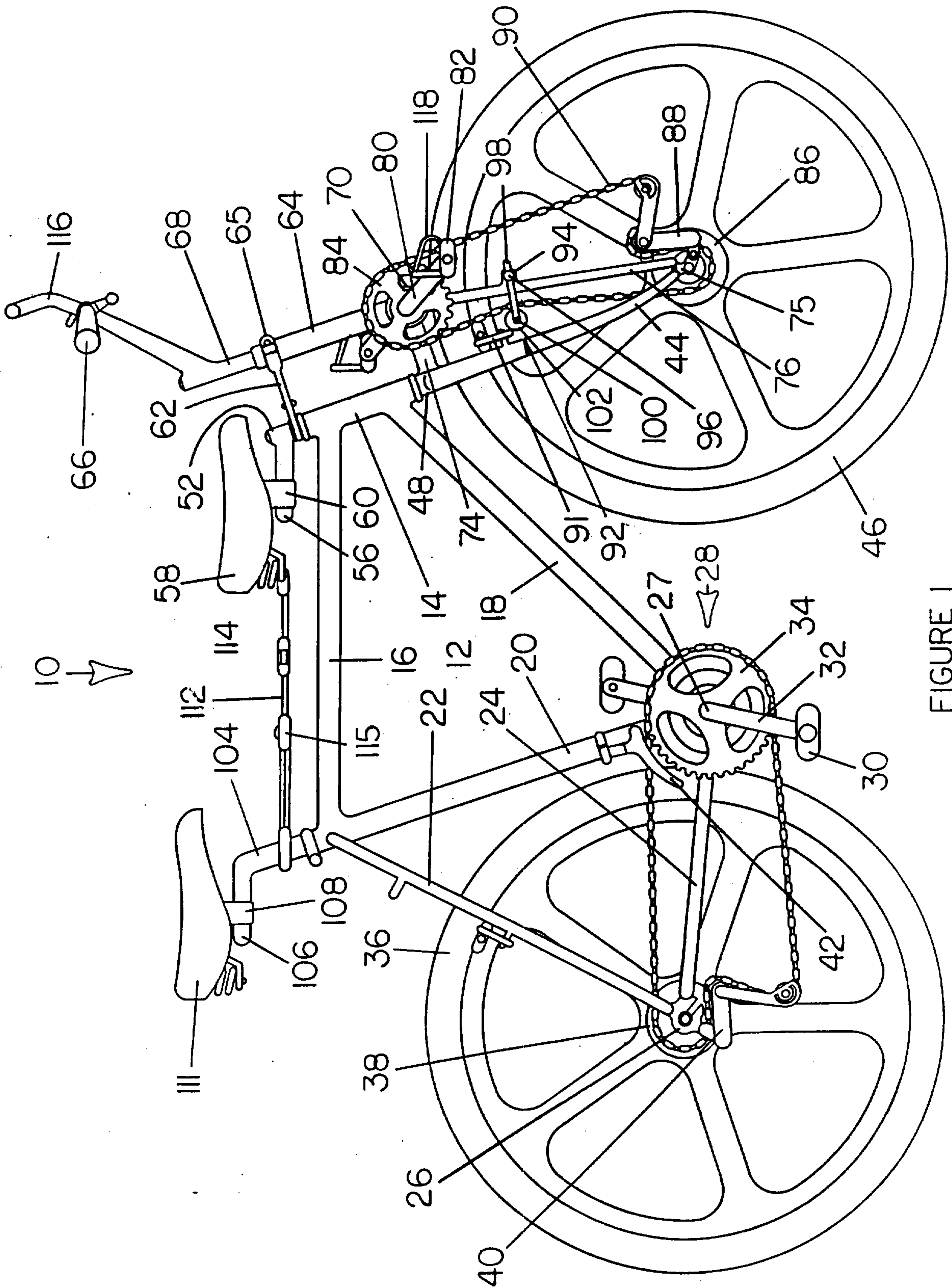


FIGURE 1

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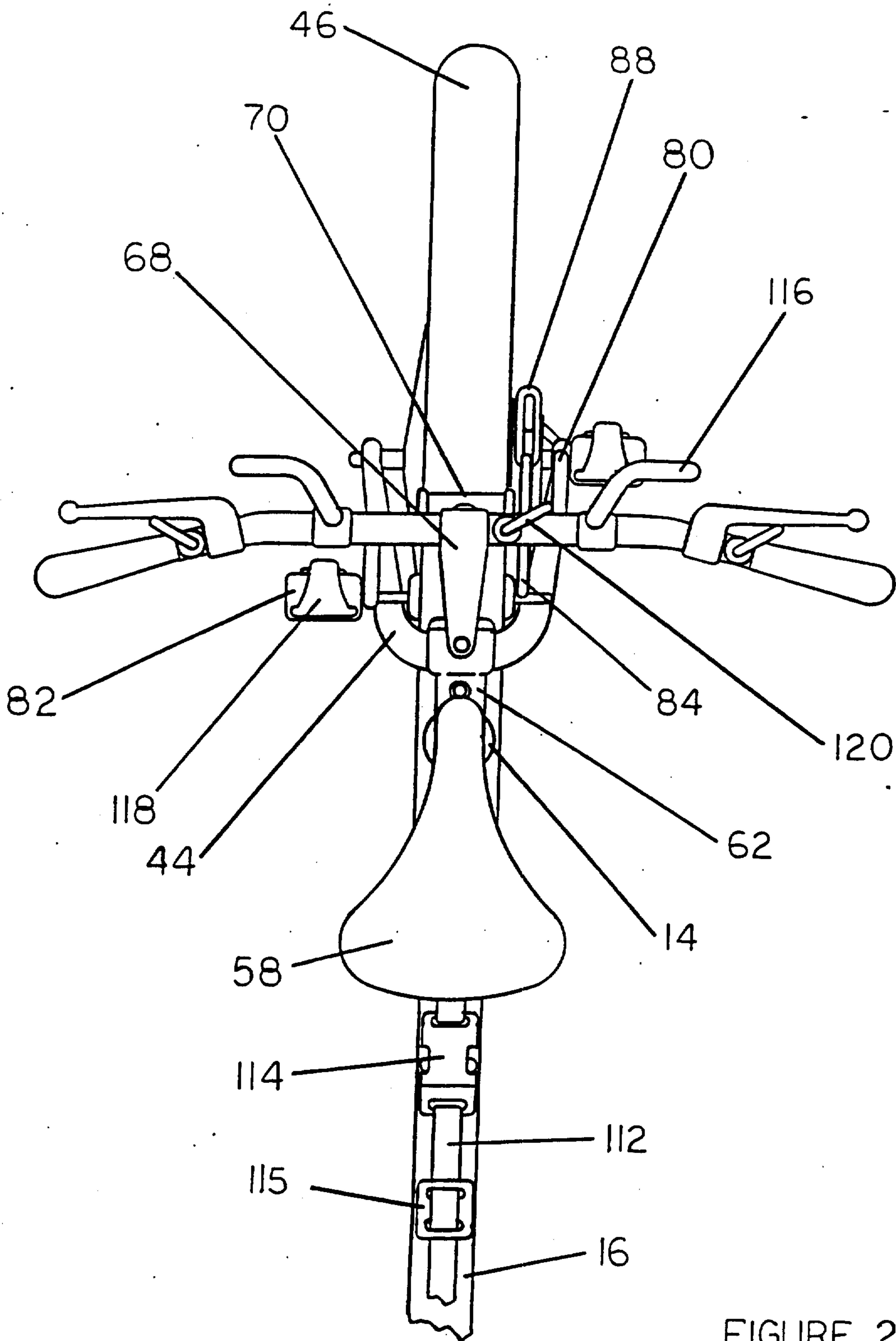


FIGURE 2

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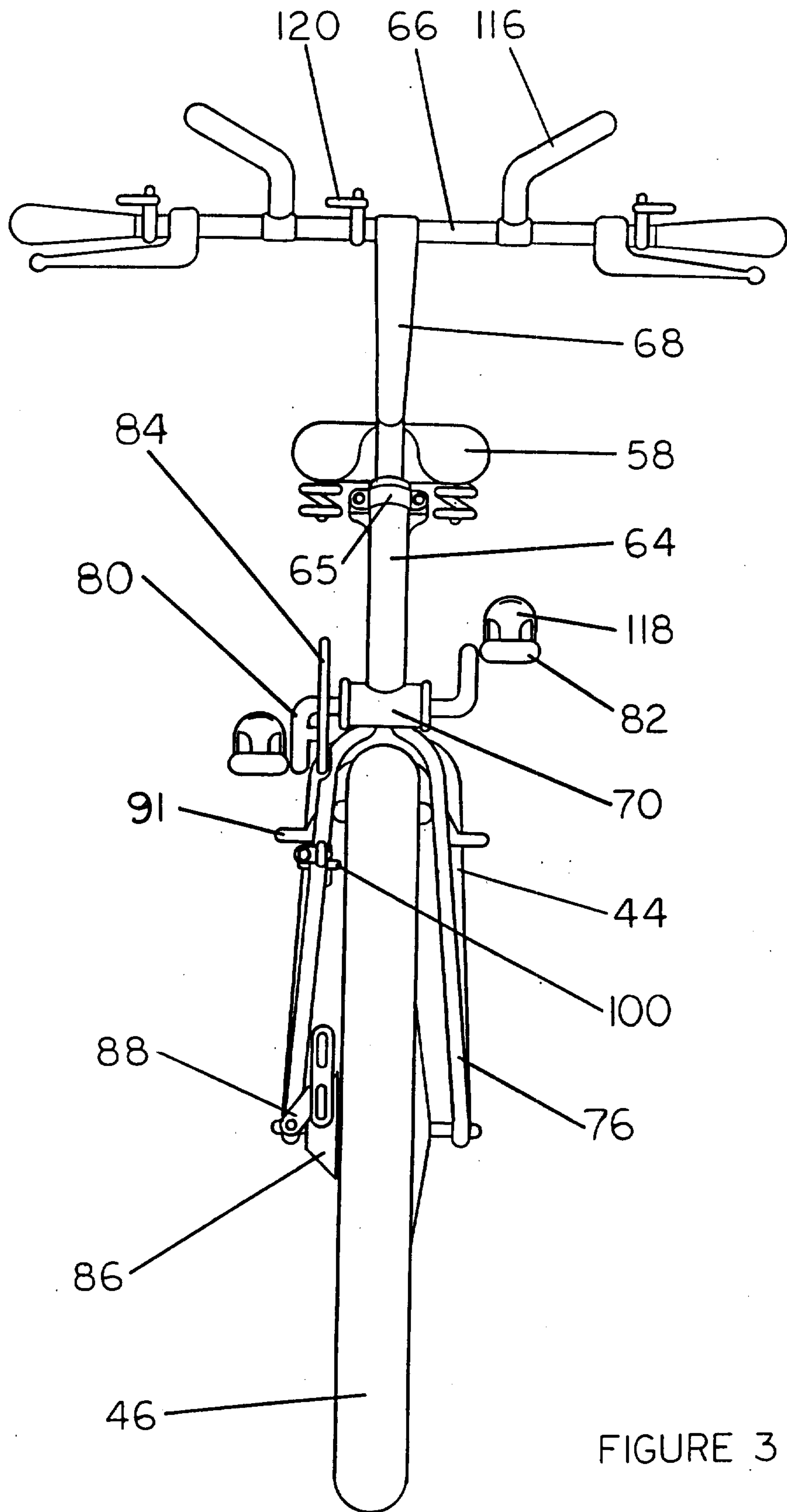


FIGURE 3

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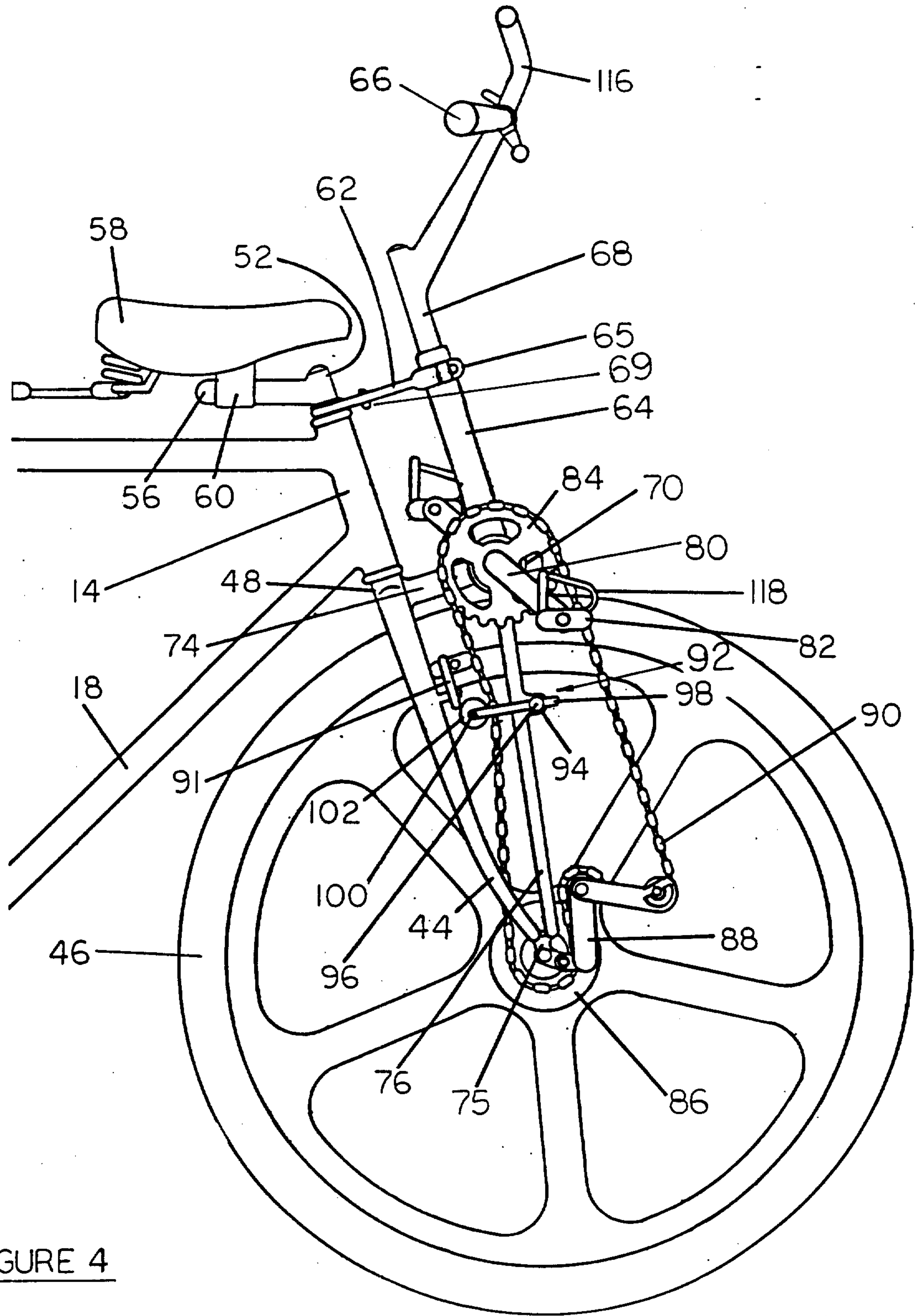


FIGURE 4

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