Oct. 24, 1939. C. F. RUBLE 2,177,552

TOY VEHICLE

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FIG. 1

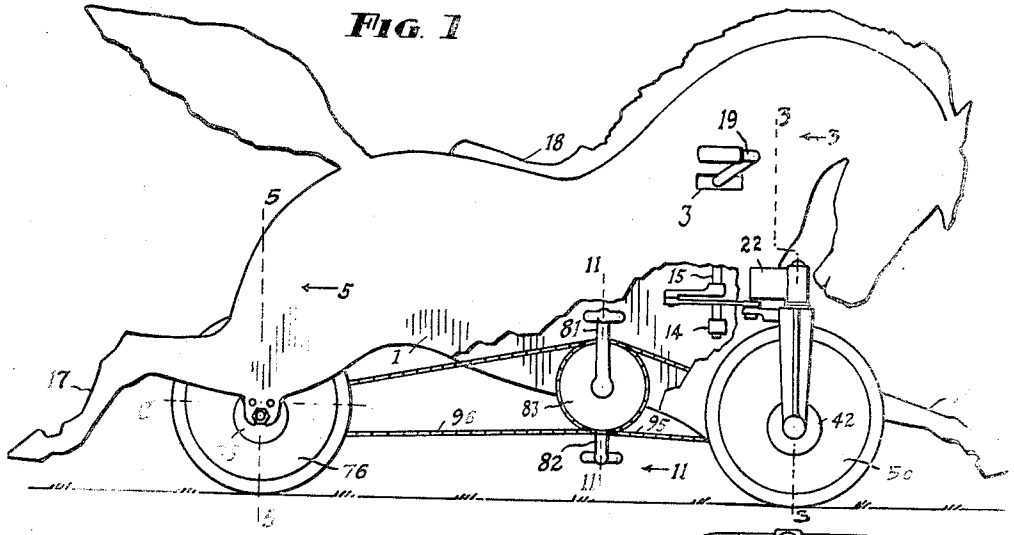


FIG. 2

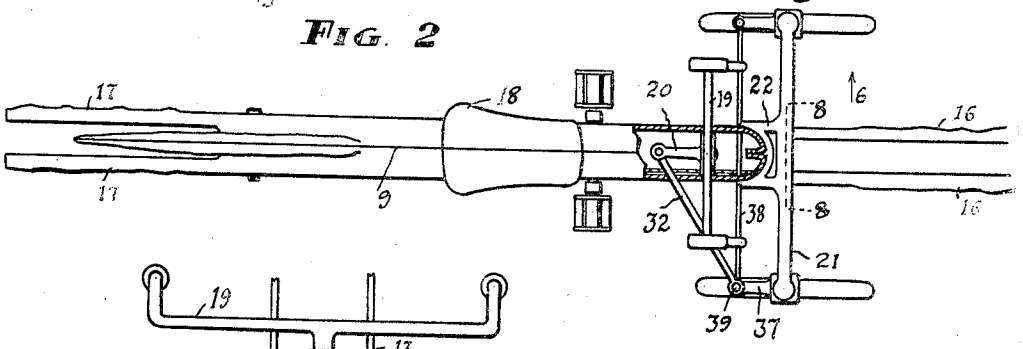


FIG. 3

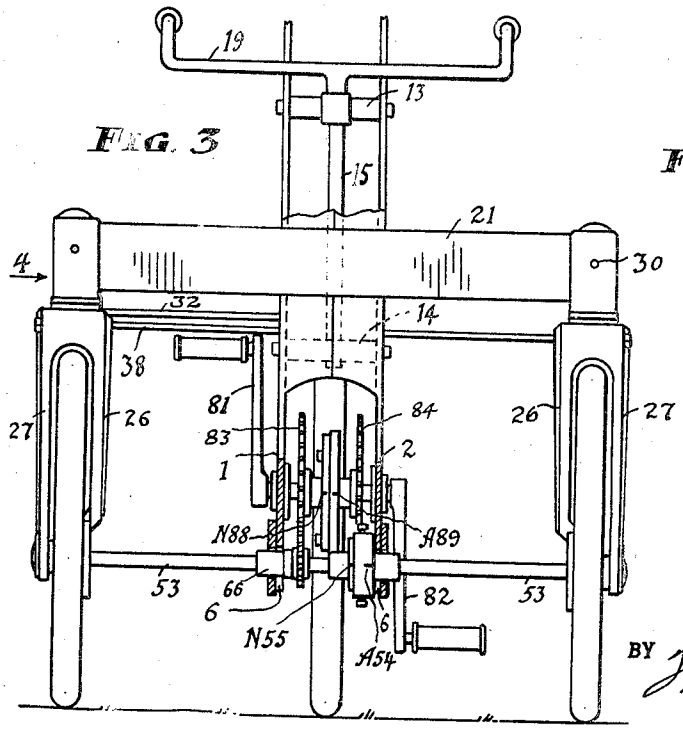
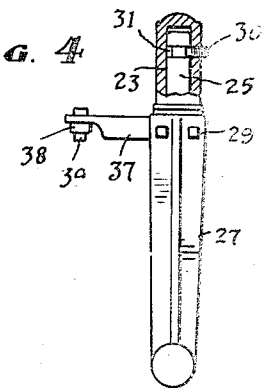


FIG. 4



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FIG. 14

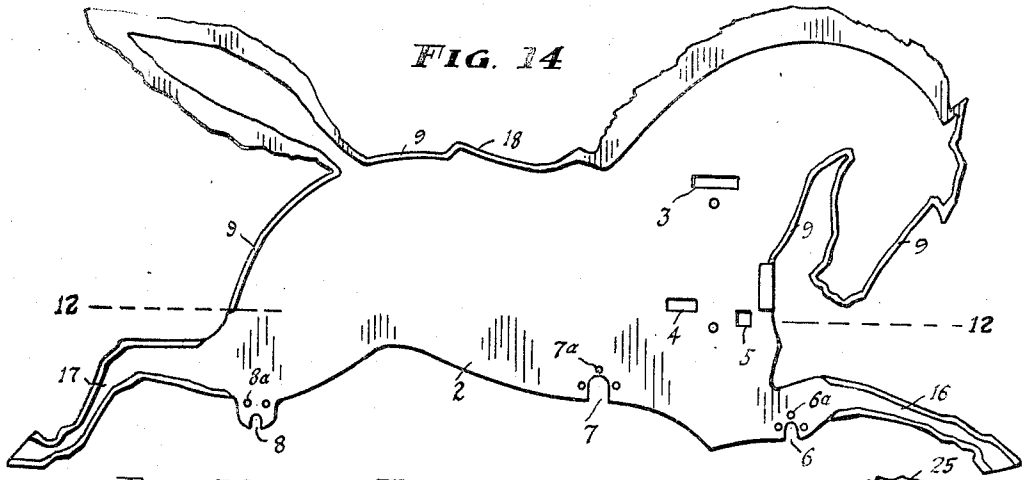


FIG. 12

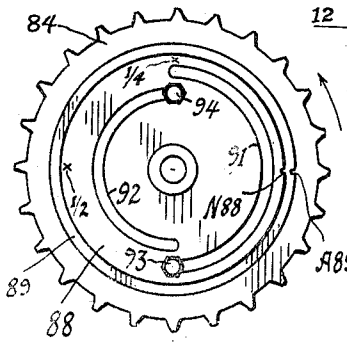


FIG. 11

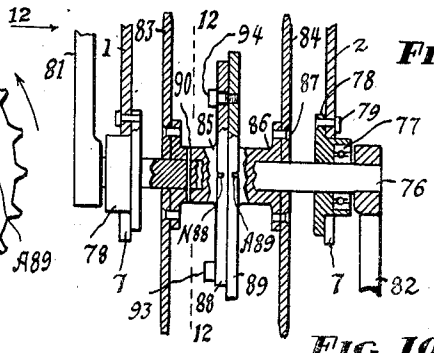


FIG. 6

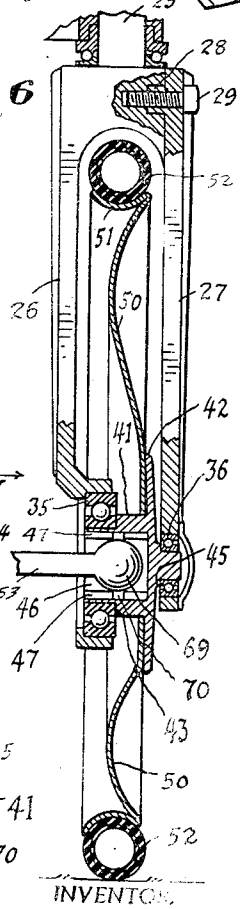


FIG. 8

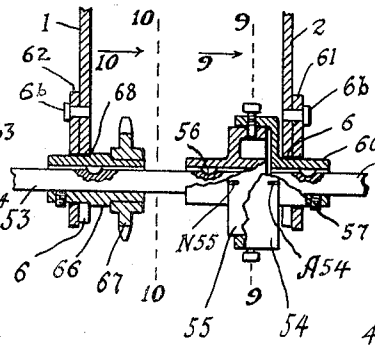


FIG. 10

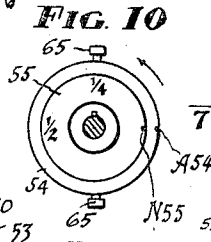


FIG. 9

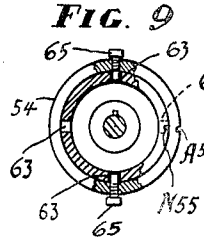


FIG. 7

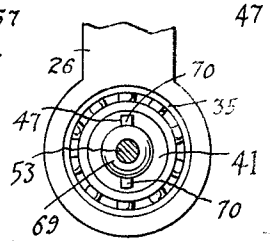


FIG. 5

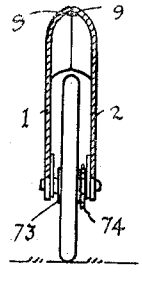
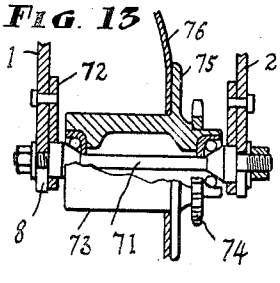


FIG. 13



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UNITED STATES PATENT OFFICE

2,177,552

TOY VEHICLE

Cecil F. Ruble, Richmond, Ind.

Application April 1, 1938, Serial No. 199,472

6 Claims. (Cl. 280—1.18)

This invention relates to improvements in playground devices of the wheeled vehicle type intended to afford exercise, recreation and amusement for the rider.

The object of the invention, broadly stated, is to provide a vehicle of the above general description which will so function, as it travels, that the rider is carried through movements akin to those experienced in riding horseback. Other and more specific aims are to provide a vehicle of the kind described, which is sturdy, dependable, easy to control and steer, relatively light in weight, and economical of manufacture. Also, which will readily lend itself to practicable modifications in frame and body design, and in alterations as to size and capacity.

The objects and aims of my invention are accomplished by, and the invention is embodied in the new construction, combination, and arrangement of parts illustrated in the accompanying drawings and described in the following specification.

The several parts of the invention are identified by suitable characters of reference applied to them in the different views in the drawings, in which—

Figure 1 is a side view of my improved amusement vehicle, portions of the side of the frame structure being broken away.

Figure 2 is a top plan view of Figure 1, portions of the top of the frame structure being broken away.

Figure 3 is a vertical cross section view, enlarged, taken on the broken line 3—3, in the direction of arrow 3 in Figure 1.

Figure 4 is a side view of the fork structure, taken in the direction of arrow 4 in Figure 3.

Figure 5 is a vertical cross section view taken on the broken line 5—5, in the direction of arrow 5 in Figure 1.

Figure 6 is a vertical central cross section view, enlarged, of the left side traction wheel and its connections, taken in the direction of arrow 6 in Figure 2.

Figure 7 is a side view of the front hub construction, taken in the direction of arrow 7 in Figure 6.

Figure 8 is a vertical cross section view, enlarged, taken on the line 8—8 in Figure 2.

Figure 9 is a vertical cross section view, on the line 9—9, in the direction of arrow 9 in Figure 8.

Figure 10 is a vertical cross section view, on the line 10—10, in the direction of arrow 10 in Figure 8.

Figure 11 is a vertical cross section view, enlarged, taken on the line 11—11, in the direction of arrow 11 in Figure 1.

Figure 12 is a vertical cross section view taken on the line 12—12, in the direction of arrow 12 in Figure 11.

Figure 13 is a detached detailed view, partly in cross section, of the hub structure of the rear traction wheel.

Figure 14 is a detached view of one of the sections, namely the left half section, of the frame structure.

In the present illustration of my invention, and wherein the vehicle is intended to be mounted by the rider after the manner of a tricycle or the like, the frame of the vehicle is of fanciful design representing an animal, preferably a horse. It is made of stout material such as sheet metal, wood fiber or other substantial composition, fashioned and adapted to provide a seat for the rider, and also to provide supports and connections for the different parts to be presently described. The said frame is composed of light sheet metal blanks pressed into suitable formation as shown and which constitute similar complemental half sections. In each of these half-sections, and which are designated as side plates 1 and 2, are provided an opening 3, an opening 4, and an opening 5 and through which said openings are passed the certain parts to be presently referred to. The border faces of the said side plates in the portions 9 thereof above the broken line 12—12, and in the leg portions thereof below said line 12—12 (see Figure 14) are united, as by electric welding, the frame thus constituted being light in weight and substantial in structure. The said side plates at their portions 1 and 2 are of straight formation and each is provided with a recess 6, a recess 7, and a recess 8. Holes 6*a*, 7*a* and 8*a* adjacent to the said recesses are for the reception of fastener screws presently to be referred to. The leg extensions 16 and 17 are preferably of curved formation in cross section to impart stiffness to them. The seat may consist of a slightly raised and curved portion 18.

A transverse beam 21 (see Figure 2) has its central portion 22 of formation to fit the front end of the said frame, and to which said frame it is firmly secured as by electric welding. Each end of said beam embodies a boss which is provided with a vertical bore that constitutes a socket 23, as shown in Figure 4. In each of these sockets 23 is journaled stem 25 of a fork between whose opposed arms 26 and 27 the traction wheel presently to be referred to, is received. The fork (see Figure 6)

is of divided formation, one arm thereof embodying the said stem 25, and the two arms being securely united at their head portions by a tenon jointure 28 and cap screws 29. The said stem 25 is retained in its position as by a fixed pin 30 whose inner end engages in a circumferential groove 31 in said stem. In suitable bores provided in the lower ends of said fork arms are secured the outer rings of the bearings 35 and 36. Integrated with the head portion of each of the said forks, as by welding, is an arm 37. A transverse connector rod 38 has its ends articulated with the said arms 37, as by pins 39.

In Figure 6 is shown in detail, the hub 41 that is journaled in each of said forks. This hub is cylindrical and it embodies an annular flange 42 to which the traction wheel is made fast, as by welding. Its inner end is of reduced diameter and is provided with annular shoulder 43 at which the inner ring of the bearing 35 is received. Its outer end also is of reduced diameter and it is provided with shoulder 45 and at which the inner ring of the bearing 36 is received. The said hub is provided with axial bore 46, and with opposed longitudinal slots 47.

A traction wheel consisting of a light sheet metal disk 50 of dished formation in cross section, as shown in Figure 6, and which embodies rim 51 in which a tire 52 of suitable type is retained, is secured eccentrically to the said flange 42. The traction wheels shown in the drawings, being similar to each other, this description in the singular, is deemed sufficient.

53 designates a countershaft to which is applied the power from a driving shaft presently to be mentioned. This countershaft is of divided formation. Heads 54 and 55 which are secured (as by a Woodruff key 56 and a set screw 57) to the proximate ends of the shaft sections, are adapted to be so retained in their coupled relation, that one may be shifted rotatively to a position different from a given position of the other. The preferred form of construction and arrangement of these heads is shown in Figure 8. Head 54 embodies a cylindrical flange which engages the cylindrical flange of the other head. The boss 60 of the head 54 is received in the recess 6 of the side plate 2 of the frame. A plate 61 loose on said countershaft and whose bore is of diameter to clear the said boss 60 is made fast to the frame side 2 as by suitable cap screws 6b, and it serves as a convenience in supporting the shaft head when assembling and disassembling the parts, and as a guard against undue flexing of the countershaft under driving strains. A similar plate 62 whose bore is of diameter to clear the sprocket wheel hub presently to be referred to, and which is made fast to the frame side 1, serves the same purpose as the plate 61.

In the flange of the head 55 are four recesses 63 which are spaced equidistant, or 90 degrees apart. In the flange of head 54 are two diametrically opposed set screws 65. These screws 65 in their close fitting engagement with the recesses 63 unite the said heads so that the half sections of the countershaft are as one. By this arrangement it is practicable to set the shaft sections in related positions different from the positions indicated in the drawings. This is accomplished by retracting the screws 65, then shifting the head 55 ninety degrees, or one quarter of a revolution, and then returning the said screws to their home positions in engagement with the other pair of recesses 63. The reason for providing means whereby to differentiate the relative positions of the sections of this countershaft will presently be pointed out.

Secured to the said countershaft 53, as by a Woodruff key and a set screw, is a hub 66 with which is integrated, as by electric welding, a sprocket wheel 67. This sprocket wheel being belted to a driving sprocket presently to be described, the head 54 of the free half section of the countershaft is the one which is moved to shifted position when the relative positions of the front traction wheels are to be changed.

At each end of the said countershaft 53 is integrated a spherical bearing ball 69. The recesses 6 in the bottom of the frame sides (see Figure 8 and Figure 14) permit of this countershaft being disposed in position, the said balls 69 being received in the bores of the said hubs 41, and their centers being coincident with the vertical axes of said forks. The shaft head 54, and the shoulder 68 of the sprocket wheel hub 66 being in registration with the interior faces of the sides 1 and 2 of the frame, the countershaft is stayed against any tendency to move transversely. The ends of a cross pin which is secured diametrically in each of the balls 69, constitute studs 70 which are received in, and which have direct coengagement with the parallel opposed longitudinal slots 47 of the said hub. By the above described combination and arrangement of parts I accomplish a flexible power transmitting connection between the countershaft and the front hubs.

Journaled on a cross shaft 71 whose ends are received in the bores of stay plates 72, and in the recesses 8 of the frame sides 1 and 2 (see Figure 13), is a rear hub 73 and to which is secured, as by electric welding, the sprocket wheel 74. This sprocket wheel is of same diameter as that of the sprocket wheel 67 hereinbefore mentioned.

Secured eccentrically to the flange 75 of the said hub 73 is a traction wheel 76 which is of diameter and structure the same as the diameter and structure of the frontal traction wheels 50 hereinbefore described.

In suitable bearings provided in cross members 13 and 14 (see Figure 1 and Figure 3) which are secured within the frame, is swiveled a steering column 15 provided with a conventional handle bar 19. Loosely articulated with a bell crank 20 (see Figure 2) which is secured to the lower portion of column 15, is a connector rod 32 which in turn is connected loosely, as by pin 39, to the end of arm 37 of the right front fork. Clearance for the outer portions of the handle bar is provided for by the openings 3 in the sides of the frame. By this arrangement the handle grips are conveniently in reach and the rider is enabled to direct the front wheels at the desired angle and thereby to guide the vehicle at will.

My invention, being intended in the present instance, as applicable to a vehicle of the velocipede type, I have shown the driving mechanism as operable by cranks and pedals. This driving mechanism I have constructed in the form of an assembly. It consists of a cross shaft 76 provided with bearings 77 which are retained in housing plates 78, the latter being adapted to be secured to the frame sides 1 and 2, as by cap screws 79. At the ends of said shaft are secured the conventional cranks 81 and 82.

Sprocket wheels 83 and 84, similar in diameter, are secured to hubs 85 and 86 respectively, as by cap screws 87. The said hubs embody face plates which preferably are of the form of disks 88 and 89. One of the said hubs, namely the hub 85 is made fast to the shaft 76 as by a diametric pin 90.

(The sprocket wheel 83 is belted to the aforesaid sprocket wheel 67 of the countershaft 53, as will presently be referred to). In the disk 88 are two arcuate slots 91 and 92. (See Figure 12).

Through the end of one of these slots, namely the slot 91, a cap screw 93 is passed and it is screwed into the disk 89. Through the end of the other slot, namely the end which is remote from the end of the first named slot which received the cap screw 93, is passed a cap screw 94. Said cap screw 94 is screwed into the disk 89. The disk 88 is thereby made fast to the said disk 89. Thus, whereas the sprocket wheels 83 and 84 are united and they move in unison, the position of one, with relation to the position of the other, rotatively, may be changed. Further reference to this feature will presently be made. Belting the sprocket wheel 83 to the sprocket wheel 67 of the countershaft 53, is a sprocket chain 95; and belting the sprocket wheel 84 to the sprocket wheel 74 of the rear hub 73, is a sprocket chain 96.

With the mechanism organized, and the several parts thereof arranged as shown in the drawings, the hubs 41 and 73 of the traction wheels are on a common plane, the minimum radius of each of said traction wheels being perpendicular.

In rotating of the drive shaft 76, there is direct propulsion of the front hubs 41 and the rear hub 73 in the same direction and at the same speed. As the vehicle moves, each of the said hubs is carried in an orbit about the center (said center being on the plane indicated by the broken line marked C (see Figure 1)) of its traction wheel, there being thus imparted to the frame of the vehicle, a rising and lowering motion simultaneously with the rolling of the traction wheels on a plane. This action of the frame structure may be designated as the trotting motion and wherein the upward movement and the downward movement of the front hubs, is simultaneous with the upward movement and downward movement of the rear hub.

To facilitate the altering of the position of the disk 89 (whereby the position of the rear hub 73 is shifted); and, to facilitate the altering of the position of the head 54 of the countershaft (whereby the position of the left front traction wheel is shifted); I have provided certain markings.

The mark N as hereinafter referred to, means normal; and the mark A as hereinafter referred to, means alter. Each of these marks is associated with the character that is indicatory of the certain part to which said mark is applied.

N88 on disk 88; and mark N55 on the shaft head 55, each, is located to face toward the front of the vehicle (when the latter is in the static position as shown in Figure 1) the said marks thereby being easy of observation.

The several parts of the invention as they appear in the drawings, are in what may be designated as their normal positions.

Mark N88 on the disk 88, is in registration with mark A89 on the disk 89.

Mark N55 on the head 55, is in registration with mark A54 on the head 54.

On the peripheral portion of the disk 88, and spaced from the mark N88 a distance equal to the measure of one-quarter of a revolution of the rear hub 73 is a mark ¼. On the peripheral portion of the disk 88 and spaced from the mark N88 a distance equal to the measure one half of a revolution of the rear hub 73, is a mark ½.

On the shaft head 55 and spaced ninety degrees from the mark N55 is a mark ¼. On the head 55 and spaced one hundred and eighty degrees from the mark N55 is a mark ½.

Preparatory to altering the position of the disk 89, the screws 93 and 94 are loosened. Now, with a setting of the disk 89 (moving it in the direction of arrow in Figure 12) so that its mark A89 is in registration with the mark ½ on the disk 88, the hub 73 will have been shifted one half of a revolution. The screws 93 and 94 are now tightened thereby securely reuniting the disks 88 and 89. With the rear traction thus changed from normal, the rear portion of the vehicle frame rises while the forward portion thereof lowers, thus imparting to the frame a movement which I designate as the perfect loping motion. A setting of the disk 89 with its mark A89 to registration with the mark ¼ on disk 88, the rear traction wheel being thereby shifted one quarter of a revolution, there is obtained an intermediate movement. The movement thus imparted to the vehicle frame, I designate as the partial loping motion.

To obtain a pacing motion of the vehicle frame; set the disk 89 so that its mark A89 is in registration with the mark ¼ on disk 88, the hub 73 with its traction wheel being thereby shifted one quarter of a revolution, then tighten the screws 93 and 94. Next, is the alteration of the position of the shaft head 54. Preparatory to alteration of said shaft head 54, the screws 65 are unscrewed sufficiently to clear the recesses 63. Now with a setting of the shaft head 54 (moving it in the direction of arrow in Figure 10) so that its mark A54 is in registration with the mark ½ on the head 55, the left front traction wheel will have been shifted to position directly opposed to the eccentricity of the right front traction wheel. At the same time, it will be understood that the rear traction wheel is at its shifted position of one quarter of a revolution removed from normal. In this pacing motion of the frame, the frontal portion thereof while rising on one side, is lowering on its ppposite side, and the rear portion of the frame is rising and lowering.

Whereas I have described and illustrated in the present specification and drawings what I consider as the preferred form, structure and arrangement of the several parts, and the preferred details of construction for carrying my invention into effect, it will be understood that minor changes and modifications may be made within the scope of the invention as it is defined in the appended claims, without departing from the spirit or principle of the invention or sacrificing any of its advantages.

What I claim as my invention is:

1. A vehicle of the kind described, comprising a frame, a fork swiveled on said frame at each side of an end portion thereof, a hub journaled in each fork, a hub journaled at the other end portion of the frame, a traction wheel secured eccentrically to each of the said hubs, and gearing between said hubs whereby all of them are rotated at the same speed.

2. A vehicle of the kind described, comprising a frame, a fork swiveled on said frame at each side of an end portion thereof, a hub journaled in each fork, a hub journaled in the other end portion of the frame, a traction wheel secured eccentrically to each of the said hubs, gearing between said hubs whereby all of them are rotated at the same speed, and means operable to move the forks to and to retain them in varied angles inclined to the longitudinal axis of the vehicle.

3. A vehicle of the kind described comprising a frame, a fork swiveled on said frame at each side of an end portion thereof, a hub journaled in each of the forks, a hub journaled in the other end portion of the frame, a driving mechanism carried by the frame, a countershaft having its ends flexibly articulated in driving coengagement with the hubs of said forks, power transmitting connections between the driving mechanism and the countershaft and the said third hub, and connections between said forks enabling said forks to be operated in unison.

4. A vehicle of the kind described comprising a frame, a fork swiveled on said frame at each side of the frontal portion thereof, a hub journaled in each of said forks, a hub journaled in the rear portion of the frame, a traction wheel secured eccentrically to each of said hubs, a driving mechanism carried by the frame, a countershaft having its ends articulated in flexible driving engagement with the said frontal hubs, power transmitting connections between the driving mechanism and the countershaft, and between the driving mechanism and the rear hub, a bell crank secured to each of said forks, and a cross rod whose ends are articulated with the said bell cranks.

5. A vehicle of the kind described comprising a frame, a fork swiveled on said frame at each side of the frontal portion thereof, a hub journaled in each of said forks and having an axial bore and opposed parallel longitudinal slots, a hub journaled at the rear portion of the frame, a traction wheel secured eccentrically to each of the said hubs, a driving shaft journaled on the frame, sprocket wheels hubbed thereon in side by side relation, their hubs being face to face, one being loose upon, and the other being secured to the said driving shaft, means to secure the loose hub to the fixed hub and at various adjusted positions with relation to a given fixed position of the driving shaft and its fixed hub, a sprocket wheel on the rear hub, a countershaft terminated at each end by a ball provided with a diametric pin whose projecting ends constitute heads, the said balls being engaged in the bores, and the said heads thereof being engaged in the opposed slots, of the said frontal hubs, a sprocket wheel secured to said countershaft, a sprocket chain belted over the fixed sprocket of the driving shaft and the sprocket of the countershaft, and a sprocket chain belted over the adjustable sprocket of the driving shaft and the sprocket of the said rear hub, and means operable to move the forks to and to retain them in varied angles inclined to the longitudinal axis of the vehicle.

6. A vehicle of the kind described comprising a frame, a fork swiveled on said frame at each side of the frontal portion thereof, a hub journaled in each of said forks and having an axial bore and having opposed parallel longitudinal slots, a hub journaled at the rear portion of the frame, a traction wheel secured eccentrically to each of the said hubs, a driving shaft journaled on the frame, sprocket wheels hubbed thereon in side by side relation, their hubs being face to face, one being loose upon, and the other being secured to the said driving shaft, means to secure the loose hub to the fixed hub and in various adjusted positions with relation to a given fixed position of the driving shaft and its fixed hub, a sprocket wheel on the rear hub, a countershaft terminated at each end by a ball provided with a diametric pin whose projecting ends constitute heads, the said balls being engaged in the bores, and the said heads thereof being engaged in the opposed slots, of the said frontal hubs, and the said countershaft being divided, coupling heads secured to the proximate ends of the sections of said countershaft, and which said coupling heads are interengaged, means to secure the coupling head of one section at a position shifted rotatively different from a given position of the coupling head of the other section, a sprocket wheel secured to one section of said countershaft, a sprocket chain belted over the fixed sprocket of the driving shaft and the sprocket of the countershaft, and a sprocket chain belted over the adjustable sprocket of the driving shaft and the sprocket of the said rear hub, and means operable to move the forks to varied angles inclined to the longitudinal axis of the vehicle.

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