

(No Model.)

3 Sheets—Sheet 1

G. G. J. MILLAR.
FOOT PROPELLED VEHICLE.

No. 577,826.

Patented Feb. 23, 1897.

Fig. 1.

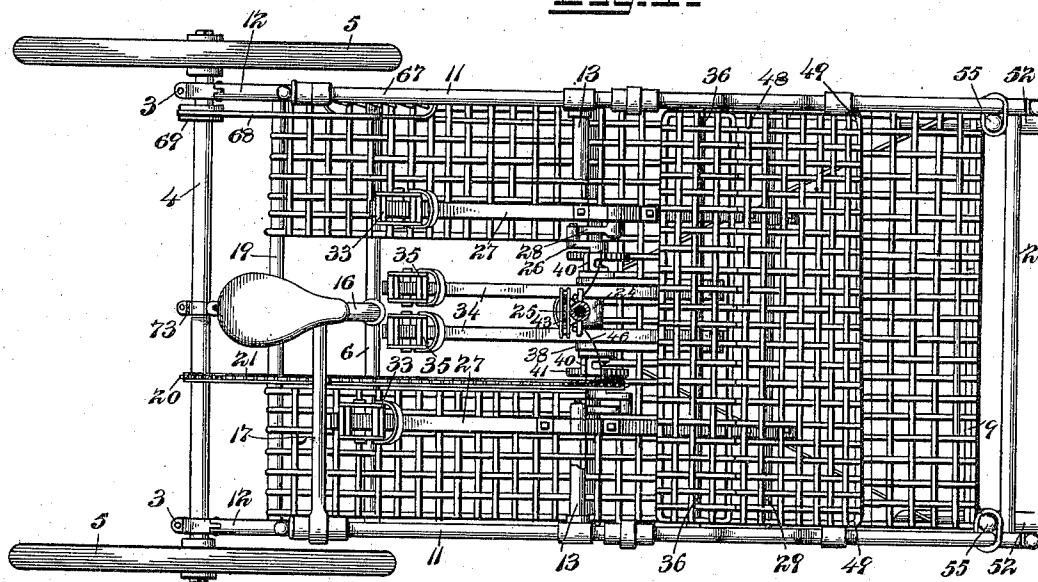


Fig. 2.

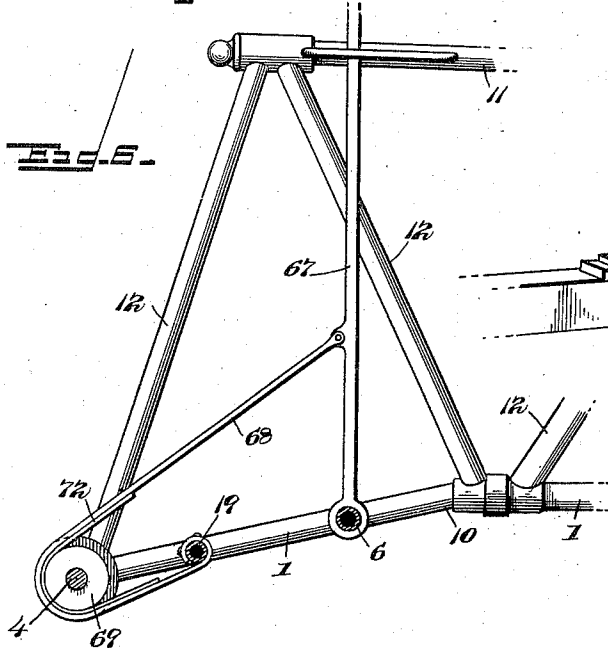
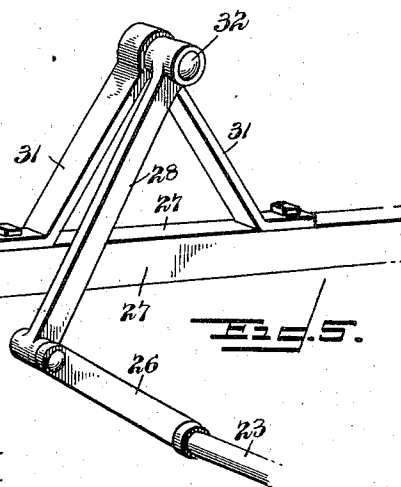


Fig. 3.



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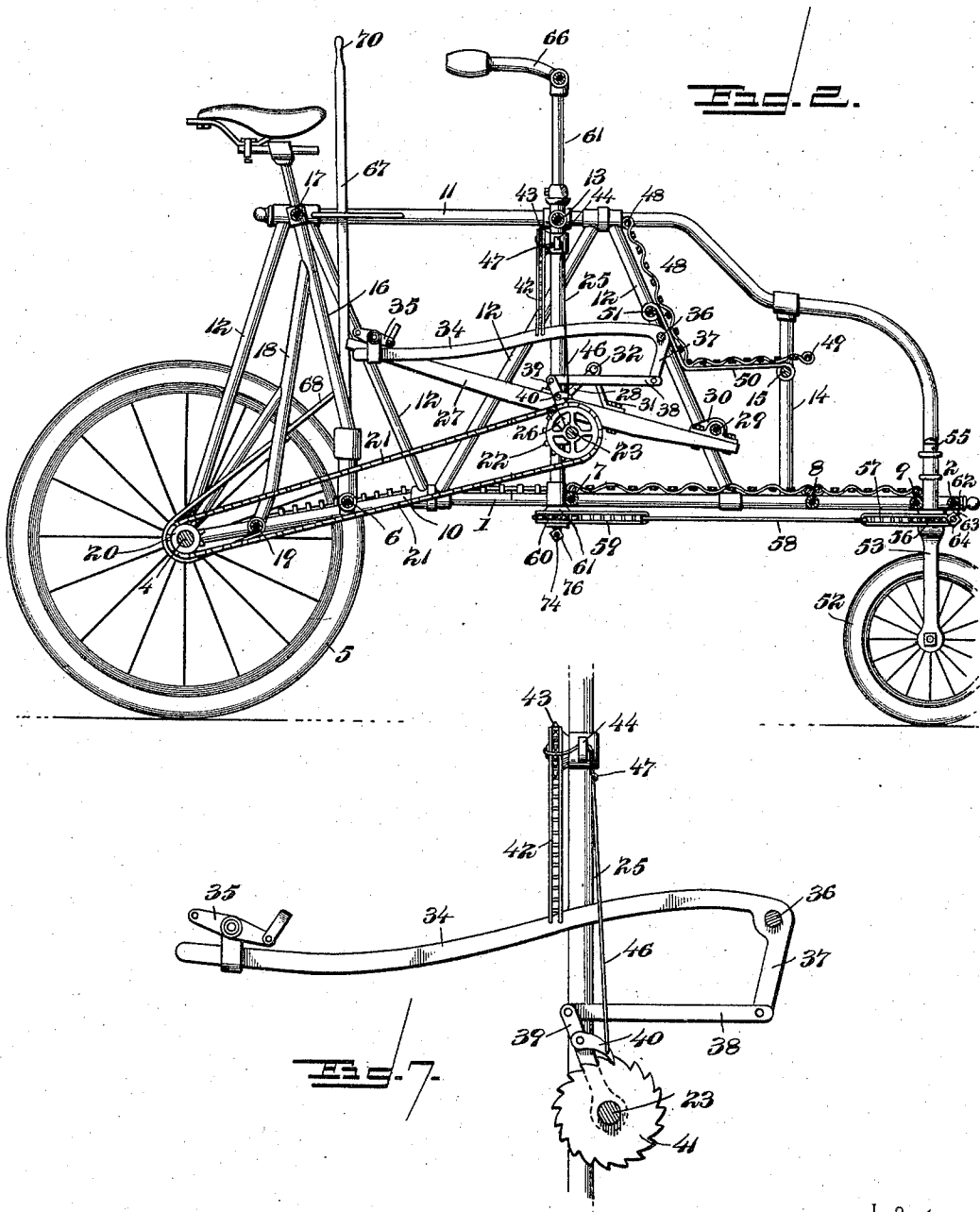
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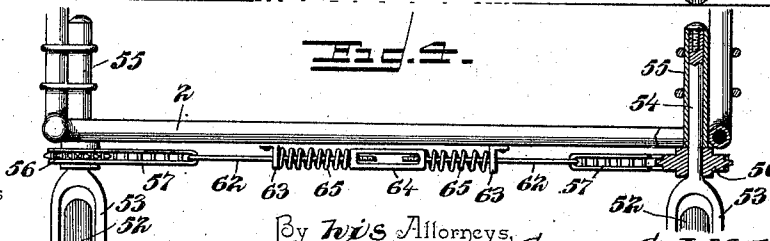
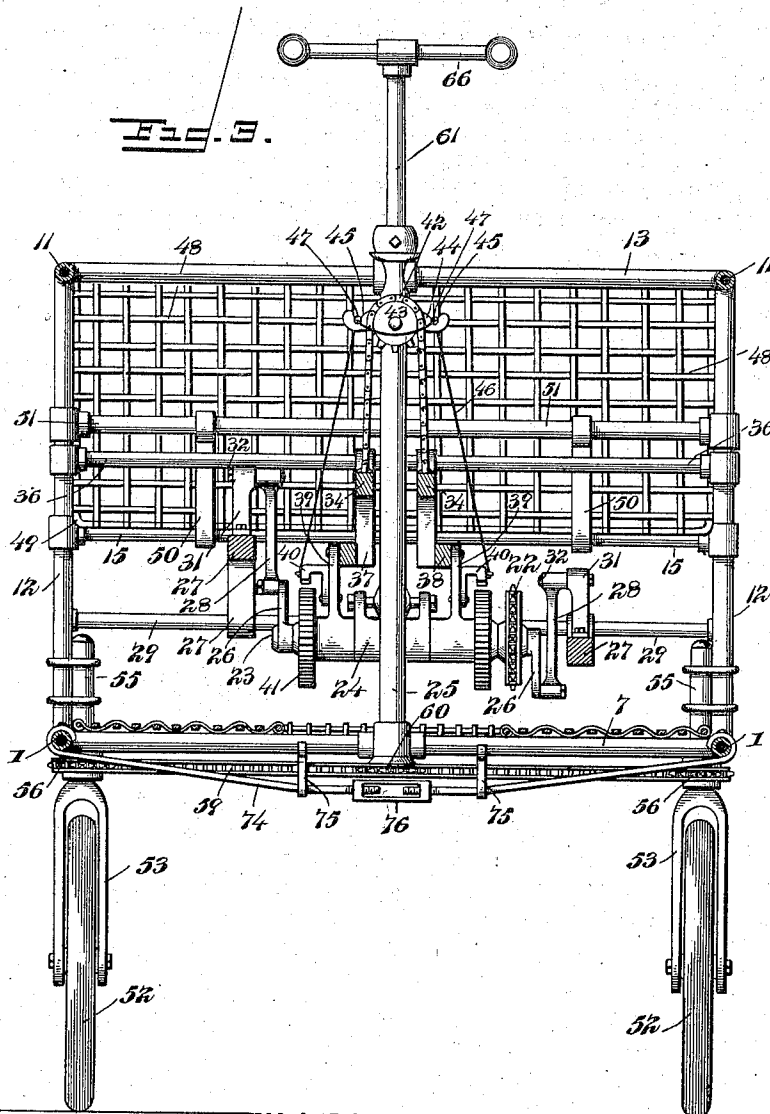
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UNITED STATES PATENT OFFICE.

GEORGE G. J. MILLAR, OF GROVEPORT, OHIO, ASSIGNOR OF ONE-HALF TO
LUKE G. BYRNE, OF COLUMBUS, OHIO.

FOOT-PROPELLED VEHICLE.

SPECIFICATION forming part of Letters Patent No. 577,826, dated February 23, 1897.

Application filed September 9, 1895. Serial No. 561,982. (No model.)

To all whom it may concern:

Be it known that I, GEORGE G. J. MILLAR, a citizen of the United States, residing at Groveport, in the county of Franklin and State of Ohio, have invented a new and useful Foot-Propelled Vehicle, of which the following is a specification.

This invention relates to that class of foot-propelled vehicles known as "polycycles," and is in the nature of an improvement on the vehicle shown and described in another pending application, Serial No. 547,267, filed by me April 26, 1895.

One object of the present invention is to provide a novel and superior construction of frame or body which is braced and strengthened by what is known as the "diamond" principle.

Another object is to provide a novel system of levers and driving mechanism whereby the machine is adapted as well for hill-climbing and propulsion over rough and uneven roads as for level and speedy riding.

A further object of the invention is to provide a simple, reliable, and efficient steering mechanism.

Other objects and advantages of the invention will appear in the course of the subjoined description.

The invention consists in certain novel features and details of construction and arrangement of parts, as hereinafter fully described, illustrated in the drawings, and finally embodied in the claims.

In the accompanying drawings, Figure 1 is a plan view of the improved vehicle complete. Fig. 2 is a longitudinal section through the same. Fig. 3 is a vertical transverse section through the machine. Fig. 4 is a detail front elevation, partly in section, showing a portion of the steering apparatus. Fig. 5 is an enlarged detail perspective view showing the connection between the speed-levers and the main sprocket-shaft. Fig. 6 is a detail longitudinal section enlarged, showing the brake mechanism. Fig. 7 is an enlarged detail side elevation showing one of the power-levers, its operative connection with the main sprocket-shaft, and its means of support.

Similar numerals of reference designate cor-

responding parts in the several figures of the drawings.

Referring to the accompanying drawings, the frame of the improved vehicle is constructed from steel tubing of the proper size and gage for obtaining the necessary strength and stiffness, and comprises a pair of lower horizontal bars 1, which are spaced apart a distance equal to the desired width of the finished machine and arranged in parallel relation. The bars 1 are connected at their front ends by a transverse horizontal bar 2 and at their rear ends are provided with anti-friction-bearings 3, in which is mounted the main driving-shaft 4, upon the opposite ends of which the main carrying-wheels 5 are rigidly secured. The parallel base-bars 1 are also connected at suitable intermediate points by means of transverse bars 6, 7, 8, and 9 for further stiffening and strengthening the lower horizontal portion or base of the complete frame. In order to give the desired elevation to the base-frame above described, the bars 1 are given a bend at the point 10 and inclined downwardly and rearwardly to the axle 4.

11 designates a pair of longitudinal bars arranged at a suitable distance above and in vertical alinement with the base-bar 1 and for the most part in parallel relation thereto, said bars 1 and 11 being connected and braced relatively to each other by means of reversely-inclining braces 12, the rear pair of which incline rearwardly and connect with the bearings 3 on the main driving-shaft 4, as shown. In this manner each side of the body or frame construction is in the form of a compound diamond frame, which affords strength and stiffness in a very high degree. The upper bars 11 are also connected with each other by means of an interposed transverse bar 13, and just in advance of such transverse bar the frame-bars 11 are deflected downwardly and given a compound bend and finally connected rigidly to the base-bars 1 at or near the advanced ends thereof, as shown. A pair of vertically-disposed braces 14 are interposed between the base-bars 1 and the forward curved portions of the upper bars 11, and these vertical braces are connected by a

transverse horizontal bar 15, which forms the support for the front edge of the passenger-seat.

16 represents the seat-post tube, the lower end of which connects with and is supported from the transverse bar 6 of the base-frame, the upper end thereof being provided with a seat-post socket which is connected with and braced relatively to one side of the body or frame constructed by means of a horizontally-disposed bar 17. Neither the seat-post socket nor tube 16 is connected with the opposite side of the frame, the object being to leave an open space upon that side of the socket for permitting the rider to enter the vehicle at the rear, pass to one side of the saddle and the seat-post socket and to the interior of the body construction preparatory to getting into the saddle. The seat-post socket is further braced by means of a downwardly and rearwardly inclining bar 18, connected to said socket at its upper end and to a transverse bar 19, interposed between and connecting the downwardly-inclining rear ends of the base-bars 1, as shown in Fig. 2. This completes the construction of the frame or body of the vehicle, and as the various bars and braces above referred to consist of thin steel tubing a very light and at the same time a very stiff and rigid frame is obtained which is capable of supporting the weight of the rider and in addition thereto the weight of two or more passengers.

Proceeding now to the description of the driving mechanism, 20 designates a sprocket-wheel which is secured to the revoluble driving-shaft 4, and from this sprocket-wheel a drive-chain 21 extends forward to and passes around the main driving-sprocket 22, fast on a short transverse shaft 23, revolubly mounted in a bearing-hanger 24, pivotally connected with and suspended from the vertically-disposed steering-post tube 25, arranged in proximal relation to the center of the machine, as shown. The steering-post tube 25 is rigidly connected at its lower extremity to the center of the transverse bars 7, above referred to, and also connects rigidly at its upper end with the upper transverse bar 13, also described hereinabove. The sprocket-shaft 23 has secured rigidly to each of its ends a crank 26, and these cranks are connected with the main driving or speed levers 27 by means of interposed pivotal links 28, thus enabling the levers 27 to be connected to the machine-frame by a stationary fulcrum, a transverse horizontal rod 29 constituting said fulcrum. The bar or rod 29 is interposed between the forward pair of inclined braces 12 and is secured thereto by means of a pair of clips or straps 30, which embrace the braces 12 in such manner as to permit of a sliding movement thereon and a consequent up and down adjustment of the fulcrum-bar 29. Thus the pivotal connection of the speed-levers 27 with the frame may be regulated to suit the rider's convenience, according as to whether he is tall

or short of stature. In order to dispose the levers 27 at a sufficiently low altitude, an inverted-V-shaped bracket 31 is secured to the upper edge of each of said levers, and this is formed at its apex with a bearing-eye for the reception of the bolt or pivot 32, which journals the upper extremity of the connecting link or bar 28, as shown in Figs. 3 and 5. This construction effects the lowering of the speed-levers 27 to a point which will bring the pedals 33 into the desired relation to the rider's feet. The driving mechanism above described permits the machine to be readily propelled either forward or backward, as may be desired, and is especially designed for use on level and smooth roads.

In order to provide for the propulsion of the vehicle over rough and uneven roads and up steep inclines, a pair of power-levers 34 is supplied, and these are arranged in a higher plane than the speed-levers 27, and also arranged in closer proximity to the steering-post tube 25, so as to operate between the speed-levers 27. The levers 34 have pedals 35 at their rear ends, and are fulcrumed at their advance ends upon a transverse horizontal rod 36, connecting the forward pair of inclined braces 12. The levers 34 are also formed adjacent to their fulcrums with downward extensions 37, from which horizontally-disposed connecting rods or bars 38 extend rearwardly and connect pivotally to the upper extremities of levers 39, journaled upon the main sprocket-shaft 23 or upon the bearing-sleeve in which said shaft revolves. Each of the levers 39 carries a gravity-pawl 40, which engages a ratchet-disk 41, secured fast on the main sprocket-shaft 23. When the levers 34 are depressed, the horizontally-disposed rods or bars 38 are drawn forward, thus rocking the levers 39 and causing the pawls 40 thereon to actuate the ratchet-disks 41 and rotate the shaft 23 in a direction which will propel the machine forward, and the parts just referred to are so proportioned and fulcrumed that greatly-increased power will be afforded thereby, in the propulsion of the vehicle, as compared with the speed-levers 27. The levers 34 are supported in advance of their fulcrums by means of a chain 42, which is attached at its opposite extremities to said levers and passes over a sprocket-wheel 43, journaled on a stud on the steering-post tube. As one of the levers 34 is depressed the other lever is correspondingly elevated by the chain 42.

44 designates a cross-head secured to the steering-post tube and projecting laterally upon each side thereof, said cross-head being provided with notches 45 for the reception of a flexible cord 46, the opposite extremities of which are attached to the pawls 40, above referred to, and the central portion of which passes around the tube 25, where it is within reach of the rider. The cord 46 is also provided at suitable points with knots 47, which are adapted to engage behind the notches 45

of the cross-head and serve as stops for upholding the pawls 40 out of engagement with their respective ratchet-wheels 41 for throwing the power-levers out of gear with the main sprocket-shaft. When traveling over smooth and level roads, the pawls 40 are thrown out of engagement with the ratchet-wheels 41, after which the chain 42 may be lifted off the sprocket-wheel 43 and lowered until the power-levers 34 rest upon the floor of the vehicle, where they will be out of the way and not interfere with the proper working of the speed-levers 27.

48 designates the passenger's seat, which is preferably formed from any suitable meshed fabric or wicker work, the opposite side edges thereof being reinforced and held in proper shape by means of angular formers 49, and the central portion thereof being supported by means of two or more angular straps 50, which at their forward ends embrace the transverse horizontal bar 15 and at their rear ends are hooked over a transverse bar 51, connecting the forward pair of inclined braces 12. The width of this seat corresponds to the width of the frame or body construction, and by reason of the particular manner in which the same is supported it is capable of accommodating two passengers. The base-frame of the vehicle is also covered with similar meshed or woven fabric from the front edge of said frame as far back as the steering-post tube, and at this point such fabric is divided and extends rearwardly upon each side of the center of the machine, reaching to and connecting with the transverse connecting-bar 19, above described. This fabric forms a light and durable flooring for the vehicle, and by extending the same rearwardly, as described, ample room is also provided for carrying packages, &c.

The vehicle is supported at its front end upon two caster-wheels 52, one beneath each forward corner of the frame. These wheels 52 are journaled in forks 53, and the upright spindle portions 54 of said forks are in turn journaled in a pair of vertically-disposed sleeves 55, secured in any convenient manner to the machine-frame.

Secured fixedly upon the upright spindle portion of each of the forks 53 is a sprocket-wheel 56, around which passes a section of sprocket-chain 57, from which draft-rods 58 converge rearwardly and connect with a similar section of sprocket-chain 59, passing around a sprocket-wheel 60, fast on the lower extremity of the steering-post or handle-bar stem 61, as shown in Figs. 2 and 3. The other ends of the chain-sections 57 connect with draft-rods 62, which extend transversely of the machine toward each other, passing through pendent guiding-brackets 63, and threaded at their extremities, where they are engaged by a turnbuckle 64.

65 designates a pair of springs arranged upon opposite sides of the turnbuckle 64 and interposed between the same and the pendent

brackets 63 referred to. The turnbuckle 64 provides for taking up any slack in the flexible chain-and-rod device, and the springs 65 serve to keep the guiding caster-wheels 52 in proper alinement for directing the course of the machine in a straight line.

The sprocket-wheel 60 on the lower end of the handle-bar stem 61 is made larger than the sprockets 56 on the fork-stems 54, so that a slight movement of the handle-bar 66 will swing the guiding-wheels to the desired angle.

The brake mechanism comprises a vertically-disposed brake-lever 67, fulcrumed at its lower end on the transverse frame-bar 6. A strap 68 connects with said brake-lever and passes around a pulley or drum 69, fast on the main driving-shaft 4, and thence forward, where it connects with the transverse bar 19 of the base-frame. By grasping the handle 70 of said brake-lever and thrusting the same forward the strap 68 will bind against the drum 69 and impede the rotation of the driving-shaft 4 in a manner that will be readily understood. The strap 68 is preferably made from steel and has upon its inner surface a reinforcing-strip 72, of rubber or leather or similar material, the same constituting a wearing or friction shoe, which binds directly against the drum 69 and which may be removed when worn and replaced.

In order to prevent the springing of the main driving-shaft 4, an additional bearing 73 is arranged near the center of said shaft, from which a tubular brace inclines upwardly and forwardly and connects with the brace 18 of the seat-post socket or any other convenient point of the frame. Truss-rods 74 may also be employed for stiffening the lower or base portion of the frame, in which case such rods are arranged beneath the transverse frame-bars and suitable struts 75 interposed between the latter and the trusses, the inner adjacent ends of the latter being provided with right and left hand screw-threads and adjustably connected by means of turnbuckles 76.

From the foregoing description it will be apparent that a very simple, durable, and convenient vehicle is obtained in which two different and independent driving means are employed, one for propelling the vehicle over smooth and level roads and the other for propelling the same over rough and uneven roads and up steep inclines. The particular arrangement of steering apparatus described permits the placing of a steering caster-wheel beneath each of the forward corners of the machine-frame, which, together with a similar arrangement of the driving-wheels at the rear of the machine, serves to support the vehicle equally at all points.

It will also be seen that each side of the frame comprises a compound diamond frame, which affords greatly-increased strength and stiffness to the body construction.

It will be apparent that changes in the form, proportion, and minor details of construction

may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In a foot-propelled vehicle, a frame of substantially rectangular form comprising spaced lower longitudinal bars connected by cross tie-braces, elevated longitudinal bars located above the said lower longitudinal bars and connected thereto by suitable bracing, a seat-post tube arranged centrally between the said longitudinal bars and having its upper end arranged in about the same horizontal plane with the elevated frame-bars, a rigid and substantially horizontal brace extending from one of the upper bars to the top of the seat-post tube, the axle journaled in the lower portion of the frame, and a brace connected at one end to the seat-post tube and inclining rearward and downward and provided at its opposite end with a bearing for said axle, all combined and arranged substantially as described.

2. In a foot-propelled vehicle, the combination with the substantially rectangular and horizontal base-frame, and the side frames comprising the upper and lower substantially parallel bars braced and connected as described, of a seat-post tube arranged about in the longitudinal center of the frame, a seat-post socket at the upper end of said tube, and a rigid and substantially horizontal brace extending from said socket to one of the side frames, the space between said seat-post socket and the other side of the frame being left unobstructed, substantially as and for the purpose described.

3. In a foot-propelled vehicle, the combination with the substantially rectangular and horizontal base-frame, of the transverse axle having ground-wheels at its ends and on opposite sides of the base-frame, the bearings at or near each end of the axle, a supplemental bearing located intermediate the ends of said axle in proximity to the sprocket-wheel, and a brace connected at one end to said bearing and extending thence toward the seat-post tube to which it is rigidly related, whereby the weight of the load is distributed at inter-

vals along the axle and the latter is prevented from springing intermediate its ends, substantially as described.

4. In a foot-propelled vehicle, the combination with a substantially rectangular and horizontal base-frame, of a pair of steering-wheels arranged beneath the opposite corners of said frame and journaled in forks thereunder, a sprocket-wheel fast on each fork, the handle-bar stem having a sprocket-wheel fast thereon, a chain extending around all of said sprocket-wheels, the rods at the ends of the chain forming extensions thereof, and a turnbuckle connecting the adjacent ends of said rods, substantially as and for the purpose described.

5. In a foot-propelled vehicle, the combination with the frame or body thereof, of a vertically-disposed handle-bar stem, a sprocket-wheel thereon, steering-wheels arranged beneath the opposite forward corners of said body or frame, the vertically-disposed forks in which said wheels are mounted, the sprocket-wheels fast on said forks, a section of sprocket-chain passing partially around each of said sprocket-wheels, draft-rods interposed between and connecting said chain-sections, a turnbuckle interposed between and connecting the threaded inner ends of two of said draft-rods, and a pair of springs arranged on opposite sides of said turnbuckle and interposed between the same and suitable fixed brackets or stops, substantially as and for the purpose set forth.

6. In a foot-propelled vehicle, the combination with the driving-shaft, of a ratchet-wheel fast thereon, a lever and pawl for imparting motion thereto, and a suspension-cord connected to said pawl and provided with a stop whereby it may be engaged with the machine-frame for the purpose of holding the pawl out of engagement with the ratchet-wheel, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

GEORGE G. J. MILLAR.

Witnesses:

LUKE G. BYRNE,
W. H. ENGLISH.